International Society for Applied Ethology

ISAE 2022

Proceedings of the 55th Congress of the ISAE

Animal Behaviour and Beyond

Edited by:
Miroslav Kjosevski
Susanne Waiblinger
Vlatko Ilieski

55TH Congress ISAE 2022 4-8 September, Ohrid

ISAE 2022

Proceedings of the

55th Congress of the ISAE

Animal Behaviour and Beyond

Edited by:
Miroslav Kjosevski
Susanne Waiblinger
Vlatko Ilieski

Applied ethology 2022

Animal Behaviour and Beyond

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned. Nothing from this publication may be translated, reproduced, stored in a computerised system or published in any form or in any manner, including electronic, mechanical, reprographic or photographic, without prior written permission from the publisher.

Publisher:
MVI ILGEN – Educational center "Sireda"

The individual contributions in this publication and any liabilities arising from them remain the responsibility of the authors.

Printed by:
STV Prizma Skopje, Macedonia

Published:
August 2022

Welcome

It is our great pleasure to welcome you to the 55th Congress of the International Society for Applied Ethology (ISAE) in Ohrid. After more than three years of physical distance due to the COVID-19 pandemic ISAE is back again, albeit slightly modified. The feeling is great to see you in person. The pandemic is still present and we all learned to fully exploit the virtual meetings, it had affected the congress as well, making it the first ISAE congress in a hybrid format. This format enables the researchers from all over the world to participate at this event regardless of the obstacles they had to be present in-person.

Ohrid, with its beauty and rich history has always been a center of education. It is the place of the first Slavic University founded in the IXth century, which was also the oldest university in Europe. Hence, spreading new knowledge, new challenges and ways of thinking is so typical of Ohrid. This is the context of this congress as well. For the first time the ISAE congress is organized in this region, and gathering the best world scientists and students in the field of animal behavior should have great impact on promoting the animal behavior and welfare, moreover expand the presence of the ISAE organization in the western Balkans.

The main congress theme of the ISAE 2022 is Animal Behaviour and Beyond. The infinite cycle of interdisciplinarity continues, and as the multiple disciplines contribute to understanding animal behaviour, likewise the knowledge of animal behaviour is applied in even more disciplines and practices. Today, we cannot imagine any type of management and care for companion animals, farm animals, wild animals, and animals used in research and teaching, without taking into account the knowledge about their behaviour. This goes even further: animal behaviour is a crucial part in understanding the interspecies relationships, including Homo sapiens. Thus, knowledge of animal behaviour is important in establishing the ethical and moral values, in societies, economy, public health and food safety, in applied technology and animal protection, as well as in understanding the holistic concepts and processes, such as climate change or One Health. Therefore, the 55th ISAE Congress is about seeing ANIMAL BEHAVIOUR in each corner of science and BEYOND, in any aspect of the modern life.

The Congress theme is also reflected on the congress logo, which represents a stylized display of the fresco of St. Naum, one of the teachers and founders of the first Slavic University. According to the legend, one of the miracles of St. Naum was that he helped a farmer to finish the work on his land by putting the wild bear, which had eaten one of his oxes, to safely yoke to the plow, right next to the other oxen. So, the ploughman tilled the field with the ox and the bear yoked next to each other. This story and the congress logo are illustrating the potential of a holistic approach and its impact through the interactions among humans, animals and the environment. So, human-animal-environment relations are evident, probably not on purpose, even in the fresco from the 18th Century in the Chapel of the Church of St. Naum near the tomb of the saint. These threads will continue and highlight the whole Congress. Beginning with the Wood Gush memorial speaker and the work of David Wood-Gush (marking 100 years since his birth and 30 years from his death) in the scientific topics of the oral and poster presentations, and continuing outside the congress, by the Ohrid Lake, in the town of Ohrid and his very ancient history. You just need to open your senses and minds.

It is an honor hosting you on the shore of Ohrid Lake, a UNESCO protected natural world heritage and we hope that you will enjoy in every moment and have a beautiful and unforgettable memories from the 55th ISAE Congress in Ohrid, Macedonia.

Vlatko Ilieski and Miroslav Kjosevski

Acknoweldgement

Local Organizing Committee

Vlatko Ilieski (chair) and Miroslav Kjosevski (Faculty of veterinary medicine – Skopje, University Ss. Cyril and Methodius – Skopje, Macedonia); Sokol Duro (Faculty of Veterinary Medicine, Agricultural University of Tirana, Tirana, Albania); Marijana Vučinić and Katarina M. Nenadović (Faculty of Veterinary Medicine, University of Belgrade, Belgrade, Serbia); Mirjana Đukić Stojčić (Faculty of Agriculture, University of Novi Sad, Novi Sad, Serbia); Skender Muji (University of Prishtina "Hasan Prishtina", Prishtina, Kosovo); Mario Ostović and Tomislav Mikuš (Faculty of Veterinary Medicine, University of Zagreb, Zagreb, Croatia) Evangelia N. Sossidou (Veterinary Research Institute, Ellinikos Georgikos Organismos-Dimitra, Thessaloniki, Greece);

Congress Scientific Committee

Susanne Waiblinger (chair), (University of Veterinary Medicine Vienna); Vlatko Ilieski and Miroslav Kjosevski (Faculty of Veterinary Medicine-Skopje); Gudrun Ilman and Radka Sarova (Institute of Animal Science, Prague); Christoph Winckler and Christine Leeb (University of Natural Resources and Life Sciences-BOKU, Vienna); Marijana Vučinić (Faculty of Veterinary Medicine, University of Belgrade); Mirjana Đ. Stojčić (Faculty of Agriculture, University of Novi Sad)

ISAE Ethics Committee

Alexandra Whittaker (Chair), Cecilie Mejdell, Elize van Vollenhoven, Beth Ventura, Ellen Williams, Inès de Freslon, Faye Tahamtani

Student Poster Competition chairs

Susanne Waiblinger, Charlotte Goursot, Rachel Caddiell and Saskia Kliphuis

Student helpers

Ena Dobrikj, Viktor Denkovski, Edi Xhafa, Ivana Sabolek, Tamara Tankovska, Irem Ademovich, Marko Zahariev, Magdalena Gavrilovska, Meri Acevska, Damjan Petreski

Web designer

Ivo Iloski

Administrative congress organizer

MVI ILGEN – Educational center "Sireda"

Technical Organizers

Zebra Production (www.zebraproduction.net)
Infomedia (www. infomedia.mk)

Referees

Adroaldo José Zanella
Agnieszka Sergiel
Alison Hanlon
Alistair Lawrence
Amy Robinson-Junker
Anna Olsson
Anna Valros
Bas Rodenburg
Birte Nielsen
Bjorn Forkman
Brianna Gaskill
Cassandra Tucker
Cathy Dwyer
Christian Nawroth
Christine Leeb
Christine Nicol
Christoph Winckler
Eberhard von Borell
Edna Hillmann
Elisabetta Canali
Emma Fabrega
Fabio Napolitano
Gudrun Illmann
Hanno Würbel
Hans Spoolder
Ines Windschnurer
Irene Camerlink
Jan Langbein
Janne Winther Christensen
Jean-Loup Rault
Jens Malmkvist
Jeremy Marchant-Forde
Karen Thodberg
Katarina Nenadović
Laura Boyle
Laura Hänninen
Lena Lidfors
Lorenz Gygax
Madan Lal Kamboj
Margit Bak Jensen
Maria José Hötzel
Maria Vilain Rørvang
Marie Haskell
Marijana Vučinić
Marina von Keyserlingk
Mario Ostović
Mette Herskin
Michael Appleby
Michael Toscano
Mirjana Dj. Stojchic
Miroslav Kjosevski
Moira Harris
Pawan Singh
Radka Sarova
Rebeca Garcia Pinillos
Ruth Newberry
Sandra Edwards
Sara Hintze
Silvana Mattiello
Simon Turner
Stephanie Lürzel
Susanne Waiblinger
Suzanne Millman
Tomislav Mikus
Ute Knierim
Victoria Sandilands
Vijay Pal Singh
Vlatko Ilieski
Xavier Boivin
Xavier Manteca

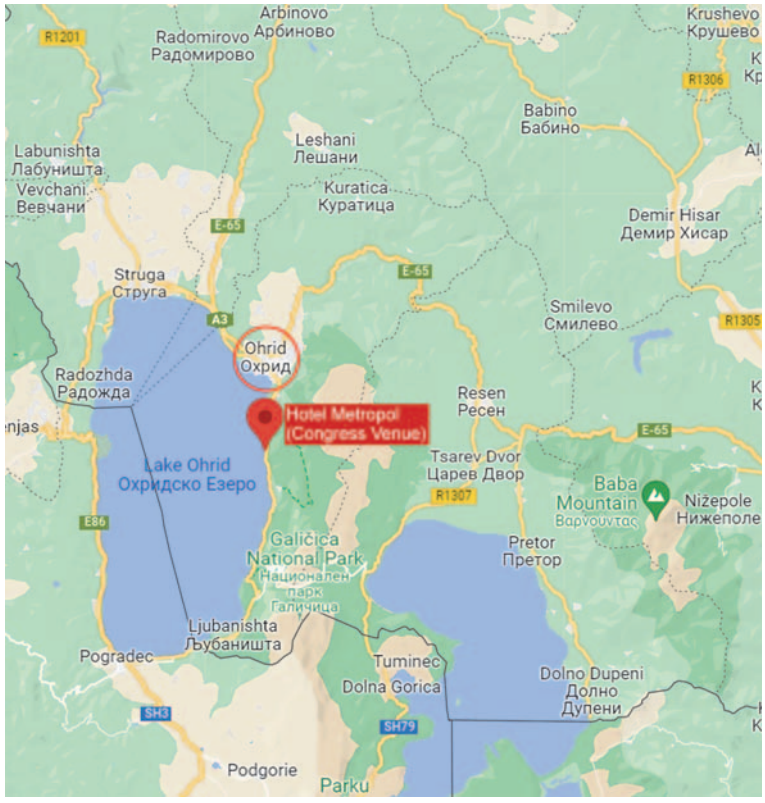
Sponsors

HUMANE SOCIETY
INTERNATIONAL

FACULTAS MEDICINAE VETERINARIAE
SKOPJE

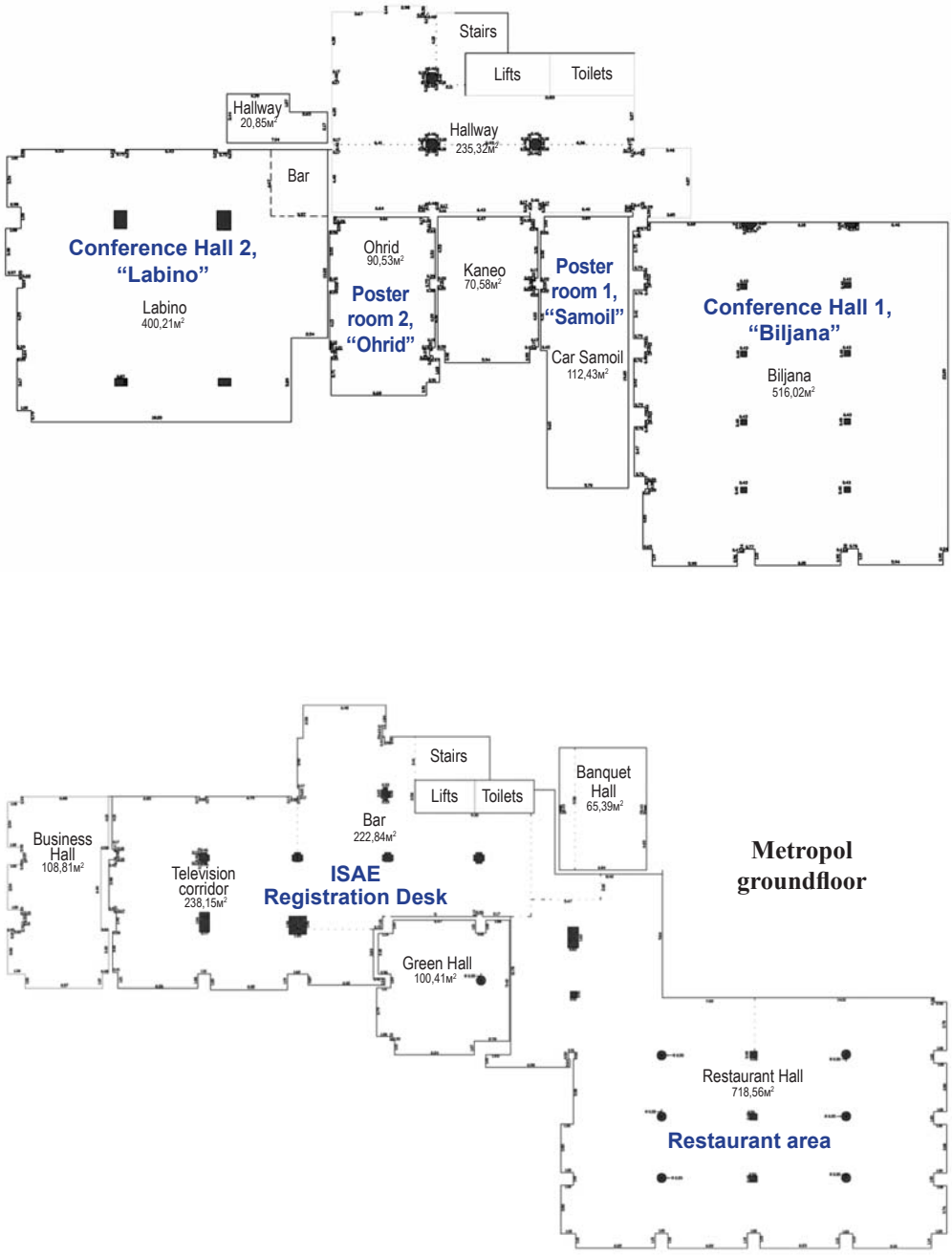
МЛЕКАРА
ЗДРАВЈЕ
РАДОВО

Maps


Arbinovo
Арбиново
Radomirovo
Радомирово
R1201
Krushevo
Крушево
R1306
Babino
Бабино
Leshani
Лешани
Labunishta
Лабуништа
Vevchani
Вевчани
Kuratica
Куратица
E-65
Demir Hisar
Демир Хисар
Struga
Струга
Smilevo
Смилево
R1305
A3
Ohrid
Охрид
Radozhda
Радожда
Hotel Metropol
(Congress Venue)
Resen
Ресен
Lake Ohrid
Охридско Езеро
Tsarev Dvor
Царев Двор
R1307
Baba
Mountain
Варвоунтас
Nižepole
Нижеполе
E86
Galičica
National Park
Национален
парк
Галичица
Pretor
Претор
Ljubanishta
Љубаништа
Pogradec
Tuminec
Dolna Gorica
Dolno Dupeni
Долно
Дупени
SH3
SH79
Podgorie
Parku

Hotel Metropol
Hotel Belvi

Congress facilities at the Hotel Metropol



General Information

Congress Venue
The Congress will be held at the Hotel Metropol, Dolno Konjsko bb, 6000 Ohrid, Macedonia, phone: 389 46 203 001, e-mail: sales@metropol-ohrid.com.mk

Official language
English is the official language of the ISAE 2022 Congress.

Registration desk
The registration desk will be located at the entrance of the Hotel at the ground floor. The ISAE registration desk will be marked with the logo of the congress.

Opening hours of the registration desk:

Sunday (04.09.2022) from	13:00 h – 19:00 h
Monday (05.09.2022) from	08:30 h – 20:00 h
Tuesday (06.09.2022) from	08:30 h – 20:00 h
Wednesday (07.09.2022) from	08:30 h – 20:00 h
Thursday (08.09.2022) from	09:00-13:00 h

Congress rooms:

Plenary talks and oral presentations:
Conference Hall 1 “Biljana”
Conference Hall 2 “Labino”

Poster presentations:
Poster room 1 “Car Samoil”
Poster room 2 “Ohrid”

Social events at the hotel:
Welcome Cocktail – Hotel Metropol Terrace
Gala Dinner – Hotel Bellevue

Name badges & Tickets
Name badges are required for admittance to the Congress sessions, coffee breaks, lunches, welcome cocktail, gala dinner. Badges will be handed out at the Registration desk, along with tickets issued for all separately-priced social events.

Hybrid format
The 55 ISAE Conference will be held in a hybrid format. This means that all registered participants will have the opportunity to be present virtually at the congress. The access details are directly sent to the registered participants.

Internet Accees
Free high-speed, wireless Internet is available throughout the hotel.

Coffee breaks
Tea, coffee, and refreshments will be served at the Terrace by the Poster rooms.

Lunches
Lunches will be held in the hotel restaurant. Please wear your badge.

Parking
The hotel is having its own parking and it will be free of charge for the registered participants.

Local transport
For travelling to and from the Congress venue during the Congress the participants can use the organized transport from the Congress each day after the working program ends and also there will be a local taxi available at any time. All information will be available at congress desks.

Social Events

Welcome Cocktail, Sunday (04.09.2022)

Welcome cocktail with a music program will be held at the Hotel Metropol terrace where the congress venue is.

Wine/Cheese tasting, Monday (05.09.2022)

Pairing Macedonian wines and local cheeses while enjoying the view of Ohrid Lake.

Ohrid City Tour, Tuesday (06.09.2022)

Within two hours you will witness thousands years of history, culture, architecture and knowledge imprinted in the natural beauty of the surroundings.

National Dinner – Ohrid Old Town, Tuesday (06.09.2022)

Tasting local traditional food at the National restaurant near one of the oldest church in the city.

Galla Diner – Hotel Bellevue, Wednesday (07.09.2022)

Gala Dinner at the last night of the Congress will be held in the Hotel Bellevue accompanied with Macedonian traditional music and dances. The farewell party will continue at the Disco club.

Lunch/Music performance in Saint Naum –Thursday (08.09.2022)

After the closing ceremony of the Congress the lunch will be held at the restaurant set in the springs of the river Crn Drim and near the St. Naum Monastery.

Boat tour from Saint Naum to Ohrid –Thursday (08.09.2022)

The boat tour after the lunch in St. Naum will enable you to enjoy the stunning beauty of the Ohrid Lake coast.

Program at a Glance

September 04 2022 (Sunday)	
13:00 – 19:00	Registration
09:00 – 17:00	DCCAF pre-congress workshop on Farm Animal welfare
09:00 – 16:00	Council Meeting
19:00 – 22:30	Welcome cocktail with a music program
September 05 2022 (Monday)	
09:00 – 09:15	Opening ceremony
09:15 – 09:35	David Wood-Gush – Life and Impact on Applied Animal Behaviour Science
09:35 – 10:35	Wood-Gush-Memorial Lecture
10:35 – 11:00	**Coffee break**
11:00 – 12:30	Conference Hall 1, "Biljana" – Dog behaviour, cognition and interactions with humans Conference Hall 2, "Labino" – Animal Behaviour in response to on-farm management procedures
12:30 – 13:30	**Lunch**
13:30 – 15:30	Conference Hall 1, "Biljana" – Human-animal interactions Conference Hall 2, "Labino" – Animal Behaviour in response to on-farm management procedures
15:30 – 16:45	**Coffee break & Posters** Poster presentations 1-24, Poster room 1 Poster presentations 25-39, Poster room 2
16:45 – 18:45	**Workshops** Conference Hall 1, "Biljana":Teaching applied ethology and animal welfare: How to build a community of practice Conference Hall 2, "Labino":Developing Standards for the Management and Welfare of Elephants in Human Care to facilitate positive Human – Elephant interactions
20:00	**Wine/Cheese tasting – Ohrid City**
September 06 2022 (Tuesday)	
09:00 -09:40	**Plenary Talk** Conference Hall 1, "Biljana" – PLF and Measuring behaviour and welfare
09:45 -10:45	Conference Hall 1, "Biljana" – PLF and Measuring behaviour and welfare Conference Hall 2, "Labino" – Behaviour and welfare of indigenous breeds and in extensive production systems (1)

10:45 – 11:15	**Coffee break & Posters**
	Poster presentations 40-49, Poster room 1
	Poster presentations 59-67, Poster room 2
11:15 – 12:45	Conference Hall 1, "Biljana"– PLF and Measuring behaviour and welfare in cattle
	Conference Hall 2, "Labino" – Behaviour and welfare of indigenous breeds and in extensive production systems (1)
12:45 – 13:45	**Lunch**
13:45 – 15:15	Conference Hall 1, "Biljana" – PLF and Measuring behaviour and welfare in Poultry and Pigs
	Conference Hall 2, "Labino" – Environmental effects on behaviour and welfare
15:15 – 15:45	**Coffee break & Posters**
	Poster presentations 50-58, Poster room 1
	Poster presentations 68-78, Poster room 2
15:45 – 17:15	Conference Hall 1, "Biljana" – Free topics – Motivation, cognition and emotion
	Conference Hall 2, "Labino" – Environmental effects on behaviour and welfare (continued)
17:00 – 17:15	**Coffee break**
17:15 – 18:00	**Workshops**
	The present and the future of the ECAWBM
	The OIE Platform on Animal Welfare for Europe
18:00	**Touristic tour Ohrid**
20:00	**National Dinner – Ohrid Old Town**
September 07 2022 (Wednesday)	
09:00 – 09:40	**Plenary Talk** - Conference Hall 1, "Biljana" – Positive animal welfare
09:45 – 10:45	Conference Hall 1, "Biljana" – Positive animal welfare (1)
	Conference Hall 2, "Labino" – Genetics and breeding for improved animal welfare
10:45 – 11:15	**Coffee break & Posters**
	Poster presentations 79-95, Poster room 1
	Poster presentations 110-114, Poster room 2
11:15 – 13:00	Conference Hall 1, "Biljana" – Positive animal welfare (continued)
	Conference Hall 2, "Labino" – Behavioural development in poultry

13:00 – 14:00	**Lunch**
14:00 – 14:40	**Plenary Talk**- Conference Hall 1, "Biljana" – Positive animal welfare
14:45 – 15:30	Conference Hall 1, "Biljana" – Positive animal welfare (2) Conference Hall 2, "Labino" – Abnormal and damaging behaviour
15:30 – 16:00	**Coffee break & Posters** Poster presentations 96-109, Poster room 1 Poster presentations 115-125, Poster room 2
16:00 – 17:15	Conference Hall 1, "Biljana" – Free topics Conference Hall 2, "Labino" – Abnormal and damaging behaviour
17:15 – 17:30	**Coffee break**
17:30 – 18:30	**AGM**
20:00	**Galla Diner and Night club (optional)**
September 08 2022 (Thursday)	
09:00 – 09:40	**Plenary Talk -** Conference Hall 1, "Biljana"
09:45 – 11:15	Conference Hall 1, "Biljana" – JOINT ISAE – EAAP Session – Behaviour of farm animals and how to measure it Conference Hall 2, "Labino" – Abnormal and damaging behaviour
11:15 – 11:30	**Coffee break**
11:30 – 12:15	**Closing Ceremony Announcements of awards**
13:00 – 15:30	**Lunch/Music performance in Saint Naum**
15:30 – 17:00	**Boat tour from Saint Naum to Ohrid (optional)**

ISAE 2022 FULL PROGRAM

September 04 2022 (Sunday)

13:00 – 19:00	Registration
09:00 – 17:00	DCCAF pre-congress workshop on Farm Animal welfare
09:00 – 16:00	Council Meeting
19:00 – 22:30	Welcome cocktail with a music program

September 05 2022 (Monday)

09:00 – 09:15	Opening ceremony	
09:15 – 09:35	*Chair: Birte Nielsen* **David Wood-Gush – Life and Impact on Applied Animal Behaviour Science** – *Alistair Lawrence*	
09:35 – 10:35	**Wood-Gush-Memorial Lecture**: **Wolf-dog differences: It is not that simple!** – *Friederike Range*	
10:35 – 11:00	Coffee break	
	Oral presentations in parallel sessions	
	Conference Hall 1, "Biljana" – Dog behaviour, cognition and interactions with humans, *Chair: Björn Forkman*	**Conference Hall 2, "Labino" – Animal Behaviour in response to on-farm management procedures**, *Chair: Suzanne Millman*
11:00 – 12:30	Non-offspring nursing in free-ranging domestic dogs (Canis familiarise) – *Sunil Kumar Pal*	On-farm administration of local anaesthetic and surgical castration of piglets: acute behavioural and physiological consequences – *Mathilde Coutant*
	The effect of dam fear and stress on puppy welfare in commercial-breeding kennels – *Aynsley Romaniuk*	The influence of procaine hydrochloride plus meloxicam on the behaviour, feed intake and weight gain of dairy calves following hot-iron disbudding – *Nnenna Ugwu*
	Effect of positive human interaction on attention bias and affective states of commercial breeding dogs – *Uri Baqueiro Espinosa*	Behavioural changes in the first 3 weeks after disbudding in dairy calves – *Sarah Adcock*
	Dog breed differences in reactions to a disgruntled stranger partially support veterinarian's distinct pain sensitivity ratings – *Rachel M.P. Caddiell*	Evidence of social buffering benefits to castration stress in beef calves housed with familiar pen-mates – *Caleb Brezina*
	Humans' mask wearing has limited effect on family dogs' behaviour in standard test situations – *Anna Kis*	The impact of clamp castration on the behavior and body temperature of reindeer (Rangifer tarandus tarandus) – effects of local anesthesia and non-steroidal anti-inflammatory drug – *Hanna Nurmi*
	POSTER Presentations: Human-animal interactions, *Poster 1-12*	*POSTER Presentations: Animal Behaviour in response to on-farm management procedures*, *Poster 25-3*1

12:30 – 13:30	Lunch	
	Oral presentations in parallel sessions	
	Conference Hall 1, "Biljana" – Human-animal interactions, *Chair: Xavier Boivin*	**Conference Hall 2, "Labino" – Animal Behaviour in response to on-farm management procedures**, *Chair: Ruth Newberry*
13:30 – 15:30	Perception of human directed aggressive behaviour of dogs in English versus Japanese language dog owners – *Mie Kikuchi*	Previous experience in the restraining chute affects chute score of beef cattle – *Ruan Daros*
	Factors associated with owner-perceived behaviour problems in dogs enrolled in a longitudinal study: Are training methods important? – *Sara Owczarczak-Garstecka*	Long-term effects of early maternal deprivation on goat social behaviour and stress coping abilities – *Claire Toinon*
	Can owners recognise their dog's welfare state? Novel insights from a "Smart Collar" – *Carmen Glanville*	Hunger affects cognitive performance of dairy calves – *Benjamin Lecorps*
	Country of origin influences management practices and attitudes towards triplet-born lambs – *Cathrine Erichsen*	Cross-fostering impacts suckling activity of fostered piglets, but not residents – *Janko Skok*
	Pigs' response to different types of interactions with a human: free-form vs. imposed contact – *Suzanne Truong*	Previous handling procedure affects flight speed test results when assessing cattle temperament – *Maria Camila Ceballos*
	Tactile reactivity in equids: challenges and factors of influence – *Léa Gueguen*	Is it social restriction or space constraint that determines a sow's posture immediately post-weaning when confined to a stall? – *Jen-Yun Chou*
	The weaning method of dam-reared dairy calves affects their response to humans during an arena test – *Maja Bertelsen*	Behaviour and welfare impacts of water provision via misting in commercial Pekin ducks – *Dana Campbell*
	POSTER Presentations: Human-animal interactions, *Poster 13-24*	*POSTER Presentations:* Animal Behaviour in response to on-farm management procedures, *Poster 32-39*
15:30 – 16:45	Coffee break & Posters **Poster presentations 1-24, *Poster room 1*** **Poster presentations 25-39, *Poster room 2***	
	Workshops	
16:45 – 18:45	**Conference Hall 1, "Biljana"**: **Teaching applied ethology and animal welfare: How to build a community of practice** – *Beth Ventura*	**Conference Hall 2, "Labino"**: **Developing Standards for the Management and Welfare of Elephants in Human Care to facilitate positive Human – Elephant interactions** – *Jake Rendle-Worthington*
20:00	***Wine/Cheese tasting – Ohrid City***	

September 06 2022 (Tuesday)

09:00 -09:40	***Plenary Talk*** **Conference Hall 1, "Biljana" – PLF and Measuring behaviour and welfare** The quest to develop automated systems for monitoring animal behaviour – *Janice Siegford*	
	Oral presentations in parallel sessions	
	Conference Hall 1, "Biljana" – PLF and Measuring behaviour and welfare, *Chair: Mark Rutter*	**Conference Hall 2, "Labino" – Behaviour and welfare of indigenous breeds and in extensive production systems (1)**, *Chair: Marcia Endres*
09:45 -10:45	Digital Livestock Technologies as boundary objects: impacts on management practices and on stakeholders' perception of animal welfare – *Juliette Schillings*	Welfare status of dairy cattle managed under extensive and intensive systems in hill state of Uttarakhand, India – *Mayamitta Saini*
	Preliminary results on the use of geolocation collars on extensive reared livestock to assess health state and predators' attacks in mountainous areas (above 2000 meters) in Spain – *Roger Vidal*	Cattle behaviour in silvopastoral systems: integrating animal welfare and the provision of ecosystem services – *Francisco Galindo*
	Developmental changes in humming in a captive polar bear (Ursus maritimus) cub at the Tennoji Zoo – *Homare Yamamoto*	How behavioural robustness in sheep reared in rangeland can be impacted by early rearing conditions and genetics? – *Xavier Bovin*
	POSTER Presentations: PLF and Measuring behaviour and welfare, *Poster* 40-49	*POSTER Presentations:* Behaviour and welfare of indigenous breeds and in extensive production systems, *Poster* 59-67
10:45 – 11:15	Coffee break & Posters **Poster presentations 40-49, *Poster room 1*** **Poster presentations 59-67, *Poster room 2***	
	Oral presentations in parallel sessions	
	Conference Hall 1, "Biljana"– PLF and Measuring behaviour and welfare in cattle, *Chair: David Arney*	**Conference Hall 2, "Labino" – Behaviour and welfare of indigenous breeds and in extensive production systems (1)**, *Chair: Christine Leeb*
11:15 – 12:45	Development of acoustic sensors for detecting individual cow vocalizations – *Laura Hunter*	The impact of gastrointestinal parasitism on lamb behaviour and welfare – *Michelle Reeves*
	Using precision technology to investigate personality and predictability of movement and space use in farmed calves and their associations with production – *Francesca Occhiuto*	Influence of weaning age and naturally acquired nematode infections on behaviour of lambs – *Lena Lidfors*
	Personality traits are associated with precision technology measures of feeding and activity behaviors within the home pen in dairy calves – *Megan Woodrum Setser*	Welfare and parasitology condition of extensively reared sheep during winter – *Katarina Nenadović*

11:15 – 12:45	New approach suggests that dairy heifers do not show stable circadian rhythms upon entry to the milking herd – *Teresa Johansson*	Association of range use, individual behavior, and welfare indicators of two laying hen hybrids housed under organic conditions – *Kaitlin Wurtz*
	Monitoring synchronous lying time in commercial dairy herds using accelerometers – *Akke Kok*	Animal welfare in changing agricultural landscapes of Ethiopia: a mixed methods approach – *Gezahegn Ayalew*
	POSTER Presentations: PLF and Measuring behaviour and welfare, *Poster* 50-58	*POSTER Presentations:* Environmental effects, *Poster* 68-78
12:45 – 13:45	Lunch	
	Oral presentations in parallel sessions	
	Conference Hall 1, "Biljana" – PLF and Measuring behaviour and welfare in Poultry and Pigs, *Chair: Lene Juul Pedersen*	**Conference Hall 2, "Labino" – Environmental effects on behaviour and welfare**, *Chair: Stephanie Buijs*
13:45 – 15:15	Perception of laying hen farmers, poultry veterinarians and poultry experts on sensor-based continuous monitoring of health and welfare of laying hens – *Lara van Veen*	Changing milking and feeding times to reduce heat stress in a pasture-based dairy system – *Karin Schutz*
	Detection of climate-induced behavioural changes through elevated platforms with an integrated weighing system in broiler chickens – *Helen Schomburg*	Shelter-seeking behaviour in horses during summer – do weather conditions and horsefly (Tabanidae) activity matter? – *Janne Winther Christensen*
	Individual-level variation in movement within a commercial aviary – *Matthew Petelle*	Jet aircraft overflights on pasture: do sheep care? – *Judit Vas*
	The use of eggshell quality as a measure of stress in laying hens – *Helen Gray*	Long-term consequences of forage presentation on horses' welfare – *Marie Roig-Pons*
	Estimation of resilience parameters in pigs based on activity measured with computer vision – *Bas Rodenburg*	How much is too much? Feeding live black soldier fly larvae to laying hens – *Fernanda Tahamtani*
	Validation of non-invasive sensor technologies to measure use of enrichment material in weaned piglets – *Fleur Veldkamp*	Effects of a rearranged drinking system on the behavior of turkeys (Meleagris gallopavo) – *Stephanie Schäfers*
15:15 – 15:45	Coffee break & Posters **Poster presentations 50-58, *Poster room 1*** **Poster presentations 68-78, *Poster room 2***	
	Oral presentations in parallel sessions	
	Conference Hall 1, "Biljana" – Free topics – Motivation, cognition and emotion, *Chair: Lucy Asher*	**Conference Hall 2, "Labino" – Environmental effects on behaviour and welfare (continued)**, *Chair: Marko Ocepek*
15:45 – 17:15	Investigating intention in non-human animals: the need for a new theoretical and methodological framework – *Anne-Lise Dauphiné-Morer*	Evaluating the temperature preferences of sexually mature Duroc, Landrace, and Yorkshire boars – *Rebecca Pritchett*

15:45 – 17:15	How do goats read 2D-images of familiar and unfamiliar conspecifics? – *Jan Langbein*	Light intensity preference depends on breed, age and behaviour – *Jerine van der Eijk*
	Goats may recognise humans cross-modally – *Marianne Mason*	Photovoltaic panels as a strategy for enhancing animal welfare and sustainability of sheep farming in tropical environments – *Vinicius Fonsêca*
	Measuring motivation for Sudan grass hay in finishing cattle using voluntary interaction with an aversive stimulus – *Rachael Coon*	Pre-weaning social behaviour and peripheral serotonin levels are associated with behavioural and physiological responses to weaning in pigs – *Caroline Clouard*
	Heart rate variability response in horses during immediate and withheld food reward – *Sarah Kappel*	Welfare and performance of finishing pigs are strongly affected by group size, density and production system – *Inger Lise Andersen*
	POSTER Presentations: Free topics, *Poster 79-88*	Perch use in commercial broiler breeder pullet hens – effect of perch type, height and age – *Guro Vasdal*
17:00 – 17:15	Coffee break	
17:15 – 18:00	Workshop: The present and the future of the ECAWBM	
17:15 – 18:00	Workshop: The OIE Platform on Animal Welfare for Europe; from science to action	
18:00	**Touristic tour Ohrid**	
20:00	***National Dinner – Ohrid Old Town***	

September 07 2022 (Wednesday)

09:00 – 09:40	***Plenary Talk*** **Conference Hall 1, "Biljana" – Positive animal welfare** Pig olfaction – a well-known yet overlooked sensory modality, *Sarah-Lina Aagaard Schild*	
09:45 – 10:45	***Oral presentations in parallel sessions***	
	Conference Hall 1, "Biljana" – Positive animal welfare (1), *Chair: Frank Tuyttens*	**Conference Hall 2, "Labino" – Genetics and breeding for improved animal welfare,** *Chair: Christina Rufener*
09:45 – 10:45	Enrichment preferences of beef cattle grazing at pasture – *Emily Dickson*	The best dad: how boars housing systems can shape their offspring's survival – *Leandro Sabei*
	Smell This! – pigs' interest in, and behaviour towards odours of non-social origin – *Maria Vilain Rørvang*	Prevalence of keel bone fractures in hens and roosters from four non-commercial laying breeds – *Käthe Kittelsen*
	Let's mo(o)ve cows! Quantifying and optimizing locomotor activity by providing different modalities of exercise access – *Marjorie Cellier*	Behavioural welfare indictors in conventional, intermediate, and slow growing broiler chicken strains: Slower growing strains have better mobility and utilise perching enrichment more – *Charlotte James*

09:45 – 10:45	*POSTER Presentations:* Positive animal welfare, *Poster* 89, 91-95	*POSTER Presentations:* Genetics and breeding for improved animal welfare, *Poster* 110-114
10:45 – 11:15	Coffee break & Posters **Poster presentations 79-95, *Poster room 1*** **Poster presentations 110-114, *Poster room 2***	
	Oral presentations in parallel sessions	
	Conference Hall 1, "Biljana" – Positive animal welfare (continued), *Chair: Lena Lidfors*	**Conference Hall 2, "Labino" – Behavioural development in poultry**, *Chair: Lubor Kostal*
11:15 – 13:00	Importance of Motherhood: How Motivated Are Dairy Cows (Bos taurus taurus) to Nurse their Calves? – *Emma Hvidtfeldt Jensen*	Artificial moving cues alter ramp use behaviour of laying hens in the early life period – *Alex Johny*
	Calf-mother-bull stimulus in buffaloes: effects on the behavior and welfare of dams and their calves – *Sanjay Choudhary*	Effects of the rearing environment complexity on laying hens' spatial cognition – *Lucille Dumontier*
	Do cows see the forest or the trees? A preliminary investigation of attentional scope as an indicator of emotional state in dairy cows kept with their calves – *Heather Neave*	The relationship between age, fear responses, and walking ability of broiler chickens – *Sigga Rasmussen*
	Play behaviour of dam-reared dairy calves is affected by daily duration of contact with the dam – *Eléa Bailly-Caumette*	Laying hen chicks make earlier use of elevated areas and perform more inter-tier transitions when provided with ramps in the rearing aviary – *Ariane Stratmann*
	Is calves' motivation to play affected by milk allowance and social environment? – *Verena Größbacher*	Resting behaviour of broilers reared with or without artificial brooders – *Sara Forslind*
	Do cows need to be social to be happy? – *Bjorn Forkman*	Mummys boys and girls? Effects of the rearing system on behaviour in an Open-Field-Novel-Object test in turkeys (Meleagris gallopavo) – *Jenny Stracke*
	POSTER Presentations: Positive animal welfare, *Poster* 90, 96-102	*POSTER Presentations:* Free topics, *Poster* 115-117
13:00 – 14:00	Lunch	
14:00 – 14:40	***Plenary Talk*** **Conference Hall 1, "Biljana" – Positive animal welfare** Music for animal welfare: A critical review and conceptual framework, *Buddhamas Pralle Kriengwatana*	
	Oral presentations in parallel sessions	
	Conference Hall 1, "Biljana" – Positive animal welfare (2), *Chair: Margit Bak Jensen*	**Conference Hall 2, "Labino" – Abnormal and damaging behaviour**, *Chair: Gudrun Illmann*
14:45 – 15:30	Effects of musical instrumentation on emotional responses of growing pigs – *Ariel Marcel Tarazona*	Doubling feeder space can reduce competition for feed in pigs – *Roberta Maria D'Alessio*

14:45 – 15:30	The use of positive associations to strengthen the effects of auditory enrichment – *Richard Mott*	Supplementation of amino acids at requirements for optimal growth largely counteracts the negative effects of low protein diets on tail biting in pigs, while extra enrichment is less effective – *Ilaria Minussi*
	POSTER Presentations: Free topics, *Poster* 103-109	*POSTER Presentations:* Abnormal and damaging behaviour, *Poster* 118-125
15:30 – 16:00	Coffee break & Posters **Poster presentations 96-109, *Poster room 1*** **Poster presentations 115-125, *Poster room 2***	
	Oral presentations in parallel sessions	
	Conference Hall 1, "Biljana" – Free topics, *Chair: Bas Rodenburg*	**Conference Hall 2, "Labino" – Abnormal and damaging behaviour**, *Chair: Laura Hänninen*
16:00 – 17:15	Influence of the movement of social partners on housed dairy cows' decisions to use an outdoor space – *Emeline Nogues*	Cognitive ability affects pigs' choice of opponents in aggression after regrouping – *Lucy Oldham*
	Temporal dynamics in chicken dominance hierarchies over maturation – *Klara J. Grethen*	Improved gestation housing reduces sow oral stereotypical behaviour, and improves offspring health during the suckling period – *Martyna Lagoda*
	The inter-relationship between housing, pain, inflammation and vaginal microbiota on the welfare of sows and their offspring – *Adroaldo José Zanella*	Reducing aggressive behaviour in rabbit does housed in groups – *Ágnes Moravcsíková*
	Peer Community In Animal Science: a free publication model for transparent and open science – *Christian Nawroth*	Risk factors for stereotypic behaviour in captive ungulates – *Kate Lewis*
	What are indirect proxies worth? – *Bernhard Voelkl*	Effect of access to pasture on hair cortisol and behaviour of sheep – *Ricard Parés*
17:15 – 17:30	Coffee break	
17:30 – 18:30	AGM	
20:00	***Galla Diner* and Night club (optional)**	

September 08 2022 (Thursday)

09:00 – 09:40	***Plenary Talk*** **Conference Hall 1, "Biljana"** A psychobiological approach to the assessment of animal behaviour and its application in applied ethology, *Daniel Mills*	
	Oral presentations in parallel sessions	
09:45 – 11:15	**Conference Hall 1, "Biljana" – JOINT ISAE – EAAP Session – Behaviour of farm animals and how to measure it**, *Chair: Christoph Winckler*	**Conference Hall 2, "Labino" – Abnormal and damaging behaviour**, *Chair: Sara Hintze*

09:45 – 11:15	Exploring diurnal feeding patterns of individual growing-finishing pigs under healthy and undisturbed conditions – *Jacinta Bus*	Effects of playpen access on stereotypic behaviour and aggression in conventionally housed female laboratory mice – *Anna Ratuski*
	Daily activity of dairy goats in extensive husbandry systems – *Monica Battini*	Learning performance and active enrichment use in farm mink with different forms of abnormal behaviour – *Jens Malmkvist*
	How do horses express their stress: the effect of coping styles on subtle behavioural indicators? – *Anne-Laure Maigrot*	Toe-pecking – a serious but rarely studied welfare problem in laying hens – *Sabine Gebhardt – Henrich*
	The Effects of Competition at the Feeder on Dominance in Dairy Cows – *K. Sheng*, *EAAP live stream*	Light & larvae as early-life interventions to prevent feather pecking in laying hens – *Saskia Kliphuis*
	Detecting Animal Contacts – A Deep Learning-Based Pig Detection and Tracking Approach – *M. Wutke, EAAP live stream*	Limit feeding of TMR increases intersucking in year-old dairy heifers – *Blair Downey*
	Pain expression as an indicator of orthopedic disease in dairy cattle – *M. Söderlind, EAAP live stream*	Assessing captive African elephant welfare using self-directed behaviours and tail-hair cortisol – *Maud Bonato*
11:15 – 11:30	Coffee break	
11:30 – 12:15	**Closing Ceremony Announcements of awards**	
13:00 – 15:30	**Lunch/Music performance in Saint Naum**	
15:30 – 17:00	**Boat tour from Saint Naum to Ohrid (optional)**	

LIST OF POSTER PRESENTATIONS

Poster number	*Presenting Author*	*Title*
1	Megumi Fukuzawa	The effect on dogs of short-term exposure to unfamiliar visual, auditory, and olfactory stimuli
2	Rachel Kinsman	What's the problem? Owner perceptions of problem behaviours in dogs aged 6, 12, and 18 months
3	Rowena Packer	Is UK puppy-buying culture also suffering a long-COVID effect? Quantifying the COVID-19 Pandemic legacy upon UK puppy buying behaviours
4	Mario Ostović	Information quality and attitudes of cat owners in Croatia about cat keeping and health: preliminary results
5	Mohammad Bashir Aliyu	Attitude towards animals by pet and non-pet owners in some selected veterinary clinics/hospitals of Northern Nigeria
6	Javiera Calderón-Amor	Factors associated with children´s attitudes towards the humane treatment of animals
7	Sam Jack	Psychopathy, Infant Features and Pet Attachment
8	Grace Carroll	The impact of the Covid-19 pandemic on animal adoptions and relinquishment: the perspective of shelter staff
9	Elizabeth Walsh	Attitudes towards belief in "Animal Mind"
10	Sara Platto	Behavioral changes in pets, as reported by the owners, before and during the lockdown in China
11	Lieve Meers	Impact of Covid-19 safety protocols on the wellbeing of dogs involved in canine-assisted interventions – comparison between Flanders (Belgium), Italy and Spain
12	Fanny Menuge	Research program about the development of future guide dogs for blind people: How can we optimise the breeding programme, from weaning to the end of training?
13	Susanne Waiblinger	Behaviour and health of horses used in equine-assisted intervention is associated with workload and husbandry conditions
14	Marlyn Romero Peñuela	Assessment of the welfare of working horses and mules in Colombia
15	Daniela Luna	The protective effect of social support: can humans reassure pigs during stressful challenges by using social learning?
16	Emma Fabrega	Effect of human-animal interaction on tear staining and body temperature of piglets
17	Heleen van de Weerd	A systematic review of studies of chicken welfare at catching and risk of bias

Poster number	*Presenting Author*	*Title*
18	Alina Schaffer	Gaze following in ungulates: domesticated and non-domesticated species follow the gaze of both humans and conspecifics in an experimental context
19	Jasmine Muszik	It makes a brave cow: how frequency of outdoor access improves the reactivity and human-animal relationship of dairy cattle
20	Karen Luke	Exploring ridden horse behaviour and rider satisfaction: A pathway for improving horse welfare and rider safety?
21	Uta König von Borstel	ManyGoats – an initiative to promote open and reproducible research on goat behaviour and welfare
22	Sergio Acuña Ballesteros	Flight distance in cows with limited resources
23	Abdelkareem Abdallah Ahmed	Owners' perceptions of the welfare of their diseased goats in Nyala, Sudan
24	Oluwafemi Daodu	Assessment of human beliefs, value and practice towards animal welfare in 21st century in Sub-Saharan Africa
25	Zimbábwe Osório-Santos	The effect of early pain experience on pain sensitivity later in life
26	Dimitar Nakov	Consumers' awareness of piglet castration and attitudes towards alternatives to surgical castration: results from North Macedonia
27	Joseph Krahn	Effects of group size on the social experience of dairy cows
28	Gustavo Mazon	Can an oral probiotic affect the performance and feeding behavior of crossbred Holstein x Angus calves?
29	Jung-hwan Jeon	Effect of enrichment on change of behaviour and cortisol level in Hanwoo(Korean native cattle)
30	Si Nae Cheon	Effect of alternative farrowing pens with temporary crating on the performance and behavior of lactating sows and their litters
31	Maja Prevolnik Povše	The impact of cross-fostering on teat order in fostered piglets and residents
32	Alice Scaillierez	Effect of different light intensities on the activity patterns of growing-finishing pigs
33	Sofie van Nieuwamerongen – de Koning	Effects of light intensity on space use and pen fouling in growing-finishing pigs
34	Marko Ocepek	How to improve pig and pen cleanliness and reduce ammonia concentration in welfare and environmentally friendly pig production system?

Poster number	*Presenting Author*	*Title*
35	Roxanne Berthel	Particle and protein sorting in mixed rations by sheep and goats within two hours after feeding
36	Nina Keil	Feeding behaviour of sheep and goats on mixed rations varying in cutting lengths
37	Azadeh S Jalali M	Assessment of feeding, drinking and nest box usage of laying hens in response to routine vaccination
38	Quang Hanh Han	Perch use and leg health measures of slow-growing broiler chickens provided with perches and outdoor access
39	Jalal Sarder	Present scenario of poultry welfare at traditional and commercial farming in Bangladesh
40	Alexander Ulrichsen	Camera-based automatic cow identification using deep neural networks
41	Miroslav Kjosevski	The impact of ambient temperature on the drinking behaviour of dairy cows measured with ruminal sensors
42	Emily Rice	Heat stress effects in dairy calf behavior: Association between elevated temperature-humidity index (THI) and behavior in dairy calves during the preweaning period
43	Ena Dobrik	A study concept: Developing models from an optimised number of sensors used for the welfare assessment of dairy cows
44	Aiden Juge	Signs of bovine respiratory disease: A review of literature evaluating clinical illness scoring
45	Luis Fernando Costa Garrido	Can we reliably detect livestock respiratory disease through precision farming? a systematic review
46	Barbara Bagiova	The use of accelerometers for automated monitoring of laying hens' behaviour – pilot study
47	Stefania Celozzi	A pilot study of the use of acceleration data loggers for automatic behavior monitoring of layer hens
48	Nina Salvesen	Anti-predatory movement pattern of different breeds of sheep on Norwegian rangeland pastures based on data from GPS collars
49	Angélica Palomino	What was that noise? Horse behavior and facial expression after a sudden noise
50	Jennifer Weller	Using an automated infrared thermography system to detect changes in dairy cow eye temperature after an event presumed to cause stress (hoof trimming)
51	Jashim Uddin	Infrared thermography to measure behavioural responses of emotion and productivity in dairy cows
52	Marcia Endres	Associations between feeding behaviors and management practices in automatically fed group-housed preweaned dairy calves in the Upper Midwest USA

Poster number	*Presenting Author*	*Title*
53	Cecilie Kobek-Kjeldager	Validation of behavioural sampling techniques for 20-25 kg pigs during 23-hour transport
54	Emiline Sundman	Validation of scan sampling techniques for nursery pig feeder and enrichment use
55	Iris Boumans	Exploring variation in feeding behaviour traits within and between gestating sows
56	Frank A.M. Tuyttens	Introducing the aWISH project: Animal Welfare Indicators at the SlaughterHouse
57	Bianca Vandresen	Sow and piglet welfare in farrowing housing systems: a systematic review
58	Lydiane Aubé	Reliability and repeatability of behavioural welfare measures for grazing dairy cows
59	Christos Kalfopoulos	The restraint enclosure effects on the reproductive ethology and efficiency of boars and sows of the free range Greek autochthonous black breed
60	Sava Spiridonović	Welfare parameters of Banat Naked Neck and Sombor Crested chickens in extensive production system
61	Oluwaseun Iyasere	Nigerian indigenous chicks show age related difference in vocalization characteristics during short term social isolation
62	Madan Lal Kamboj	Welfare assessment of migratory Gaddi goats of North-Western Himalayan region
63	Mariam Logunleko	There is hope for aged roosters to be sexually active and produce good quality semen
64	Victor Oyeniran	Brooding behaviours differ between the two ecotypes of Nigerian indigenous chicken
65	Saber Yagoub	On-farms dairy cattle welfare assessment in Nyala city, Sudan
66	Ankaj Thakur	Behaviour of Gaddi goats reared under nomadic pastoralism in North-Western Himalayan region in India
67	Brij Vanita	Expert opinion on welfare risks of migratory goat production system of India
68	Lucy Markland	Investigating the effects of jute nesting material and enriched piglet mats on sow welfare and piglet survival
69	Lene Juul Pedersen	Dealing with the challenge of early-life piglet hypothermia during the keeping of outdoor farrowing sows
70	Marc Bagaria	Nutritional strategies to prevent post-weaning diarrhoea in organic piglets
71	Gudrun Illmann	Removal of confinement 3 days postpartum does not steadily increase exploratory behaviour nor reduce inactivity in domestic lactating sows

Poster number	*Presenting Author*	*Title*
72	Mirjana Dj. Stojchic	Effects of housing system on behaviour of middle growing broilers
73	Maria Madeleine Guerrero Gutierrez	Shearing rams in winter increased their physical activity and decreased their resting time
74	Gustavo Dias	The influence of the bedding material on dairy cows' behaviour
75	Karolini de Sousa	An overview of the effect of different tree arrangements of silvopastoral system on cattle behavior
76	Luiz Carlos Pinheiro Machado Filho	Effect of water and shade availability on grazing behaviour of cows in a Voisin Rational Grazing System
77	Ayuka Sanada	The effect of hot summer condition on the behavior of the captive red panda
78	Syed Saad Ul Hassan Bukhari	Welfare concerns with mounted load carrying by working donkeys
79	Saara Junttila	Breed Differences of Cognitive Traits in the Domestic Dog (Canis familiaris)
80	Lubor Kostal	Performance of laying hens in the 8-arm radial maze task
81	Katarína Pichová	Optimization of the operant judgement bias test for the assessment of laying hens welfare
82	Liesbeth G.W. Van Damme	Preliminary results: effectiveness of cage enrichment for reducing aggressive behavior in group-housed unfamiliar breeding does.
83	Logan Rahmel	Impact of stocking density and exercise on the maintenance behaviors and herd synchrony of developing beef heifers
84	Claes Anderson	Synchronic observations of behaviour of five species of felid cats in three Swedish zoos
85	Beth Ventura	How should the public contribute to improving cattle welfare? Ambivalence in perspectives from veterinarians and animal scientists
86	Annika Krause	Do you feel what I feel? Emotional contagion in domestic pigs – a pilot study
87	Miho Saito	Housing male together triggers higher aggressive behaviors from high-ranking female towards low-ranking female in giraffe
88	Razlina Raghazli	Public knowledge of the legislation, awareness, and attitudes towards animal welfare: a study among clients of department of veterinary services Malaysia

Poster number	*Presenting Author*	*Title*
89	Elsa Vasseur	Don't get in their way: How outing conditions relate to the motivation of movement-restricted cattle to access an outdoor exercise yard
90	Christina Rufener	Can straw or compost satisfy the rooting motivation of fattening pigs?
91	Katarína Bučková	Reduction in body lesions of pigs through the provision of novel enrichment
92	Shanis Barnard	Rehoming dogs from commercial breeding kennels: behavioral and management factors to set them up for success
93	Carly O'Malley	Thinking outside the (shoe)box: Refining rat housing to enhance animal welfare
94	Yumi Yamanashi	Development of a novel digital enrichment system to enhance the welfare of zoo-housed chimpanzees
95	Aitor Arrazola	Stranger-directed fear in breeding dogs linked with management practices in commercial breeding kennels
96	Olivia Bolton	The effects of foster cow rearing on dairy calf health and welfare
97	Sandra Ospina	Pasture-based dairy cow and calf suckling system
98	Laura Field	The presence of non-maternal social models in early life affects long-term dairy heifer responses to novelty.
99	Laura Candelotto	Laying hens increase litter use in the presence of a novel object
100	Regine Victoria Holt	A buffet of litters – Broiler chicken responses to multiple litter choices
101	João Pedro Donadio da Silva Pereira	Is one water trough enough for beef cow-calf water supply?
102	Oluwaseun Ojelade	Influence of environmental enrichment on growth, behaviour and physiology of juveniles of Clarias gariepinus under laboratory conditions
103	Callan Lichtenwalter	Impact of European starlings (Sturnus vulgaris) on lactating dairy cow behavior
104	Janja Novak	Cage dividers reduce aggression and differentially affect corticosterone and testosterone levels in mice of different ranks
105	Akitsu Tozawa	Effect of social isolation at a zoo on behavioural state in the bush dog
106	Birte Nielsen	UFAW and ISAE – the importance of collaboration
107	Jessica Porter	Impact of bedding type on cattle behavior while housed in a biocontainment facility

Poster number	*Presenting Author*	*Title*
108	Sabrina Sato	Methods in feline personality assessment: a scoping review
109	Skender Muji	Initiation of university dual study programs in field of animal sciences in Albania and Kosovo (Erasmus+ DualAFS)
110	Elena Gobbo	Can we predict Lippizan horse's personality traits based on anatomical characteristics?
111	Marisol Parada Sarmiento	Lameness in pregnant sows altered placental cortisol and cortisone ratio and gestation length
112	Fidel Pretto	Grazing behavior of different breeds in a Voisin Rational Grazing System
113	Makala Herman	Temperament evaluation in feedlot-housed Brahman heifers
114	Samuel Durosaro	Genotypic differences in open field behaviours of FUNAAB Alpha broiler chickens
115	Catharina Broekmeulen	Effects of individual hatching system factors on stress responsivity in laying hens
116	Janja Sirovnik	Effect of dark brooders on activity level in layer pullets
117	Maja Makagon	Consequences of mixed sex rearing on reproductive behavior and physiology of sexually mature drakes, and flock fertility
118	Catherine Hamelin	Increased dietary fiber, protein and tryptophan levels in the feed reduced feather pecking behavior in cage-housed intact-beaked laying hens
119	Emilia König	Relation of faecal lactobacilli to manipulative behaviour in pigs
120	Friederike Katharina Warns	Preliminary study on link between tail biting behaviour, tail posture and enrichment manipulation
121	Alexis Nalovic	Slow down tail biting outbreak by supplementing gilts water with essential oil of orange
122	Sokol Duro	Can be pale pink comb color in laying hens an indicator of keel bone fractures detected by palpation – a case study from Albania
123	Aline Bouquet	Development of abnormal oral repetitive behaviours in foals: the role of maternal and suckling behaviour
124	Jean-Francois Gabarrou Gabarrou	Slow down aggressive behaviour by supplementing poultry with a sensory feed additive mainly based on essential oil of orange
125	Femke Delanglez	Survey of professional egg producers and private bird keepers on control measures against avian influenza and their effects on animal welfare

Table of Contents

Wood-Gush-Memorial Lecture

David Wood-Gush – His Life and Impact on Applied Animal Behaviour Science **1**
Alistair Lawrence

Wolf-dog differences: It is not that simple! **2**
Friederike Range

Plenary Talk - PLF and Measuring behaviour and welfare

The quest to develop automated systems for monitoring animal behaviour..... **3**
Janice Siegford, Juan Steibel, Junjie Han, Madonna Benjamin, Tami Brown-Brandl, Joao R. R. Dorea, Daniel Morris, Tomas Norton, Eric Psota, Guilherme J. M. Rosa

Plenary Talk - Positive animal welfare

Pig olfaction – a well-known yet overlooked sensory modality **4**
Sarah-Lina Aagaard Schild, Maria Vilain Rørvang

Music for animal welfare: a critical review & conceptual framework **5**
Buddhamas P. Kriengwatana, Richard Mott, Carel ten Cate

Plenary Talk - Abnormal behaviour

A psychobiological approach to the assessment of animal behaviour and its application in applied ethology..... **6**
Daniel S. Mills

Session 01: Dog behaviour, cognition and interactions with humans

Non-offspring nursing in free-ranging domestic dogs (*Canis familiaris*)..... **7**
Sunil Kumar Pal

The effect of dam fear and stress on puppy welfare in commercial-breeding kennels..... **8**
Aynsley Romaniuk, Shanis Barnard, Jennifer Weller , Uri Baqueiro Espinosa, Traci Shreyer, Gareth Arnott, Candace Croney

Effect of positive human interaction on attention bias and affective states of commercial breeding dogs..... **9**
Uri Baqueiro-Espinosa, Tsz H Lo, Victoria McEvoy, Rachel Hunter, Gareth Arnott

Dog breed differences in reactions to a disgruntled stranger partially support veterinarian's distinct pain sensitivity ratings **10**
Rachel M. P. Caddiell, Rachael M. Cunningham, B. Duncan. X. Lascelles, Margaret E. Gruen

Humans' mask wearing has limited effect on family dogs' behaviour in standard test situations **11**
Anna Kis, Edina Vanderer, József Topál

Session 02: Human-animal interactions

Perception of human directed aggressive behaviour of dogs in English versus Japanese language dog owners **12**
Mie Kikuchi, Daniel S. Mills, Todd Hogue

Factors associated with owner-perceived behaviour problems in dogs enrolled in a longitudinal study: are training methods important? **13**
Sara Owczarczak-Garstecka, Rachel Casey, Rosa Da Costa, Rachel Kinsman, Michelle Lord, Séverine Tasker, Adam Williams, Jane K. Murray

Can owners recognise their dog's welfare state? Novel insights from a "Smart Collar" **14**
Carmen Glanville, Heidi Ortmeyer, Paul Hemsworth, Lauren Hemsworth, Grahame Coleman

Country of origin influences management practices and attitudes towards triplet-born lambs **15**
Cathrine Erichsen, Tamsin Coombs, Neil Sargison, Sue McCoard, Belinda Vigors, Marie Rowland, Tim W J Keady, Cathy M Dwyer

Pigs' response to different types of interactions with a human: free-form vs. imposed contact **16**
Suzanne Truong, Oceane Schmitt, Jean-Loup Rault

Tactile reactivity in equids: challenges and factors of influence **17**
Léa Gueguen, Noémie Lerch, Marine Grandgeorge, Martine Hausberger

The weaning method of dam-reared dairy calves affects their response to humans during an arena test **18**
Maja Bertelsen, Karolina Steinerova, Margit Bak Jensen

Session 03: Animal Behaviour in response to on-farm management procedures

On-farm administration of local anaesthetic and surgical castration of piglets: acute behavioural and physiological consequences **19**
Mathilde Coutant, Jens Malmkvist, Marianne Kaiser, Leslie Foldager, Mette S. Herskin

The influence of procaine hydrochloride plus meloxicam on the behaviour, feed intake and weight gain of dairy calves following hot-iron disbudding **20**
Nnenna Ugwu, Joanna Murrell, Emma Love, Toby Knowles, Helen Whay, Suzanne Held, Jo Hockenhull

Behavioural changes in the first 3 weeks after disbudding in dairy calves **21**
Sarah J.J. Adcock*, Blair C. Downey, Cassandra B. Tucker

Evidence of social buffering benefits to castration stress in beef calves housed with familiar pen-mates **22**
Caleb M. Brezina, Grant A. Dewell, Renee D. Dewell, Rebecca L. Parsons, Anna K. Johnson, Derek B. Haley, Suzanne T. Millman

The impact of clamp castration on the behavior and body temperature of reindeer (Rangifer tarandus tarandus) – effects of local anesthesia and non-steroidal anti-inflammatory drug **23**
Hanna Nurmi, Sauli Laaksonen, Taija Häätylä, Anna Valros, Mikaela Sauvala, Laura Hänninen

Session 04: Animal Behaviour in response to on-farm management procedures

Previous experience in the restraining chute affects beef cattle chute scores **24**
Clara W. B. Lachica, Francisco A. R. Catalano, Luiz E. Kozicki, Ruan R. Daros

Long-term effects of early maternal deprivation on goat social behaviour and stress coping abilities **25**
C. Toinon, S. Waiblinger, R. Palme, J.-L. Rault

Hunger affects cognitive performance of dairy calves **26**
Benjamin Lecorps, Raphaela E. Woodroffe, Marina A.G. von Keyserlingk, Daniel M. Weary

Cross-fostering impacts suckling activity of fostered piglets, but not residents **27**
Lara Pajžlar, Maja Prevolnik Povše, Dejan Škorjanc, Janko Skok

Previous handling procedure affects flight speed test results when assessing cattle temperament **28**
Maria C. Ceballos, Aline C. Sant'Anna, Mateus J. R. Paranhos da Costa

Is it social restriction or space constraint that determines a sow's posture immediately post-weaning when confined to a stall? **29**
Jen-Yun Chou, Thomas D. Parsons

Behaviour and welfare impacts of water provision via misting in commercial Pekin ducks **30**
Dana L.M. Campbell, Sue Belson, Jim M. Lea

Session 05: PLF and Measuring behaviour and welfare

Digital Livestock Technologies as boundary objects: impacts on management practices and on stakeholders' perception of animal welfare **31**
Juliette Schillings, Richard Bennett, David Rose

Preliminary results on the use of geolocation collars on extensive reared livestock to assess health state and predators' attacks in mountainous areas (above 2000 meters) in Spain **32**
Roger Vidal-Cardos, Emma Fàbrega, Antoni Dalmau

Developmental changes in humming in a captive polar bear (Ursus maritimus) cub at the Tennoji Zoo **33**
Homare Yamamoto, Yusuke Sano, Kenji Aburaya, Masayuki Nakamichi, Kazunori Yamada

Session 06: PLF and Measuring behaviour and welfare in cattle

Development of acoustic sensors for detecting individual cow vocalizations **34**
Laura Hunter, Paul Shorten

Using precision technology to investigate personality and predictability of movement and space use in farmed calves and their associations with production. **35**
Francesca Occhiuto, Jorge. A. Vázquez-Diosdado, Charles Carslake, Jasmeet Kaler

Personality traits are associated with precision technology measures of feeding and activity behaviors within the home pen in dairy calves **36**
Megan M. Woodrum Setser, Heather Neave, Joao H.C. Costa

New approach suggests that dairy heifers do not show stable circadian rhythms upon entry to the milking herd..... **37**
Teresa Johansson, Maya Gussman, Keni Ren, Svenja Woudstra, Lars Rönnegård, Carsten Kirkeby, Per Peetz Nielsen

Monitoring synchronous lying time in commercial dairy herds using accelerometers **38**
Akke Kok, Ariette van Knegsel, Eddie Bokkers, Vivi Thorup

Session 07: PLF and Measuring behaviour and welfare in Poultry and Pigs

Perception of laying hen farmers, poultry veterinarians and poultry experts on sensor- based continuous monitoring of health and welfare of laying hens **39**
Lara A. van Veen, Anna C.M. van den Oever , Henry van den Brand, Bas Kemp

Detection of climate-induced behavioural changes through elevated platforms with an integrated weighing system in broiler chickens..... **40**
Julia Malchow, Helen Schomburg, Jonas Knöll, Oliver Sanders, Lars Schrader

Individual-level variation in movement within a commercial aviary **41**
Matthew B. Petelle, Camille Montalcini, and Michael J. Toscano

The use of eggshell quality as a measure of stress in laying hens **42**
Helen Gray, Emma Malcolm, Katherine Herborn, Lucy Asher

Estimation of resilience parameters in pigs based on activity measured with computer vision..... **43**
Lisette. E. van der Zande, Oleksiy Guzhva, Séverine Parois, Ingrid A. van de Leemput, J. Elizabeth Bolhuis1, T. Bas Rodenburg

Validation of non-invasive sensor technologies to measure use of enrichment material in weaned piglets **44**
Fleur Veldkamp, Tomas Izquierdo Garcia-Faria, Vivian L. Witjes, Johanna M.J. Rebel, Ingrid C. de Jong

Session 08: Motivation, cognition and emotion

Investigating intention in non-human animals: a need for a new theoretical and methodological framework **45**
Anne-Lise Dauphiné-Morer, Alain Boissy, Franck Zenasni, Muriel Mambrini-Doudet

How do goats read 2D-images of familiar and unfamiliar conspecifics? **46**
Jan Langbein, Mauricio Moreno-Zambrano, Katrin Siebert

Goats may recognise humans cross-modally **47**
Marianne Mason, Harry Marshall, Stuart Semple, Alan McElligott

Measuring motivation for Sudan grass hay in finishing cattle using voluntary interaction with an aversive stimulus **48**
Rachael Coon, Cassandra B. Tucker

Heart rate variability response in horses during immediate and withheld food reward **49**
Sarah Kappel, Marco A Ramirez Montes De Oca, Sarah Collins, Katherine Herborn, Mike Mendl, Carole Fureix

Session 09: Behaviour and welfare of indigenous breeds and in extensive production systems

Welfare status of dairy cattle managed under extensive and intensive systems in hill state of Uttarakhand, India **50**
Mayamitta Saini, Madan Lal Kamboj, Arun Kumar Mishra, Ajmer Singh, K.Pannusamy

Cattle behaviour in silvopastoral systems: integrating animal welfare and the provision of ecosystem services **51**
Francisco Galindo

How behavioural robustness in sheep reared in rangeland can be impacted by early rearing conditions and genetics? **52**
Nadège Aigueperse, Cécile Ginane, Sara Parisot, André Guittard, Gaëtan Bonnafe, Sébastien Douls, Flavie Tortereau, Xavier Boivin

The impact of gastrointe stinal parasitism on lamb behaviour and welfare **53**
Michelle C Reeves, Naomi Booth, Naomi J Fox, Jo Donbavand, Mhairi Jack, Fiona Kenyon, Jessica E Martin, Emma M Baxter, Cathy M Dwyer

Influence of weaning age and naturally acquired nematode infections on behaviour of lambs **54**
Lena Lidfors, Niclas Högberg, Anna Hessle, Johan Höglund

Welfare and parasitology condition of extensively reared sheep during winter **55**
Katarina Nenadović, Marijana Vučinić, Nemanja Jovanović, Dejan Bugarski, Tamara Ilić

Association of range use, individual behavior, and welfare indicators of two laying hen hybrids housed under organic conditions **56**
Kaitlin E. Wurtz, Fernanda M. Tahamtani, Leslie Foldager, Karen Thodberg, Anja B. Riber

Animal welfare in changing agricultural landscapes of Ethiopia: a mixed-methods approach **57**
Gezahegn Alemayehu, Mulugeta Mokria, Tsega Berhe, Eyob Gelan, Knight – Jones Theodore, Rebecca Doyle

Session 10: Environmental effects on behaviour and welfare

Changing milking and feeding times to reduce heat stress in a pasture-based dairy system **58**
Karin E. Schütz, Neil R. Cox, Vanessa M. Cave, Frances J. Huddart, Cassandra B. Tucker

Shelter-seeking behaviour in horses during summer – do weather conditions and horsefly (Tabanidae) activity matter? **59**
Janne Winther Christensen, Henrik Skovgård

Jet aircraft flights over sheep on pasture: how do sheep respond? **60**
Judit Vas, Ruth Newberry, Ståle Otervik, Inger Lise Andersen

Long-term consequences of forage presentation on horses' welfare **61**
Marie Roig-Pons, Pr. Hanno Würbel, Dr. Sabrina Briefer

How much is too much? Feeding live black soldier fly larvae to laying hens **62**
Fernanda M. Tahamtani, Emma Ivarsson, Viktoria Wiklicky, Cecilia Lalander, Helena Wall, T. Bas Rodenburg, Frank A.M. Tuyttens, Carlos E. Hernandez

Effects of a rearranged drinking system on the behavior of turkeys (Meleagris gallopavo) **63**
Stephanie Schäfers, Nicole Kemper

Evaluating the temperature preferences of sexually mature Duroc, Landrace, Yorkshire boars **64**
Rebecca Pritchett, Victoria Raber, Lindsey Robbins, Kara Stewart, Brianna Gaskill, Angela Green-Miller, Jay Johnson

Light intensity preference of broilers is affected by breed, age and behaviour **65**
Jerine A.J. van der Eijk, Stephanie Melis, Tomas Izquierdo Garcia-Faria, Johan van Riel, Ingrid C. de Jong

Photovoltaic panels as a strategy for enhancing animal welfare and sustainability of sheep farming in tropical environments **66**
Vinicius de França Carvalho Fonsêca, Eric de Andrade Culhari, Gustavo André BernardoMoura, Hugo Maia Milan, Marcos Chiquitelli Neto, Alex Sandro Campos Maia

Pre-weaning social behaviour and peripheral serotonin levels are associated with behavioural and physiological responses to weaning in pigs **67**
Caroline Clouard, Héloïse Vesque-Annear, Colette Mustière, Françoise Thomas, Stéphane Ferchaud, Armelle Prunier, Elodie Merlot

Welfare and performance of finishing pigs are strongly affected by group size, density, and production system **68**
Inger Lise Andersen, Marko Ocepek

Perch use in commercial broiler breeder pullet hens – effect of perch type, height and age **69**
Guro Vasdal, Sabine G. Gebhardt-Henrich, Kathe E. Kittelsen, Fernanda M. Tahamtani

Session 11: Positive animal welfare

Enrichment preferences of beef cattle grazing at pasture **70**
Emily J. Dickson, Dana L.M. Campbell, Caroline Lee, Jim M. Lea, Paul G. McDonald, Jessica E. Monk

Smell this! - pigs' interest in, and behaviour towards odours of non-social origin **71**
Maria Vilain Rørvang, Anna Wallenbeck, Birte Nielsen, Anna Valros, Sarah-Lina Aagaard Schild, Rebecca Grut, Moses Gadri, Johanna Stenfelt

Let's mo(o)ve cows! Quantifying and optimizing locomotor activity by providing different modalities of exercise access **72**
Marjorie Cellier, Elise Shepley, Nadège Aigueperse, Marianne Villettaz Robichaud, Elsa Vasseur

Importance of motherhood: how motivated are dairy cows (Bos taurus taurus) to nurse their calves? **73**
Emma H. Jensen, Melissa Bateson, Heather W. Neave, Jean-Loup Rault, Margit B. Jensen

Calf-mother-bull stimulus in buffaloes: effects on the behavior and welfare of dams and their calves **74**
Sanjay Choudhary, Madan Lal Kamboj, Pawan Singh, Anjali Aggarwal, Nishant Kumar

Do cows see the forest or the trees? A preliminary investigation of attentional scope as an indicator of emotional state in dairy cows kept with their calves **75**
Heather W. Neave, Jean-Loup Rault, Melissa Bateson, Emma Hvidtfeldt Jensen, Margit Bak Jensen

Play behaviour of dam-reared dairy calves is affected by daily duration of contact with the dam **76**
Elea Bailly-Caumette, Maja Bertelsen, Margit Bak Jensen

Is calves' motivation to play affected by milk allowance and social environment? **77**
Verena Größbacher, Christoph Winckler, Marek Špinka, Alistair Lawrence

Do cows need to be social to be happy? **78**
Björn Forkman, Linda Keeling, Ronja Landvogt

Session 12: Positive animal welfare (2)

Effects of musical instrumentation on emotional responses of growing pigs **79**
Juliana Zapata Cardona, Maria Camila Ceballos, Ariel Marcel Tarazona Morales, Berardo de Jesús Rodríguez

The use of positive associations to strengthen the effects of auditory enrichment **80**
Richard Mott, Scottish SPCA, Fiona Dowell, Neil Evans

Session 13: Free Topics

Influence of the movement of social partners on housed dairy cows' decisions to use an outdoor space ... **81**
Emeline Nogues, Marthe Bourg, Borbala Foris, Daniel M. Weary, Marina A.G. von Keyserlingk

Temporal dynamics in chicken dominance hierarchies over maturation ... **82**
Klara J. Grethen, Yamenah Gómez, Michael J. Toscano

The inter-relationship between housing, pain, inflammation and vaginal microbiota on the welfare of sows and their offspring ... **83**
Adroaldo José Zanella

Peer Community In Animal Science: a free publication model for transparent and open science ... **84**
C. Nawroth, M. Gagaoua, F. Gondret, M. Hess, D. P. Morgavi, I. A. S. Olsson, M. Taghipoor, L. Tedeschi, I. Veissier, R. Muñoz-Tamayo

What are indirect proxies worth? ... **85**
Bernhard Voelkl

Session 14: Genetics and breeding for improved animal welfare

The best dad: how boars housing systems can shape their offspring's survival ... **86**
Leandro Sabei, Thiago Bernardino, Marisol Parada Sarmiento, César Gonçalves de Lima, Rosangela Poletto, Adroaldo José Zanella

Prevalence of keel bone fractures in hens and roosters from four non-commercial laying breeds ... **87**
Käthe Elise Kittelsen, Randi Oppermann Moe, Tone Beate Hansen, Ingrid Toftaker, Jens Peter Christensen, Guro Vasdal

Behavioural welfare indictors in conventional, intermediate, and slow growing broiler chicken strains: Slower growing strains have better mobility and utilise perching enrichment more ... **88**
Charlotte James, Dawn Scholey, Ashraf Alkhtib, Nicholas Ham, Keith Warner, Emily Burton

Session 15: Behavioural development in poultry

Artificial moving cues alter ramp use behaviour of laying hens in the early life period ... **89**
Alex Johny, Andrew Michael Janczak, Janicke Nordgreen, Michael Jeffery Toscano, Ariane Stratmann

Effects of the rearing environment complexity on laying hens' spatial cognition ... **90**
Lucille Dumontier, Andrew M. Janczak, Janicke Nordgreen

The relationship between age, fear responses, and walking ability of broiler chickens **91**
Sigga Nielsen Rasmussen, Dr. Marisa Erasmus, Dr. Anja Brinch Riber

Laying hen chicks make earlier use of elevated areas and perform more intertier transitions when provided with ramps in the rearing aviary **92**
Ariane Stratmann, Janice Siegford, Michael J. Toscano

Resting behaviour of broilers reared with or without artificial brooders..... **93**
Sara Forslind, Carlos E. Hernandez, Anja B. Riber, Helena Wall, Harry J. Blokhuis

Mummys boys and girls? Effects of the rearing system on behaviour in an Open-Field-Novel- Object test in turkeys (*Meleagris gallopavo*) **94**
Jenny Stracke, Alica Krasny, Lea Ahrens, Nicole Kemper

Session 16: Abnormal and damaging behaviour

Doubling feeder space can reduce competition for feed in pigs..... **95**
Roberta Maria D'Alessio, Alison Hanlon, Keelin O'Driscoll

Supplementation of amino acids at requirements for optimal growth largely counteracts the negative effects of low protein diets on tail biting in pigs, while extra enrichment is less effective **96**
Ilaria Minussi, Walter J. J. Gerrits, Alfons J. M. Jansman, Rosemarijn Gerritsen, Johan J. Zonderland, William Lambert, J. Elizabeth Bolhuis

Cognitive ability affects pigs' choice of opponents in aggression after regrouping **97**
Lucy Oldham, Gareth Arnott, Mark Brimsa[1], Irene Camerlink, Andrea Doeschl- Wilson, Agnieszka Futro, Victoria Lee, Francoise Wemelsfelder, Simon P. Turner

Improved gestation housing reduces sow oral stereotypical behaviour, and improves offspring health during the suckling period..... **98**
Martyna Lagoda, Keelin O'Driscoll, Maria Costanza Galli, Joanna Marchewka, Laura Boyle

Reducing aggressive behaviour in rabbit does housed in groups..... **99**
Ágnes Moravcsíková, Ondřej Krunt, Adam Kraus, Lukáš Zita, Luděk Bartoš

Risk factors for stereotypic behaviour in captive ungulates..... **100**
Kate Lewis, Leanne Proops, Matthew O. Parker, Sebastian D. McBride

Effect of access to pasture on hair cortisol and behaviour of sheep..... **101**
Ricard Pares, Pol Llonch, Xavier Manteca, Xavier Such

Session 17: Abnormal behaviour

Effects of playpen access on stereotypic behaviour and aggression in conventionally housed female laboratory mice..... **102**
Anna Ratuski, I. Joanna Makowska, Dan Weary

Learning performance and active enrichment use in farm mink with different forms of abnormal behaviour **103**
Jens Malmkvist, Maria Díez-León, Janne Winther Christensen

Toe-pecking – a serious but rarely studied welfare problem in laying hens **104**
Sabine G. Gebhardt-Henrich, Sabine Mueller; Lisa Zanini; Michael J. Toscano

Light & larvae as early-life interventions to prevent feather pecking in laying hens **105**
Saskia Kliphuis, Maëva WE Manet, Vivian C Goerlich, Rebecca E Nordquist, Frank AM Tuyttens, T Bas Rodenburg

Limit feeding of TMR increases intersucking in year-old dairy heifers **106**
Blair C. Downey, Harman B. Goeller, Cassandra B. Tucker

Assessing captive African elephant welfare using self-directed behaviours and tail-hair cortisol **107**
Jodie Brogan, Primrose Manning, Denise Hough, Maud Bonato

Session 18: JOINT ISAE - EAAP
Session - Behaviour of farm animals and how to measure it

Exploring diurnal feeding patterns of individual growing-finishing pigs under healthy and undisturbed conditions **108**
Jacinta D. Bus, Iris J.M.M. Boumans, Jasper Engel, Ron Wehrens, Laura E. Webb, Eddie A.M. Bokkers

Daily activity of dairy goats in extensive husbandry systems **109**
Monica Battini, Manuela Renna, Luca Battaglini, Silvana Mattiello

How do horses express their stress: the effect of coping styles on subtle behavioural indicators? **110**
Anne-Laure Maigrot, Marie Roig-Pons, Iris Bachmann, Sabrina Briefer Freymond

The Effects of Competition at the Feeder on Dominance in Dairy Cows **111**
K. Sheng, B. Foris, J. Krahn, D.M. Weary, M.A.G. Von Keyserlingk

Detecting Animal Contacts - A Deep Learning-Based Pig Detection and Tracking Approach **112**
M. Wutke, M. Gültas, A.O. Schmitt, I. Traulsen

Pain expression as an indicator of orthopedic disease in dairy cattle **113**
M. Söderlind, K. Ask, A. Granlund, A. Leclercq, E. Hernlund, P. Haubro Andersen, M. Rhodin

Poster session: Human-animal interactions

The effect on dogs of short-term exposure to unfamiliar visual, auditory, and olfactory stimuli (A pilot study) **114**
Megumi Fukuzawa, Sui Toyoizumi, Mizuki Ito, Osamu Kai

What's the problem? Owner perceptions of problem behaviours in dogs aged 6, 12, and 18 months **115**
Rachel Kinsman, Rachel Casey, Ben Cooper, Kassandra Giragosian, Naomi Harvey, Sara Owczarczak-Garstecka, Lauren Samet, Séverine Tasker, Jane Murray

Is UK puppy-buying culture also suffering a long-COVID effect? Quantifying the COVID-19 Pandemic legacy upon UK puppy buying behaviours **116**
Rowena MA Packer, Claire L Brand, Zoe Belshaw, Fiona Dale, Camilla L Pegram, Kim B Stevens, Dan G O'Neill

Information quality and attitudes of cat owners in Croatia about cat keeping and health: preliminary results **117**
Leon Pečarić, Mario Ostović, Sven Menčik, Ivana Sabolek, Željko Pavičić, Kristina Matković, Željka Mesić

Attitude towards animals by pet and non-pet owners in some selected veterinary clinics/hospitals of northern Nigeria **118**
Mohammad Bashir Aliyu, Sadiq Adamu Hassan, Fatima Lawal Yusuf, Mohammed Sanusi Yusuf, Daniel Obinna Esonu, Abubakar Sadiq Usman

Factors associated with children´s attitudes towards the humane treatment of animals **119**
Javiera Calderón-Amor, Camila Palma, Carmen Gallo

Psychopathy, Infant Features and Pet Attachment **120**
Sam Jack , Carroll Grace

The impact of the Covid-19 pandemic on animal adoptions and relinquishment: the perspective of shelter staff **121**
Grace A. Carroll, Alice Torjussen, Catherine Reeve

Belief in "Animal Mind": a survey of Italian ornamental bird owners and breeders **122**
Elizabeth Ann Walsh, Filippo Morrone, Dinato Beatrice, Lieve Lucia Meers, Donatella Gelli, Simona Rosaria Normando

Behavioral changes in pets, as reported by the owners, before and during the lockdown in China **123**
Sara Platto, Agathe Serres, Simona R C Normando, Wang Yanqing , Dennis C. Turner

Impact of Covid-19 safety protocols on the wellbeing of dogs involved in canine-assisted interventions - comparison between Flanders (Belgium), Italy and Spain **124**
Lieve Meers, Maya Sturlese, Carolina Duarte-Gan, Elizabeth Walsh, Laura Contalbrigo, William Samuels, Vicky Stevens, Stephan Laufer, Simona Normando

Research program about the development of future guide dogs for blind people: How can we optimise the breeding programme, from weaning to the end of training? **125**
Fanny Menuge, Míriam Marcet-Rius, Camille Chabaud, Eva Teruel, Galice Kalonji, Cécile Bienboire-Frosini, Tiago Mendonça, Alessandro Cozzi, Patrick Pageat

Behaviour and health of horses used in e quine-assisted intervention is associated with workload and husbandry conditions **126**
Susanne Waiblinger, Sarah Gosch, Stephanie Lürzel, Ines Windschnurer

Assessment of the welfare of working horses and mules in Colombia **127**
Marlyn H. Romero, Jorge Alberto Sanchez

The protective effect of social support: can humans reassure pigs during stressful challenges by using social learning? **128**
Daniela Luna, Javiera Calderón-Amor, Catalina González, Christopher Byrd, Rocío Palomo, Elizabeth Huenul, Jaime Figueroa

Effect of human-animal interaction on tear staining and body temperature of piglets **129**
Dayane Lemos Teixeira, Giovanni Marcone, Marc Bagaria, Berta Baulida, Emma Fàbrega

A systematic review of studies of chicken welfare at catching and risk of bias **130**
Heleen van de Weerd, Jon E.L. Day

Gaze following in ungulates: domesticated and non-domesticated species follow the gaze of both humans and conspecifics in an experimental context **131**
Alina Schaffer, Alvaro L. Caicoya, Montserrat Colell, Ruben Holland, Conrad Ensenyat[5], Federica Amici.

It makes a brave cow: how frequency of outdoor access improves the reactivity and human-animal relationship of dairy cattle **132**
Jasmine E. Muszik, Marjorie Cellier, Nadège Aigueperse, Elsa Vasseur

Exploring ridden horse behaviour and rider satisfaction: a pathway for improving horse welfare and rider safety? **133**
Karen Luke, Amanda Warren-Smith, Bradley Smith, Tina McAdie

ManyGoats - an initiative to promote open and reproducible research on goat behaviour and welfare **134**
Federica Amici, Okan Atay, Mario Balaro, Monica Battini, Desiree Brucks, Joao HC Costa[7], Ruan Daros, Shai David, Özdal Gökdal, Edna Hillmann, Nina M. Keil, Whitney Knauer, Uta König von Borste, Lorena Lacuesta, Serge-Yan Landau1, Rebecca K. Meagher, Carly Moody, Christian Nawroth, Heather Neave, Tjasa Pangerl, Fernando Sanchez-Davila, Janko Skok, Jenny Stracke, Jordan Tonooka, Rodolfo Ungerfeld, Beth Ventura, Arantxa Villagrá, Susanne Waiblinger, Tolulope J. Williams, Gosia Zobel

Flight distance in cows with limited resources **136**
Sergio Acuña Ballesteros, Fidel de Souza Pretto, João Pedro Donadio da Silva Pereira, Kevin Bernardes de Oliveira, Priscila Deotti Signor, Luiz Carlos Pinheiro Machado Filho

Owners' perceptions of the welfare of their diseased goats in Nyala, Sudan **137**
Saber Adam, Abdelkareem Ahmed

Assessment of human beliefs, value and practice towards animal welfare in 21st century, Sub- Saharan Africa **138**
Oluwafemi Babatunde Daodu, Michael Akagbe

Poster session: Animal Behaviour in response to on-farm management procedures

The effect of early pain experience on pain sensitivity later in life **139**
Zimbábwe Osório-Santos, Thomas Ede, Maria José Hötzel, Daniel M. Weary, Marina A. G. von Keyserlingk

Consumers' awareness of piglet castration and attitudes towards alternatives to surgical castration: results from North Macedonia **140**
Dimitar Nakov, Metodija Trajchev, Branislav Stanković, Marko Cincović, Slavča Hristov

Effects of group size on the social experience of dairy cows **141**
Joseph Krahn, Borbala Foris, Kehan Sheng, Daniel M. Weary, Marina A. G. von Keyserlingk

Can an oral probiotic affect the performance and feeding behavior of crossbred Holstein x Angus calves? **142**
Gustavo Mazon, Mackenzie Berry, Joao H.C. Costa

Effect of enrichment on change of behaviour and cortisol level in Hanwoo (Korean native cattle) **143**
Jung-hwan Jeon, Ki-hyun Kim, Ju-lan Chun

Effect of alternative farrowing pens with temporary crating on the performance of lactating sows and their litters **144**
Si Nae Cheon, Jung Hwan Jeon

The impact of cross-fostering on teat order in fostered piglets and residents **145**
Lara Pajžlar, Janko Skok, Dejan Škorjanc, Maja Prevolnik Povše

Effect of different light intensities on the activity patterns of growing-finishing pigs **146**
Alice Scaillierez, Sofie van Nieuwamerongen - de Koning, Iris Boumans, Rik van der Tol, Eddie Bokkers

Effects of light intensity on space use and pen fouling in growing-finishing pigs **147**
Sofie van Nieuwamerongen - de Koning, Alice Scaillierez, Iris Boumans, Rik van der Tol, Eddie Bokkers

How to increase pig and pen cleanliness and reduce ammonia concentration on fattening pig farms **148**
Marko Ocepek, Inger Lise Andersen

Particle and protein sorting in mixed rations by sheep and goats within two hours after feeding **149**
Roxanne Berthel, Frigga Dohme-Meier, Nina Keil

Feeding behaviour of sheep and goats on mixed rations varying in cutting lengths **150**
Roxanne Berthel, Frigga Dohme-Meier, Nina Keil

Assessment of feeding, drinking and nest box usage of laying hens in response to routine vaccination **151**
Azadeh Jalali, Klara J. Grethen, Laura Candelotto, Yamenah Gomez, Michael Toscano

Perch use and leg health measures of slow-growing broiler chickens provided with perches and outdoor access **152**
Hanh Han Quang, Xuan Nguyen Thi, Ton Vu Dinh

Present scenario of poultry slaughter welfare at traditional and commercial farming in Bangladesh **153**
Jalal Sarder, Hemayatul Islam, Rashida Khatun, Abdulla Bhuyan, Afia Khatun, Reazul Islam, Ishrat Moni, Jashim Uddin

Poster Session: PLF and Measuring behaviour and welfare

Camera-based automatic cow identification using deep neural networks **154**
Alexander Ulrichsen, Brian Lee, Paul Murray, Stephen Marshall, Mark Rutter

The impact of ambient temperature on the drinking behaviour of dairy cows measured with ruminal sensors **155**
Miroslav Kjosevski, Vlatko Ilieski, Aleksandar Janevski, Aleksandar Dodovski

Heat stress effects in dairy calf behavior: Association between elevated temperature-humidity index (THI) and behavior in dairy calves during the preweaning period **156**
Emily M. Rice, Melissa C. Cantor, and Joao H.C. Costa

A study concept: Developing models from an optimised number of sensors used for the welfare assessment of dairy cows **157**
Ena Dobrikj, Miroslav Kjosevski

Signs of bovine respiratory disease: A review of literature evaluating clinical illness scoring **158**
Aiden Juge, Courtney Daigle

Can we reliably detect livestock respiratory disease through precision farming? a systematic review **159**
Luís Fernando C. Garrido, Sabrina T. M. Sato, Leandro B. Costa, Ruan R. Daros

A pilot study of the use of acceleration data loggers for automatic behavior monitoring of layer hens **160**
Barbara Bagiova, Miroslav Hlasnik, Katarina Bodova, Katarina Pichova, Lubor Kostal

Vocalizations emitted by goats: are there any differences between bleats depending on the contexts of emission? **161**
Stefania Celozzi, Giorgio Presti, Mael Vittorio Vena, Stavros Ntalampiras, Luca Andrea Ludovico, Tyfenn Ogel, Monica Battini, Silvana Mattiello

Anti-predatory movement pattern of sheep on Norwegian rangeland pastures based on data from GPS collars **162**
Nina Salvesen, Svein-Olaf Hvasshovd, Lise Grøva, Inger Hansen, Erling Meisingset, Jennifer Stien

What was that noise? Horse behavior and facial expression after a sudden noise **163**
Angélica M. Palomino, Laize Guedes do Carmo, Laís C. Werner, Pedro Vicente Michelotto Jr, Ruan R. Daros

Using an automated infrared thermography system to detect changes in dairy cow eye temperature after an event presumed to cause stress (hoof trimming) **164**
Jennifer E Weller, Anna Henry, Stephanie Buijs

Infrared thermography to measure behavioural responses of emotion and productivity in dairy cows **165**
Jashim Uddin, Clive J.C. Phillips, David M. McNeill

Associations between feeding behaviors and management practices in automatically fed group-housed preweaned dairy calves in the Upper Midwest USA **166**
Rielle K. Perttu, Marcia I. Endres

Validation of behavioural sampling techniques for 20-25 kg pigs during 23-hour transport **167**
Cecilie Kobek-Kjeldager, Line D. Jensen, Leslie Foldager, Marianne Kaiser, Karen Thodberg, Mette S. Herskin

Validation of scan sampling techniques for nursery pig feeder and enrichment use **168**
Emiline R. Sundman, Daytona L. Fortney, Nicholas K. Gabler, Anna K. Johnson, Suzanne T. Millman, Kenneth J. Stalder,Cassandra R. Stambuk

Exploring variation in feeding behaviour traits within and between gestating sows **169**
Iris J.M.M. Boumans, Eddie A.M. Bokkers

Introducing the aWISH project: Animal Welfare Indicators at the Slaughter House **170**
Jarissa Maselyne, Tuna Coppens, Anneleen Watteyn, Anneleen De Visscher, Eline Kowalski, Marijke Aluwé, Frank Tuyttens

Sow and piglet welfare in farrowing housing systems: a systematic review **171**
Bianca Vandresen, Jen-Yun Chou, Maria José Hötzel

Reliability and repeatability of behavioural welfare measures for grazing dairy cows **172**
Lydiane Aubéab, Marie-Madeleine Mialon, Luc Mouniera, Frédéric Launay, Luc Delaby, Estelle Mollaret, Isabelle Veissier, Alice de Boyer des Rochesa

Poster session: Behaviour and welfare of indigenous breeds and in extensive production systems

The restraint enclosure effects on the reproductive ethology and efficiency of boars and sows of the free range Greek autochthonous black breed **173**
Christos Kalfopoulos, Ioannis Poulkas, Georgios Vatzias

Welfare parameters of Banat Naked Neck and Sombor Crested chickens in extensive production system ... **174**
Sava Spiridonović, Mirjana Đukić Stojčić, Lidija Perić

Nigerian indigenous chicks show age related difference in vocalization characteristics during short term social isolation ... **175**
Oluwaseun S. Iyasere, Peta S. Taylor, Samuel O. Durosaro, Victor J. Oyeniran, Oluwatowo E. Oyekunle, Tunmise F. Ehigbor

Welfare assessment of migratory Gaddi goats of North-Western Himalayan region ... **176**
Madan Lal Kamboj, Ankaj Thakur, Pardeep Kumar Dogra, Brij Vanita, Rakesh Thakur

There is hope for aged roosters to be sexually active and produce good quality semen ... **177**
Mariam Logunleko, Oluwaseun Iyasere, Samuel Durosaro, Mathew Wheto, Tawakalitu Olawoyin, Oluwafeyisarami Omotayo, Grateful Akande, Adebukola Agbaoye, Aduragbemi Eburuike, James Daramola

Brooding behaviours differ between the two ecotypes of Nigerian indigenous chickens ... **178**
Victor J. Oyeniran, Oluwaseun S. Iyasere, Samuel O. Durosaro, Fasasi B. Fasasi, Peace O. Odetayo, Sulaiman A. Ogunfuyi, Paul O. Odetunde[1], Taiwo C. Akintayo, James O. Daramola

On-farms dairy cattle welfare assessment in Nyala city, Sudan ... **179**
Saber Y. Adam, Abdelkareem A. Ahmed

Behaviour of Gaddi goats reared under nomadic pastoralism in North-Western Himalayan region in India ... **180**
Ankaj Thakur, Madan Lal Kamboj, Pardeep Kumar Dogra, Madhu Suman, Nishant Verma

Expert opinion on welfare risks of migratory goat production system of India ... **181**
Brij Vanita, Ankaj Thakur, Madan Lal Kamboj, Pardeep Kumar Dogra

Poster Session: Environmental effects on behaviour and welfare

Investigating the effects of jute nesting material and enriched piglet mats on sow welfare and piglet survival ... **182**
Lucy Markland, Jay S. Johnson, Brian T. Richert, Marisa A. Erasmus, Donald C. Lay, Jr.

Dealing with the challenge of early-life piglet hypothermia during the keeping of outdoor farrowing sows ... **183**
Jens Malmkvist, Lene J. Pedersen

Nutritional strategies to prevent post-weaning diarrhoea in organic piglets ... **184**
Marc Bagaria, Berta Baulida, Lluís Vila, Pino Delàs, Emma Fàbrega

Removal of confinement 3 days post-partum does not steadily increase exploratory behaviour nor reduce inactivity in domestic lactating sows ... **185**
Gudrun. Illmann, Sébastien. Goumon, Helena. Chaloupková, Iva Leszkowová

Effects of housing system on behaviour of middle growing broilers **186**
Mirjana Đukić Stojčić, Lidija Perić

Shearing rams in winter increased their physical activity and decreased their resting time **187**
Madeleine Guerrero, Josefina Irazábal, Claudia Perez Irazábal, Paula Meerhoff, A. Freitas-de-Melo, J. Giriboni1, R. Ungerfeld

The influence of the bedding material on dairy cows' behaviour **188**
Gustavo Campos Bueno Dias, Tarcis Alexandre Januario Raimundi, Marcos Inacio Marcondes, Polyana Pizzi Rotta

An overview of the effect of different tree arrangements of silvopastoral system on cattle behavior **189**
Karolini Tenffen de Sousa, Matheus Deniz, João Ricardo Dittrich, Maria José Hötzel

Effect of water and shade availability on grazing behaviour of cows in a Voisin Rational Grazing System **190**
Luiz Carlos Pinheiro Machado Filho, Fidel de Sousa Pretto, Sergio Acuña Ballestero, João Pedro Donadio da Silva Pereira, Kevin Oliveira, Priscila Signor

The effect of hot summer condition on the behavior of the captive red panda **191**
Ayuka Sanada, Risa Uchimoto, Kyohei Inada, Maho Yamanaka, Hideaki Hayashi, Ai Tanaka, Keisuke Nanto, Takuji Hirayama

Welfare concerns with mounted load carrying by working donkeys **192**
Syed S. U. H. Bukhari, Sarah M. Rosanowski, Alan G. McElligott, Rebecca S. V. Parkes

Poster Session: Free Cognition

Breed differences of cognitive traits in the domestic dog (*Canis familiaris*) **193**
Saara Junttila, Anna Valros, Katariina Mäki, Katriina Tiira

Performance of laying hens in the 8-arm radial maze task **194**
Ľubor Košťál, Katarína Pichová, Zuzana Skalná

Optimization of the operant judgement bias test for the assessment of laying hens welfare **195**
Katarína Pichová, Zuzana Skalná, Ľubor Košťál

Preliminary results: effectiveness of cage enrichment for reducing aggressive behavior in group-housed unfamiliar breeding does **196**
Liesbeth G.W. Van Damme, Nusret Ipek, Jan Verwaeren, Frank A.M. Tuyttens

Impact of stocking density and exercise on the maintenance behaviours and herd synchrony of developing beef heifers **197**
Courtney L. Daigle, Reinaldo F. Cooke, Logan Rahmel, Aiden E. Juge, Kelsey M. Harvey

Synchronous observations of behaviour of five species of felids in three Swedish zoos **198**
Claes Anderson, Jenny Loberg, Ulrica Ahlrot, Lisa Lundin, Maria Andersson

How should the public contribute to improving cattle welfare? Ambivalence in perspectives from veterinarians and animal scientists **199**
Beth Ventura, Dan Weary, Nina von Keyserlingk

Do you feel what I feel? Emotional contagion in domestic pigs – a pilot study **200**
Annika Krause, Helena Maudanz, Jan Langbein

Housing a male giraffe with females triggers more aggressive behaviors from a high- ranking female towards a low-ranking female **201**
Miho Saito, Masayuki Matsunaga, Hiroki Fukuizumi, Kodzue Kinoshita

Public knowledge of the legislation, awareness, and attitudes towards animal welfare: a study among clients of Department of Veterinary Services Malaysia **202**
Razlina Raghazli

Poster Session: Positive animal welfare

Don't get in their way: How outing conditions relate to the motivation of movement- restricted cattle to access an outdoor exercise yard **203**
Nadège Aigueperse, Véronique Boyer, Elsa Vasseur

Can straw or compost satisfy the rooting motivation of fattening pigs? **204**
Christina Rufener, Sarah Lopez, Mirjam Holinger

Reduction in body lesions of pigs through the provision of novel enrichment **205**
Katarína Bučková, Ramon Muns, José Cerón, Ilias Kyriazakis

Rehoming dogs from commercial breeding kennels: behavioral and management factors to set them up for success **206**
Shanis Barnard, Alessia Diana, Hannah Flint, Traci Shreyer, Candace Crone

Thinking outside the (shoe)box: Refining rat housing and handling to enhance animal welfare **207**
Carly I. O'Malley, Halimatou Tambadou, Emilie Paterson, Erik Moreau, Olufemi Ekundayo, Jukka Puoliväli, Patricia V. Turner

Development of a novel digital enrichment system to enhance the welfare of zoo- housed chimpanzees **208**
Yumi Yamanashi, Ryoko Aoki, Zon Ito, Nobuaki Yoshida, Yuko Ikkatai

Stranger-directed fear in breeding dogs linked with management practices in commercial breeding kennels **209**
Aitor Arrazola, Shanis Barnard, Traci Shreyer,Candace Croney

The effects of foster cow rearing on dairy calf health and welfare **210**
Olivia Bolton, Gemma Charlton, Emma Bleach

Pasture-based dairy cow and calf suckling system **211**
Sandra Ospina-Rios, Caroline Lee, Sarah Andrewartha, Megan Verdon

The presence of non-maternal social models in early life affects long-term dairy heifer responses to a novel object **212**
Laura Field, Lauren Hemsworth, Ellen Jongman, Megan Verdon

Laying hens increase litter use in the presence of a novel object..... **213**
Laura Candelotto, Klara J. Grethen, Yamenah Gomez, Michael J. Toscano

A buffet of litters - Broiler chicken responses to multiple litter choices **214**
Regine Victoria Holt, Judit Vas, Guro Vasdal, Ruth C. Newberry

Is one water trough enough for beef calves reared with cows? **215**
João Pedro Donadio da Silva Pereira, Fidel Pretto, Karolini de Sousa Tenffen, Matheus Deniz, Luiz Carlos Pinheiro Machado Filho

Influence of environmental enrichment on growth, behaviour and physiology of juveniles of *Clarias gariepinus* under laboratory conditions..... **216**
Oluwaseun C. Ojelade, Abiodun O. Akinde, Mathew B. Oladepo, Comfort A. Sopein, Abiodun S. Bhadmus, Mary Olateju

Poster session: Free Topics

Impact of European starlings (*Sturnus vulgaris*) on lactating dairy cow behavior ... **217**
Callan Lichtenwalter, Amber Adams Progar

Cage dividers reduce aggression and differentially affect corticosterone and testosterone levels in mice of different ranks..... **218**
Christina Streiff, Adrian Herrera, Bernhard Voelkl, Rupert Palme, Hanno Würbel, Janja Novak

Effect of social isolation at a zoo on behavioural state in the bush dog (*Speothos venaticus*) **219**
Akitsu Tozawa, Haruki Saito, Kanae Shimada, Yumi Yamanashi

UFAW and ISAE – the importance of collaboration **220**
Birte L Nielsen, Huw D.R. Golledge

Impact of bedding type on cattle behaviour while housed in a biocontainment facility..... **221**
Jessica Porter, Claudia C.G. Lozada, Zach Kahn, Brandon Dominguez, Courtney L. Daigle

Methods in feline personality assessment: a scoping review..... **222**
Sabrina T. M. Sato, Luís Fernando C. Garrido, Ruan R. Daros

Initiation of university dual study programs in field of animal sciences in albania and kosovo (Erasmus+ DualAFS)..... **223**
Skender M, Heinrich S, Ardita J, Myqerem T, Muhamet K, Enkelejda E, Anila H, Alltane K, Arben M, Bajram B

Poster Session: Genetics and breeding for improved animal welfare

Can we predict Lippizan horse's personality based on anatomical characteristics? **224**
Elena Gobbo, Nataša Debeljak, Manja Zupan Šemrov

Lameness in pregnant sows altered placental cortisol and cortisone ratio and gestation length **225**
Marisol Parada Sarmiento, Leandro Sabei, Matteo Chincarini, Lydia Lanzoni, Rupert Palme, Adroaldo José Zanella, Giorgio Vignola

Grazing behavior of different breeds in a Voisin Rational Grazing System **226**
Fidel de Souza Pretto, João Pedro Donadio da Silva Pereira, Kevin Bernardes de Oliveira, Priscila Deotti Signor, Sergio Acuña Ballesteros, Luiz Carlos Pinheiro Machado Filho

Temperament evaluation in feedlot-housed Brahman heifers **227**
Makala Herman, Jocelyn Johnson, Gustavo Toro

Genotypic differences in open field behaviours of FUNAAB Alpha broiler chickens **228**
Samuel Durosaro, Oluwaseun Iyasere, Babatunde Ilori, Victor Oyeniran, Samuel Adu, Taye Eniafe, Michael Ozoje

Poster Session: Behavioural development and Free Topics

Effects of individual hatching system factors on stress responsivity in laying hens .. **229**
Catharina M.H. Broekmeulen, Yamenah Gómez, Sabine G. Gebhardt-Henrich, Michael J. Toscano

Effect of dark brooders on activity level in layer pullets **230**
Janja Sirovnik, Albert Martin-Cirera, Mark Dunn, Maciej Oczak, Anja B. Riber

Consequences of mixed sex rearing on reproductive behavior and physiology of sexually mature drakes, and flock fertility **231**
Maja M. Makagon, Lindsey J. Broadus, Brian Lee

Poster Session: Abnormal and damaging behaviour

Increased dietary fiber, protein and tryptophan levels reduces feather pecking behavior in pen-housed intact-beaked laying hens **232**
Catherine Hamelin, Céline Guerini, Anaïs Roux, Panagiotis Sakkas,

Relation of faecal lactobacilli to manipulative behaviour in pigs **233**
Emilia König, Paulina Heponiemi, Sanni Kivinen, Jaakko Räkköläinen, Shea Beasley, Vilja Hukkinen, Marianna Norring, Virpi Sali1, Seppo Salminen, Mari Heinonen, Anna Valros

Preliminary study on link between tail biting behaviour, tail posture and enrichment manipulation **234**
Friederike Katharina Warns, Andrea Friggemann, Katharina Dahlhoff, Astrid Luise van Asten

Slow down tail biting outbreak by supplementing gilts water with essential oil of orange **235**

Alexis Nalovic, Jean-François Gabarrou, Aurélie Auvray
Can be pale pink comb colour in laying hens an indicator of keel bone fractures detected by palpation - a case study from Albania **236**
Sokol Duro, Arben Kambo, Marjol Shehaj, Eduart Sula

Development of abnormal oral repetitive behaviours in foals: the role of maternal and suckling behaviour..... **237**
Aline Bouquet, Christine Nicol, Nicola Blackie, Roberta Ferro De Godoy, María Díez- León

Slow down aggressive behaviour by supplementing poultry with a sensory feed additive mainly based on essential oil of orange **238**
Jean-François Gabarrou, Quentin Tiqui, Aurélie Auvray

Survey of professional egg producers and private bird keepers on control measures against avian influenza and their effects on animal welfare **239**
Femke Delanglez, Bart Ampe, Anneleen Watteyn, Frank A.M. Tuyttens

Workshop 01: Teaching applied ethology and animal welfare: How to build a community of practice

Teaching applied ethology and animal welfare: how to build a community of practice **240**
Beth Ventura, Kathryn Proudfoot

Workshop 02: Developing Standards for the Management and Welfare of Elephants in Human Care to facilitate positive Human - Elephant interactions

Developing standards for the management and welfare of elephants in human care to facilitate positive human - elephant interactions **241**
Jake Rendle-Worthington, Marthe Kiley-Worthington, Christine Nicol, Lisa Yon

Authors Index..... **242**

David Wood-Gush – His Life and Impact on Applied Animal Behaviour Science

Alistair Lawrence

Chair of Animal Behaviour & Welfare, SRUC and University of Edinburgh
Presenting author: Alistair.Lawrence@sruc.ac.uk

David Wood-Gush is widely considered to be one of the most influential pioneers of applied animal behaviour and welfare science. This year marks 100 years since his birth (20th November 1922) and 30 years since his death (1st December 1992). In this short paper I will discuss his legacy and prominent role in the development of animal welfare science. David started his academic career in the post-war period coming to the University of Edinburgh to study the genetics of woodlice for his PhD. His growing interest in animal behaviour marked a change of direction and led to his appointment as head of Ethology at the newly created Poultry Research Centre (PRC) in 1952 at Edinburgh. He was initially interested in reproductive behaviour and physiology of poultry. This was to change with the publication of Ruth Harrison's 'Animal Machines' (1964) and the 'Brambell Committee Report (1965), after whic h he began to apply behaviour to understanding animal welfare issues. He was a prolific writer and by the time of his death had published more than 200 articles covering research on all the main terrestrial farm animals. David's lasting contributions to our field include as: (a) A scientist: David is best described as an ethologist and much of his work involved the use of ethological techniques, for example to describe the behaviour of free-ranging farm animals. These studies made important contributions to understanding the effects of domestication on behaviour and the debate over 'behavioural needs' for farmed animals. However, at the same time David had broad interests and he actively encouraged the blending of ethology with other areas of behavioural science including psychology, cognitive science and behavioural neuroscience helping create the field of applied behavioural science that we recognise today. (b) A teacher: David moved to the Edinburgh School of Agriculture in 1979 and became actively involved in developing behaviour and welfare teaching as part of the agricultural and veterinary curricula. In 1990 he helped set up the first MSc in Applied Animal Behaviour and Welfare which in 2021 celebrated it's 30 year anniversary having over 800 graduates, many working in various aspects of animal welfare. (c) An inspiration: David had great abilities to inspire his peers and students. At the PRC he built the first significant research grouping studying behaviour and welfare and at the School of Agriculture he had a profound influence on a large cohort of PhD students and post-doctoral scientists. He also collaborated with many colleagues across the University including in Zoology, where his great friend Aubrey Manning, ran lunchtime seminars on animal behaviour stimulating discussion and debate on the latest issues in animal behaviour including in applie d research. At the time of David's death to honour his memory a group of colleagues and friends organise d the fund which is used to support the ISAE annual Wood-Gush Memorial lecture.

Wolf-dog differences: It is not that simple!

Friederike Range

Domestication Lab, Konrad Lorenz Institute of Ethology,
Department of Interdisciplinary Life Sciences, University of Veterinary Medicine Vienna
Presenting author: Friederike.Range@vetmeduni.ac.at

Recent theories on the evolutionary origins of dogs' extraordinary cooperativeness propose that their tamer, more tolerant temperament in comparison to wolves allowed for accepting humans as social partners and subsequently the development of their human-like social skills. However, depending on the definition of cooperation, social relationships, as well as the social skills navigating those, might differ. While in biology cooperation is usually defined as'two (or more) individua ls working together to reach a common goal', in everyday life and according to the main English dictionaries, cooperation is also defined as 'compliance'. For example, if we refer to our dog as being cooperative, it usually means that it nicely does what we request it to do. Thus, if indeed dogs are more compliant than wolves, the evolutionary origin of dog-human cooperation might be selection for enhanced sensitivity to social inhibition, giving rise to dogs more readily accepting their social partners' leading role than wolves. Such higher tractability of dogs compared to wolves might facilitate living together and training dogs for different roles, but might also have consequences for their social-cognitive abilities. By testing similar raised and kept dogs and wolves as well as dogs with different life experiences (pet dogs/free-ranging dogs) in various 'cooperation/compliance' tasks with human partners, we investigated the social relationship they form with humans, their tractability and cooperativeness. We found that highly socialized adult wolves can learn to accept humans as partners and do not differ from dogs in their ability to cooperate with them. However, when analysing the details of the animal-human interactions, we find that while wolves really seem to cooperate i.e. seek to carry out a common goal, whilst dogs rather wait and then follow the action initiation of the human partner – in other words: dogs are compliant rather than cooperative. While this wolf-dog difference in tractability does not seem to be there early on during development, as adults, dogs' propensity to follow human commands is much more pronounced. Interestingly, this seems to be, at least to some degree, independent of the kind of socialization dogs experienced. To sum up, results to date reveal that while wolves and dogs certainly differ in compliance ensuring safe co-habitation and co-working with humans, the differences in socio-cognitive skills and the relationships they can establish with their human caregivers are smaller than expected.

The quest to develop automated systems for monitoring animal behaviour

Janice Siegford[1*], Juan Steibel[1,2], Junjie Han[1,3], Madonna Benjamin[4], Tami Brown-Brandl[5], Joao R. R. Dorea[6], Daniel Morris[7], Tomas Norton[8], Eric Psota[9], Guilherme J. M. Rosa[6]

[1] *Department of Animal Science, Michigan State University, USA*
[2] *Department of Fisheries and Wildlife, Michigan State University, USA*
[3] *Computational Mathematics, Science and Engineering, Michigan State University, USA*
[4] *Department of Large Animal Clinical Science, Michigan State University, USA*
[5] *Department of Biological Systems Engineering, University of Nebraska-Lincoln, USA*
[6] *Department of Animal and Dairy Sciences, University of Wisconsin-Madison, USA*
[7] *Department of Electrical and Computer Engineering, Michigan State University, USA*
[8] *Division of Animal and Human Health Engineering, KU Leuven, Belgium*
[9] *PIC North America, USA*
[*] *Presenting author: siegford@msu.edu*

Automated behaviour monitoring (ABM) strategies are being researched at a feverish rate to detect an array of behaviours across a range of species. There is growing optimism that soon, ethologists will not have to manually decode hours (and hours) of animal behaviour videos, but that instead a computer can process visual and audiological information for us. But before getting too excited, it is important to take a realistic look at exactly what ABM is being developed, who is developing it, and the context in which these studies occur. Once we understand common pitfalls occurring during ABM development and identify limitations, we can construct robust ABM to achieve automated (ultimately even continuous and real time) analysis of behavioural data, allowing for more detailed or longer-term studies of behaviour on larger numbers of animals than ever before. ABM is only as good as it is trained to be. A key starting point is having manually annotated data for model training. However, most ABM developers are not trained in ethology. Often no formal ethogram is developed and descriptions of target behaviours in ABM publications are limited or inaccurate. ABM is frequently developed using small datasets, which lack sufficient variability in animal morphometrics and activities or camera viewpoints and environmental features to be generalizable. Thus, ABM often needs to be further validated before being used satisfactorily on different populations or under other conditions, even for research purposes. Our team is developing a multidisciplinary network of researchers to help address problems when applying computer vision ABM to measure and use behaviour. Our activities include generating and sharing reference datasets for behaviour detection, including image data, annotations, and baseline analyses for benchmarking. We are also developing standards for creating reference datasets and methods for evaluating results. We are reviewing publicly available ABM datasets for future uses and have identified 23 datasets so far, which are suitable for a variety of computational tasks. For example, 12 datasets contain images and meta- data useful for detecting animals, 5 are suitable for animal identification, 5 are useful for pose estimation or activity classification, and 4 for training and testing tracking algorithms. As we work to realize the promise of ABM (and subsequent precision livestock farming technologies) to detect animal behaviour, a clear understanding of best practices, access to accurately annotated datasets, and networking among ethologists and ABM developers will increase our chances for rapid and robust successes.

Pig olfaction – a well-known yet overlooked sensory modality

Sarah-Lina Aagaard Schild[1*], Maria Vilain Rørvang[2,3]

[1] The Innovation Centre for Organic Farming, Denmark
[2] Dept. Biosystems and Technology, Swedish University of Agricultural Sciences (SLU), Sweden
[3] Dept. Animal Environment and Health, Swedish University of Agricultural Sciences (SLU), Sweden
[*]Presenting author: sali@icoel.dk

Pigs are widely acknowledged for their sense of smell, but how much do we know about this sensory modality in pigs? There are numerous basic questions that remain unanswered, such as: What odours are pigs able to smell? And what odours are they interested in? These questions need to be addressed to identify the odours best suited to enrich the life of our farmed pigs.This review aims to explore the currently available literature on olfaction and olfactory abilities of pigs to elucidate the current knowns and unknowns within the topic. We further want to highlight potential risks for animal welfare that the lacking knowledge poses and propose new promising research questions and ways to utilize pigs' sense of smell in the daily management of the animals. Where we, as humans, direct our eyes (i.e. vision) towards the point of attention, pigs will direct their ears and/or snout. Studies suggest that the olfactory organ of pigs is functional already at birth and that piglets can recognize the smell of the sow within 12h *postpartum*. When compared to humans, and several other animal species, the pig's olfactory system is more prominent, and their olfactory detection threshold is lower than for other mammalian species. Olfaction serves a variety of functions for pigs, for instance pigs use odours for the recognition of familiar individuals/group mates, social status, sexual receptivity, and to keep roaming bands together. Further, sniffing is a well-known part of pigs' exploratory behaviour. Still, there is a lack of knowledge of pigs' behaviour when exploring odours (other than sniffing and appetitive behaviour). Further research on the olfactory abilities of pigs is greatly needed and may ultimately ensure a more sustainable pig production in terms of improved animal welfare. With this review, we want to spark discussion of the challenges this research area may pose to the industry and potential ways to move forward.

Music for animal welfare: a critical review & conceptual framework

Buddhamas P. Kriengwatana[1,2*], Richard Mott[1], Carel ten Cate[3]

[1] Institute for Biodiversity, Animal Health & Comparative Medicine, College of Medical, Veterinary & Life Sciences, University of Glasgow, UK
[2] Animal and Human Health Engineering, Department of Biosystems, KU Leuven, Belgium
[3] Institute of Biology Leiden, Leiden University, the Netherlands
[*]Presenting author: pralle.kriengwatana@kuleuven.be

Music can have powerful effects on human health and wellbeing. These findings have inspired an emerging field of research that focuses on the potential of music for animal welfare, with most studies investigating whether music can enhance overall wellbeing. However, this sole focus on discovering what effects music have on animals is insufficient for advancing scientific and practical understanding of how music can be used as an enrichment tool and can also lead to problems in experimental design and interpretation. This paper argues for a different approach to the study of music for welfare, where music is used to address specific welfare goals, taking account what animals hear in music and selecting or creating 'musical' compositions that test current hypotheses about how music is able to influence animal behaviour and physiology. Within this conceptual framework, we outline the process through which perceptual abilities influence welfare outcomes and suggest reframing music for welfare research as *Auditory Enrichment Research* which adopts a targeted approach that does not purpose music as an all-round welfare enhancer but rather investigates whether auditory enrichment can ameliorate specific welfare problems based on species-specific perceptual abilities, needs, and welfare goals. Ultimately, we hope that these discussions will help to bring greater unification, vision, and directionality in the field.

A psychobiological approach to the assessment of animal behaviour and its application in applied ethology

Daniel S. Mills

Dept of Life Sciences, University of Lincoln. Lincoln, Lincs LN6 7DL UK
Presenting author: dmills@lincoln.ac.uk

There is little consensus in the definition of terminology used to describe many fundamental concepts relevant to applied ethology, ranging from broad phenomena such as "stress" and "emotion" to specific aspects of behaviour such as "aggression" and "play". A consensus may never be reached for some of these, but researchers need to acknowledge the limitations of these issues and ensure that they define *a priori* the way in which they are using a particular term in their scientific publications. Common errors include the initial definition of a term in one way during research (e.g. "stress" defined in terms of cortisol response) but its subsequent use in another way when considering the implications of findings (e.g. in terms of compromised welfare). Within the field of clinical animal behaviour (management of problem behaviour in companion animals), artificial comorbidities in diagnoses are common. This may arise because diagnostic categories may be used that refer to different aspects of the complaint as if they are different issues; e.g. a dog may be described as having food guarding behaviour, possessive aggression and frustration-related aggression, as if these are three separate conditions, when they actually refer to three different aspects of behaviour: its context, motivational and emotional basis. The "psychobiological approach", pioneered by the author over the last 25 years, aims to synthesise epistemologies relating to psychological and biological behavioural causes (at proximate and ultimate levels) in order to provide a consistent systematic framework for its analysis. Within this approach, the concept of motivational state is related to the functional goal of behaviour while emotional state describes the animal's personal evaluation of its relationship to stimuli and the processes that flow from this (including the creation of biases in the broader behavioural strategies of the individual). Motivational and emotional state can only be inferred, and so need to re-evaluated scientifically as new information becomes available. Tentative behavioural "diagnoses" are reached through triangulation of evidence and falsification of competing explanations at the level of context, motivation and emotion. Within the psychobiological approach, abnormal behaviour is largely viewed as having developed through normal functional processes even if the end result is maladaptive in the short term. This approach also gives insight into fundamental issues such as how different emotional qualities might develop within individuals through the classification of stimuli in terms of their emotional affordance value (i.e. importance to the individual in terms of ultimate emotional function).

Non-offspring nursing in free-ranging domestic dogs (*Canis familiaris*)

Sunil Kumar Pal

Katwa Bharati Bhaban, P.O.- Katwa, Dist.- Purba Barddhaman, W.B., India
Presenting author: drskpal@rediffmail.com

To determine whether there is any non-offspring care among free-ranging domestic dogs, from March 2019 to May 2021 a total of eight matrilineal related dog groups (range 2–3 females per group) consisting of 17 adult females were observed in the town of Katwa (23.6404° N, 88.1299° E) in the state of West Bengal, India for the first 13 weeks of rearing or until weaning. Among the focal bitches (n = 17), 16 bitches were observed to nurse their kin-related pups. Data were collected on a weekly basis using focal animal sampling. Occasionally the dog groups were observed from some kind of hiding places without disturbing them using a pair of binoculars. After parturition, the focal dog groups were observed for three times per day (30 min per session); and a total of 273 h for individual group was devoted to collect data for this two-years study. Data were analysed using a Pearson's coefficient of correlation and GLMM. In this study, 44% pups survived to the age of 13 weeks; and the survival pups in each group varied from 3 to 8. When the bitches' short foraging trips began (pups' third week of age), matrilineal females (allomothers) were observed to protect, nurse and also to feed by regurgitation to their kin related pups showing the evidence of 'non-offspring nursing'. Lactating mothers were significantly different from each other in relation to their frequency of allomother-pup contact and allomother-pup suckling bouts ($F_{15, 351} = 3.953$, $P<0.0001$; $F_{15, 351} = 3.447$, $P<0.0001$ respectively). The frequency of allomother-pup contact and allomother-pup suckling bouts increased until 6 weeks of kin-related pups' age, before switching to a decreasing trend showing the evidences of weekly variations of allomother-pup contact and allomother-pup suckling bouts ($F_{10, 351} = 97.587$, $P<0.0001$; $F_{10, 351} = 97.343$, $P<0.0001$ respectively). The most striking feature of this study was that the duration of non-offspring nursing bouts decreased as litter size increased (r=- 0.9596). There were significant differences among the dog groups in relation to their frequency of aggression ($F_{7,207} = 4.496$, $P<0.0001$) to protect the pups as well to their frequency of regurgitation ($F_{7,95} = 2.423$, $P<0.026$**).** From this study, it may be suggested that in the case of free-ranging dogs having excess milk perhaps due to high pup mortality non-offspring nursing may evolve as low cost behaviour in free-ranging dogs. Moreover, this study strongly suggests the kin selection theory.

The effect of dam fear and stress on puppy welfare in commercial-breeding kennels

Aynsley Romaniuk[1*], Shanis Barnard[1], Jennifer Weller[2], Uri Baqueiro Espinosa[3], Traci Shreyer[1], Gareth Arnott[3], Candace Croney[1]

[1] *Department of Comparative Pathobiology, Purdue University, Indiana, USA*
[2] *Agri-Food & Biosciences Institute, Northern Ireland, UK*
[3] *School of Biological Sciences, Queen's University Belfast, Northern Ireland, UK*
[*]*Presenting author: aromaniu@purdue.edu*

Dogs and puppies from commercial-breeding (CB) kennels face stressors such as encountering strangers, transportation, and acclimation to a new home. Fear and stress are typical responses to these novel situations and are associated with poor welfare. Maternal factors may affect an individual's response to stressors but have rarely been explored in dog populations. The aim of the current study was to identify the effects of dam fear and stress on puppy welfare in CB kennels. Dams and puppies were continuously housed together from whelping until weaning (mean= 47 days, range= 42- 57 days). Dams (n= 92) were tested at 6- and 1-week prepartum, and 4- and 8- weeks postpartum. Their litters (n= 390 puppies) were tested at 4- and 8-weeks of age. Dams and their puppies were subjected to a stranger approach test, physical health assessment, one-minute isolation test, and fecal collection for secretory immunoglobulin A (sIgA) concentration, fecal glucocorticoid metabolite (FGM) concentration, and presence of intestinal parasites. Additionally, hair was collected from dams for hair cortisol concentration, and blood was collected for oxytocin and vasopressin concentrations. Spearman's correlations identified significant correlations between puppies' responses to stranger approach at 4- and 8- weeks old (r_s= 0.29, p< 0.00001). There were no significant correlations between puppies' and dams' responses to stranger approach at equivalent time points or puppies' responses at 4- and 8- weeks of age and dams' responses at 6-weeks prepartum. There were significant positive correlations between exploration duration (r_s= 0.20, p= 0.0002), and frequency of lip-licking (r_s= 0.23, p< 0.0001) and elimination (r_s= 0.11, p= 0.04) exhibited by 8-week-old puppies and dams during the isolation test. Positive correlations between litter and dam FGM were identified at 4- (r_s= 0.46, p= 0.03) and 8-weeks (r_s= 0.56, p< 0.00001). Preliminary results provide insight into relationships between dam and puppy behavior in response to acute stress and basal cortisol concentrations. Results from mixed-effects models will be presented to further explore associations between behavioral and physiologic indicators of fear and stress in dams and equivalent puppy outcomes, and the potential mechanisms behind them. The current study will provide new knowledge on the association between fear and stress-related factors in dams and their offspring that may be useful in supporting their welfare in CB kennels.

Effect of positive human interaction on attention bias and affective states of commercial breeding dogs.

Uri Baqueiro-Espinosa*, Tsz H Lo, Victoria McEvoy, Rachel Hunter, Gareth Arnott

Institute of Global Food Security, School of Biological Sciences, Queen's University Belfast, Belfast, UK.
**Presenting author: ubaqueiroespinosa01@qub.ac.uk*

Long-term confinement can have detrimental effects on the welfare of dogs, leading to chronic stress and the development of behavioural problems such as aggression and fearfulness towards novel situations. Previous research in humans and animals shows that negative affective states, including anxiety and depression, increase the subject's attention towards a threatening stimulus. However, enrichment in the form of positive human interaction has been shown to reduce behavioural fear responses in shelter dogs and appears to increase positive expectancy towards ambiguous stimuli in kenneled dogs. In this study, thirty-one breeding dams from various breeds and cross-breeds from a fully licensed UK Commercial Breeding Establishment were pseudo- randomly assigned to either a control (N = 16) or a treatment group (N = 15), attempting to balance groups by breeds. Treatment consisted of 15-minute enrichment sessions, three days a week, where an experimenter offered treats to the dogs and encouraged them to play with different toys. Dogs in the control group were maintained at baseline management conditions where the only human interactions they had were those related to daily feeding and cleaning of their pens performed by the staff. After the 4-week treatment, dogs were tested in a 180 seconds attention bias test. Dogs were exposed for 10 seconds to a sudden-threatening negative stimulus (an umbrella being opened and closed in a continuous manner by a person) at the start of the test, and to a positive stimulus (bowl with food) throughout the duration of the test. Duration and frequency of the attention towards both the negative and positive stimuli were compared between the two groups. Statistical analyses using pairwise comparisons showed that control dogs had a higher frequency of looking towards the location of the threatening stimulus ($P < 0.01$). Moreover, enriched dogs spent significantly more time interacting with the food bowl (sniffing and eating: $P < 0.01$) than control dogs. To our knowledge, this study is the first to assess dogs emotional state using an attention bias paradigm. Our results suggest that long-term positive human interaction can positively influence the affective state of adult female commercial breeding dams.

Dog breed differences in reactions to a disgruntled stranger partially support veterinarian's distinct pain sensitivity ratings

Rachel M. P. Caddiell[1*], Rachael M. Cunningham[2], B. Duncan. X. Lascelles[1,3,4], Margaret E. Gruen[1,4]

[1]*Comparative Behavioral Research, Department of Clinical Sciences, College of Veterinary Medicine, North Carolina State University, Raleigh, NC, USA*
[2]*Department of Small Animal Clinical Sciences, College of Veterinary Medicine, Michigan State University, East Lansing, Michigan*
[3] *Translational Research in Pain (TRiP) Program, Department of Clinical Sciences, College of Veterinary Medicine, North Carolina State University, Raleigh, NC, USA*
[4]*Comparative Pain Research and Education Center, North Carolina State University, Raleigh, NC, USA*
[*]*Presenting author: rmpark@ncsu.edu*

Veterinarians believe different breeds have varying pain sensitivity. The current study investigated whether true differences exist, and whether veterinarian ratings are attributable to observed behavioral responses of different breeds. Ten dog breeds were selected, representing breeds subjectively rated as high (chihuahua, German shepherd, Maltese, Siberian husky), average (border collie, Boston terrier, Jack Russell terrier), or low (golden retriever, pitbull, Labrador retriever) pain sensitivity. Eligible dogs were adult (>1.5 years) and deemed pain free upon general and orthopedic examination. This cross-sectional study included a final sample of 148 dogs. Pain sensitivity was assessed using quantitative sensory testing (QST), a non-invasive technique measuring responsiveness of the somatosensory system. Additionally, all dogs participated in a disgruntled stranger test assessing behavioral reactions to an unfamiliar individual wearing a hooded sweatshirt and speaking loudly into their phone for ~30 seconds. A trained observer assigned 4-point scores for 1) the dog's initial response and 2) willingness to approach the stranger. Scoring was tethered at either end as 1=no initial response and/or an immediate approach, and 4=rapid avoidance response and/or refusal to approach. An additional trained individual coded 20% of videos and interrater reliability was excellent (Cronbach's $\alpha \geq 0.95$). Data were analyzed using one-way ANOVAs to evaluate the effect of breed on QST values. Initial analyses revealed dog breeds significantly differed in QST values; however, not in the pattern predicted by veterinarian ratings. A likelihood-ratio test found breed differences in initial response scores, $\chi 2$ (27, N=149) =45.04, p=0.02. Chihuahuas, Maltese, and Labrador retriever were most likely to score a 3 or 4, while Border collies, Jack Russell Terrier, and German shepherds were most likely to score a 1. Approach scores also differed by breed, $\chi 2$ (27, N=127) =45.80, p=0.01. Chihuahuas, Siberian husky, and Maltese were most likely to score a 4, while Golden retrievers, pitbulls, German shepherds, and Labrador retrievers were most likely to score a 1. Breeds rated as highly sensitive to pain had higher (worse) initial response and approach scores and breeds rated by veterinarians as low pain sensitivity had lower approach scores, suggesting that veterinarians' ratings of pain sensitivity may reflect canine behavior towards strangers. However, German shepherds received low scores for both their initial response and approach, despite being rated by veterinarians as highly sensitive to pain. Further research is needed to determine additional characteristics, including additional breed specific behaviors, that contribute to veterinarian's pain sensitivity beliefs.

Humans' mask wearing has limited effect on family dogs' behaviour in standard test situations

Anna Kis*, Edina Vanderer, József Topál

Research Centre for Natural Sciences, Budapest, Hungary
**Presenting author: vargane.kis.anna@ttk.hu*

COVID-19 has changed our lives in many aspects. Among the most spectacular changes is probably the mandatory wearing of masks, which was proven to negatively influence human social interactions as well as communication. The different COVID protocols, however, not only affected humans but also had a huge impact on companion animals, such as dogs, living in human society. For example, it is particularly alarming, that throughout the lockdowns the number of registered dog bites increased significantly. The phenomenon has been explained with the generally elevated stress level as well as family members and dogs spending more time together in restricted closed space. On the other hand, the communication deficit caused by the constant usage of masks cannot be ruled out as a further contributing factor. In the current study we used previously validated, standard test situations (responsiveness to human pointing, basic obedience, spontaneous play, emotion recognition, threatening approach) where the human experimenter was with, or without wearing a mask. N=20 family dogs were tested in a within subject design, with a minimum of 3-day difference between the two occasions. Tests were carried out in different sequences for each subject to eliminate the order effect. The order of the masked and maskless occasions was randomized as well. We found that the mask-wearing of the experimenter did not influence dogs' performance in cognitive tests (all $p>0.05$). The only difference found was between dogs' reaction to the masked versus non-masked experimenter in the threatening approach situation. Reaction score was coded as an ordinary measure from friendly to aggressive on a 1-5 scale. The number of more aggressive responses was significantly higher for the masked as compared to the non- masked experimenter (Mann-Whitney test: $U=21$, $p=0.016$). These results have two important implications. First, it seems that (at least in the situations investigated) dogs' cognitive performance is not affected by the experimenters mask wearing, thus suggesting that research carried out while COVID protocols enforced mask-wearing are valid. Second, and perhaps more importantly, dogs seem to react with more aggression to unfamiliar people wearing masks in ambivalent situations, thus special attention needs to be devoted to dog attacks when these regulations are in place. Further research needs to address aditional factors, e.g. the familiarity of the interacting (masked) human.

Perception of human directed aggressive behaviour of dogs in English versus Japanese language dog owners

Mie Kikuchi[1*], Daniel S. Mills[1], Todd Hogue[2]

[1] Department of Life Sciences, University of Lincoln, Lincoln, UK
[2] School of Psychology, University of Lincoln, Lincoln, UK
[*]Presenting author: m.kikuchi@animal-bestfriends.com

Human-directed aggressive behaviour is considered to be the most serious behaviour problem of dogs worldwide. However, there is no consensus definition of aggressive behaviour in dogs and this impacts on our understanding of the topic. The aim of this research was to investigate how two culturally different groups of dog owners (recognised by their preferred language) recognise human directed aggressive behaviour by dogs (HDAB) and what they perceive as it's causes. Individual perceptions of HDAB were assessed through an Internet survey, sampling a total of 1146 English and 632 Japanese speaking dog owners. Three factors were examined: 1. Perception of signals of aggressive behaviour, 2. Perception of the causes of HDAB, 3. Perception of dog emotion and motivation. Cultural differences were observed. In Factor 1, English speakers (M=4.9, SD=1.5) had significantly higher scores than Japanese speakers (M=3.7, SD=1.8) for their increased attention to all six observable domains for potentially evaluating dog behaviour: vocalization, movement, state of arousal, facial expression, body posture and context, $t(1096) = 14.2$, $p=0.001$. English speakers had a significantly higher (M=6.3, SD=2.3) total score considering: baring teeth, snarling, nipping, staring, growling, snapping, biting, lunging, barking as aggressive behaviour in dogs, than Japanese speakers (M=5.1, SD=2.3), $t(1775)=11.0$, $p=0.001$. In Factor 2, English speakers were more likely to consider "fear" (English M=0.9, SD=0.3, Japanese M=0.8, SD=0.4, $t(1061) = 4.79$, $p=0.001$) and "frustration" (English M=0.5, SD=0.5, Japanese M=0.2, SD=0.4, $t(1563) = 12.5$, $p=0.001$) as common causes in the scenarios provided than Japanese speakers. However, Japanese speakers (M=0.6, SD=0.5) were more likely to describe a dog's growling behaviour in play as being related to "dominance" than English speakers (M=0.4, SD=0.5), $t(1620) = 12.9$, $p=0.001$. In Factor 3, Japanese speakers were less consistent than English speakers in their recognition of dog's subtle signs for emotion and motivation. This research supports the suggestion that HDAB is a human perception, that varies between groups and emphasises the need for researchers to clearly define the concept in their research, limiting the generalisation of their conclusions accordingly. People's perception of what constituted HDAB may be affected by language use and/or cultural differences in relation to potential dog-owners' companionship.

Factors associated with owner-perceived behaviour problems in dogs enrolled in a longitudinal study: are training methods important?

Sara Owczarczak-Garstecka[1*], Rachel Casey[1], Rosa Da Costa[1], Rachel Kinsman[1], Michelle Lord[2], Séverine Tasker[3,4], Adam Williams[1], Jane K. Murray[1]

[1] *Dogs Trust, London, United Kingdom*
[2] *Co-Evolve, Bristol, United Kingdom*
[3] *University of Bristol, Bristol, United Kingdom*
[4] *Linnaeus Veterinary Limited, Shirley, United Kingdom*
[*]*Presenting author: sara.owczarczak-garstecka@dogstrust.org.uk*

Problematic behaviours in dogs contribute to the risk of poor welfare. This study aims to explore factors associated with owner-perceived problematic canine behaviour. Data from owner-completed surveys were collected as part of a UK/ROI longitudinal dog health and behaviour study. Ongoing recruitment takes place through veterinary practices, dog training classes, print and social media. Owner-described training approaches were classified as: 'Rewards only', 'Rewards and mild aversive', 'Rewards and strong aversive' and 'Aversive only'. Two generalised logistic regression models were built with outcome variable of owner- perceived behaviour at 12-months of age (problematic/not problematic). Predictive variables assessed for significance in both models included: dog/owner demographics; owner-perceived behaviour reported at 3 time-points (12/16-weeks, 6- and 9-months) and training approaches stated at 3 time-points (12/16-weeks, 9- and 12-months). Owner's personality score (International Personality Item Pool-50) was assessed as a predictive variable in the second model for a subset of dogs for which these data were available. At 12/16 weeks, 6-, 9-, 12-months n=3399, n=2459, n=2019 and n=1726 of n=4781 eligible participants completed the surveys. Dogs trained with an 'Aversive only' approach were excluded due to low numbers (<5). In the first model (X2=312, R2=0.33 p=<0.001, n=1130), owner-perceived problematic behaviour at 12-months was associated with: owner-perceived problematic behaviour in the 12/16 weeks (OR=1.88, CI%1.38-2.55,p<0.001), 6- (OR= 2.19, CI%1.62-2.97,p<0.001) and 9-months surveys (OR=6.51, CI%4.83-8.83,p<0.001) and changing to a more aversive training approach between 9 and 12 months compared to changing to, or maintaining, a less aversive training approach (OR=1.66, CI%1.06-2.63,p=0.029). The second model (X2=178.4, R2=0.35,p=<0.001, n=590) also showed that owner-perceived problematic behaviour at 12- months was associated with owner-perceived problematic behaviour at all previous time-points (OR=1.83, CI%1.20-2.79,p<0.005; OR= 2.29, CI%1.1.49-3.51,p<0.001; OR=6.98, CI%4.61-10-70,p<0.001 for 12/16 weeks, 6- and 9-months surveys, respectively). Additionally, the second model showed that being a first-time owner (OR=1.93; CI%1.12-3.08, p=0.006), not seeing dog's mother during acquisition (OR=2.03, CI%1.12-3.68,p=0.02) and openness personality total score (OR=1.05, CI%1.01-1.09,p=0.02) were associated with owner- perceived problematic behaviour at 12-months. Perceiving dog behaviour as problematic at earlier time-points, dog ownership experience and acquisition factors, change to a more aversive training approach and score on owner's openness trait increased the odds of owner- perceived problematic behaviour at 12-months. Previously, a positive association between owner's openness and use of training commands was found, which may explain our results. Change in training approach may be motivated by perception of deteriorating dog behaviour during adolescence, which warrants further education into the importance of consistent rewards-based training.

Can owners recognise their dog's welfare state? Novel insights from a "Smart Collar"

Carmen Glanville[1*], Heidi Ortmeyer[2], Paul Hemsworth[1], Lauren Hemsworth[1], Grahame Coleman[1]

[1]Animal Welfare Science Centre, Faculty of Veterinary and Agricultural Science, University of Melbourne, Australia
[2]School of Medicine, University of Maryland, USA
[*]Presenting author: carmen.glanville@unimelb.edu.au

To improve dog welfare, we must identify key dog-owner factors which affect dog welfare and can be improved through owner training. Here we present results from a field study examining one such factor: dog-owner "problem awareness", i.e., the extent to which owners can accurately interpret their dog's welfare state. These findings examine relationships between owner perceptions of dog welfare, owner-reported dog behaviour, dog activity, and dog heart rate variability (HRV; a possible indicator of dog welfare). Single-dog households (n=50) completed a 2-week field study using PetPace smart collars to track dog physiology (pulse, respiration, HRV) and behaviour (activity, body position) in the home environment. In an online survey prior to PetPace data collection, the dog's primary owner rated their dog's "overall welfare", "mental state", and "physical health" on sliding scales from "terrible" to "excellent" (n=52). Owners (n=49) also completed the Canine Behavioural Assessment and Research Questionnaire (C-BARQ). Items for each C-BARQ behavioural category were averaged, providing an overall score for that category (obedience, aggression, fear, separation, excitability, attachment, miscellaneous). HRV was measured using the standard deviation of normal R-R intervals over 24-h periods (SDNN), which were subsequently averaged across the 2 wk to provide a more general measurement. Owner ratings of overall welfare correlated significantly with ratings of both mental state ($r=0.585$, $p<0.001$) and physical health ($r=0.434$, $p=0.001$), but mental state and physical health did not correlate with each other. Owner ratings of physical health were significantly correlated with HRV ($r=0.34$, $p=0.016$) and activity score ($r=0.378$, $p=0.007$), while ratings of overall welfare only correlated with activity score ($r=0.299$, $p=0.035$), and mental state ratings correlated with neither objective measure. Owner ratings of mental state correlated significantly with most C-BARQ categories ($r_{aggression}=-0.419$, $p=0.003$; $r_{fear}=-0.446$, $p=0.001$; $r_{excitability}=-0.293$, $p=0.041$; $r_{attachment}=-0.309$, $p=0.031$), but overall welfare and physical health did not. HRV correlated significantly with two C-BARQ categories ($r_{excitability}=0.352$, $p=0.013$; $r_{miscellaneous}=0.363$, $p=0.010$), as did activity levels (aggression: r_{low}:-0.376, $p=0.008$, $r_{medium}=-0.304$, $p=0.034$; fear: $r_{low}=-0.314$, $p=0.028$). Activity did not correlate with HRV. Owners appear to have a reasonable understanding of their dog's physical health. But while owner ratings of mental state and dog behaviour were consistent, they did not reliably correspond to the objective measures. This could be a result of a) inaccurate owner evaluation of mental state, or b) the objective measures not being reflective of or sensitive enough to measure mental state. These possibilities will be discussed regarding their validity and implications for owner training.

Country of origin influences management practices and attitudes towards triplet-born lambs

Cathrine Erichsen[1,2,3*], Tamsin Coombs[1], Neil Sargison[2], Sue McCoard[3], Belinda Vigors[1], Marie Rowland[1], Tim W J Keady[4], Cathy M Dwyer[1]

[1]Scotlands Rural College, Roslin Institute Building, Easter Bush, Midlothian EH25 9RG, Scotland
[2] University of Edinburgh, Royal (Dick) Veterinary School of Veterinary Studies, Easter Bush, Midlothian EH25 9RG, Scotland
[3]AgResearch Grasslands, Tennent Drive, Private Bag 11008, Palmerston North, New Zealand
[4] Teagasc, Animal & Grassland Research and Innovation Centre, Athenry, Co Galway H65 R718, Ireland
[*]Presenting author: cathrine.erichsen@sruc.ac.uk

Producing more triplet lambs can be a means to increase sheep farm incomes. However, with more lambs born increases the risk of higher lamb mortality and the risk to negatively affect ewe, lamb- and farmer welfare. This study examined factors that influence management practices and attitudes to financial cost associated with triplet-bearing ewes and their progeny. An online questionnaire was circulated to sheep farmers from the United Kingdom (UK), the Republic of Ireland (IRE), and New Zealand (NZ). The quantitative questionnaire covered sociodemographic and production information, management practices and attitudinal questions about financial costs. To summarise management practices responses, a Best Practice score was developed covering pregnancy and triplet lamb management. This score was based on management actions that reflect better management and are likely to increase lamb survival. Principal Component Analyses were performed to identify groupings in the attitudinal responses. Data were subsequently analysed by linear mixed models. A total of 448 respondents took part in the survey (UK: 168, IRE: 218, NZ: 62). NZ respondents had larger flocks than UK and IRE (Mean flock size: NZ: 2640±270, UK: 536±49, IRE: 211±13, $P<0.001$) and were more likely to lamb outdoors ($P<0.001$). Respondents from the UK had higher Best Practice scores than IRE and NZ who did not differ (UK: 8.84±0.40, IRE: 8.25±0.41, NZ: 5.79±0.54, $F_{2,443}=21.81$, $P<0.001$). NZ and IRE reported more sets of triplets than UK (Mean and 95% CI number of triplets: NZ=10.6 [9.25;12.24], IRE=8.5 [7.89; 9.20], UK=7.1 [6.60; 7.64], $F_{1, 415}=3.34$, $P=0.037$) and NZ respondents tended to report higher lamb mortality than UK and IRE, who did not differ (Mean % mortality: NZ: 24.6±3.45, IRE: 14.7±1.06, UK: 13.54±1.33, $F_{2,354}=2.78$, $P=0.063$). NZ respondents were more likely to agree that costs related to triplet lamb management were justifiable than respondents from other countries ($P=0.017$), and that ewe and lamb losses were the biggest costs ($P<0.001$). IRE respondents were more likely to consider that costs associated with management as being too high. The results suggest country effects on the way flocks are managed and attitudes to financial cost differed between different sheep-producing countries. These findings may be linked to flock size, environment, and available resources which could impact survival and thus welfare of triplet lambs.

Pigs' response to different types of interactions with a human: free-form vs. imposed contact

Suzanne Truong*, Oceane Schmitt, Jean-Loup Rault

Institute of Animal Welfare Science, University of Veterinary Medicine Vienna, Veterinärplatz 1, 1210 Vienna, Austria
** Presenting author: Suzanne.Truong@vetmeduni.ac.at*

Positive human-animal interactions can improve animal welfare, but the type or quality of these interactions is often overlooked. Human-animal interaction paradigms used in research studies typically involve a human imposing standardised contact in a structured manner on the animal. However, it is unclear whether this standardisation of interactions produces findings that are comparable to free-form interactions seen in realistic contexts where animals can choose when and how to interact. We hypothesised that animals allowed to voluntarily approach and interact in a free-form manner would respond differently to the human compared to when contact is imposed by the human. We habituated 30 five-week-old female pigs for three weeks to gentle tactile and verbal contact by a familiar human in a test pen. We then compared the pig's response during test sessions of either free-form (FF) or imposed contact (IC). During the FF test, the pig was encouraged to approach on a voluntary basis where the familiar human remained in a seated position and solicited the pig to approach using verbal and visual cues. If the pig approached, the human delivered gentle tactile contact including strokes, rubs and scratches. During the IC test, the familiar human followed a standardised sequence consisting of approaching the pig for 8 sec, imposing contact (one gentle stroke every 2 sec along the side of the body) for 15 sec, and withdrawing to the seated position for 7 sec, with this sequence repeated 10 times over the 5-minute session. Interaction solicitations from the pig were ignored. Each pig underwent either of these 5-minute test sessions using a within-subject counter- balanced design across days. Their behaviour was analysed from video recordings using continuous focal sampling. The pigs did not differ between test conditions in the time they spent in contact with the human (FF: 45.7 ± 9.6 sec vs. IC: 45.9 ± 9.4 sec, $P = 0.988$). Pigs spent more time exploring their environment in the FF than in the IC tests (FF: 109 ± 11.8 sec vs. IC: 69.3 ± 11.5 sec, $P = 0.004$), and spent less time moving away from the human (FF: 26.2 ± 4.4 sec vs. IC: 40.5 ± 4.3 sec, $P = 0.023$). Hence, the time spent interacting with the familiar human did not differ, but pigs differed in their behavioural response to the type of interaction. Further analyses will focus on the behavioural dynamics of the interactions such as reciprocity and synchrony.

Tactile reactivity in equids: challenges and factors of influence

Léa Gueguen*, Noémie Lerch, Marine Grandgeorge, Martine Hausberger

Université de Rennes, Laboratoire d'Ethologie animale et humaine, UMR 6552, CNRS, Université de Caen-Normandie, Station Biologique, 35380 Paimpont, France
** Presenting author: lea.gueguen@univ-rennes1.fr*

Tactile modality is extremely important in animals' life because it allows them to adapt to environmental conditions and is also involved in social life even if there are disparities between species. In horses, social tactile contact is restricted, but tactile contact is an important part of interactions with humans, which has led to recent studies. However, even when considering studies that use the same tool to test tactile reactivity (von Frey filaments), contradictory results are observed. This may be explained by differences observed at the methodological level. Thus, we proposed here a review on the factors that are not, or partly or differently considered in studies with the objective of highlighting the importance of standardizing the methods.Thus, we conducted two studies: a first one on 16 unmounted equids (8 horses and 8 ponies) living in naturalistic conditions where we tested the potential influence of different methodological parameters (filament size, body area, test period) and of equids type; a second one to test the possible role of the type of work. Four sizes of filaments were used on each side of 3 body areas. The first study was performed in January and June and revealed (GLMM) the impact of 4 factors: filament size ($X2=64.1$, $df=3$, $p<0.001$), session ($X2=40.4$, $df=1$, $p<0.001$), body zone ($X2=30.1$, $df=2$, $p<0.001$), equine type ($X2=7.8$, $df=1$, $p=0.005$). Equids reacted more to the largest filaments (Friedman test, $N=16$, $df=3$, $p<0.001$), in June than in January (Wilcoxon test, $V=3$, $p=0.001$), at the withers than at the other areas (Friedman test, $df=2$, $p=0.005$). Horses were more reactive than ponies (Mann Whitney test, $N1=8$, $N2=8$, $W=12.5$, $p=0.045$). The second study, conducted on 60 equines involved in either equine-assisted interventions (EAI), conventional riding schools (RS), or both (EAI-RS), showed that assisted intervention equines responded more often than the others (MW test: EAI-RS: $N(EAI) = 6$; $N(EAI-RS) = 40$; $W = 17$, $p= 0.043$; RS: $N(EAI) = 6$; $N(RS) = 14$; $W = 48$, $p= 0.019$) and to milder stimuli (EAI-RS: $W = 17$, $p= 0.043$; RS: $W = 46.5$, $p= 0.017$). These results confirm that different intrinsic and extrinsic factors can influence tactile reactivity in equids tested in the familiar home setting, including the type of work. These results may indeed explain some of the discrepancies observed in the literature and suggest that more attention should be paid to the testing context, the type of animal considered and even the working conditions.

The weaning method of dam-reared dairy calves affects their response to humans during an arena test

Maja Bertelsen[1*], Karolina Steinerova[2], Margit Bak Jensen[1]

[1]Aarhus University, Animal Science, Blichers Allé 20, 8830 Tjele, Denmark,
[2]University of Saskatchewan, Western College of Veterinary Medicine, Department of Large Animal Clinical Sciences, Saskatoon, SK S7N 5B4, Canada
[*]Presenting author: maja@anis.au.dk

Dairy calves are commonly reared without contact to their dam, which facilitates a human-animal relationship based on close physical contact and feeding. Dam-rearing may negatively affect calves' human-animal relationship. The current study investigates the effect of dam-contact and weaning method on calves' response to humans. A total of 69 dairy calves were allocated to one of three dam-contact treatments [control (separated from dam after 24h), full- time (housed with dam for 23h/d) and half-time (housed with dam for 10h/d)]. Within each treatment, calves were allocated to one of two weaning treatments [stepwise (weaning off milk at eight weeks, dam-separation/pen change at nine weeks) or abrupt (weaning off milk and dam-separation/pen change simultaneously at nine weeks)]. All animals received equal human contact, except control calves who were fed milk by bucket twice a day. Calves were tested in a random order within tests with a forced approach test followed by a voluntary approach test conducted in a 2.5mx10m arena at 10 weeks (69±7 days) of age. Data was analysed using a generalized mixed model (Fixed effects: dam-contact, weaning, sex, age, dam- contact×weaning, Random effect: Block(Pen)). Throughout the duration of the test period (8m45s±15), the abruptly weaned full-time and half-time calves vocalised more frequently than other calves [control-abrupt (3.1c±1.9), full-time-abrupt (19.3a±1.8), half-time-abrupt (16.4a±1.9), control-stepwise (5.3c±2.0), full-time-stepwise (6.1c±1.8), and half-time- stepwise (6.7c±1.9); dam-contact×weaning interaction, $P<0.001$]. No treatment effects were found for the forced approach test. For the voluntary approach test, among stepwise weaned calves, control calves had the shortest latency to approach the person, while among abruptly weaned calves, there was little difference [control-abrupt (75.8s±18.5), full-time-abrupt (42.5s±17.4), half-time-abrupt (41.2s±17.0), control-stepwise (32.9s±17.5), full-time-stepwise (99.6s±19.0), and half-time-stepwise (81.2s±18.1); dam-contact×weaning interaction, $P<0.05$)]. Among only stepwise weaned calves, more control calves went within one meter of the test person [Proportion: control-abrupt (4/12), full-time-abrupt (7/11), half-time-abrupt (5/12), control-stepwise (10/12), full-time-stepwise (2/10), and half-time-stepwise (4/12), dam- contact×weaning interaction, $P<0.01$)]. For stepwise-weaned calves, control calves consistently showed more curiosity towards the test person than dam-reared calves, approaching faster, and being more likely to come close to the test person. In contrast, abruptly weaned calves - across variables - numerically showed more interest in the person than controls. High level of vocalisations among abruptly weaned dam-calves suggests that they were stressed and this may have increased their motivation for human interactions. The implication of this for the establishment of a human-animal relationship in dam-reared calves soon after weaning and separation warrants further study.

On-farm administration of local anaesthetic and surgical castration of piglets: acute behavioural and physiological consequences

Mathilde Coutant[1*], Jens Malmkvist[1], Marianne Kaiser[1], Leslie Foldager[1,2], Mette S. Herskin[1]

[1]*Department of Animal Science, Aarhus University, Tjele, Denmark*
[2]*Bioinformatics Research Centre, Aarhus University, Aarhus, Denmark*
[*]*Presenting author: mathilde.coutant@anis.au.dk*

Surgical castration is done routinely in countries in and outside EU. Local anaesthetics can be used, but impacts of injections and drug efficacy to mitigate acute pain remain questioned. Our study was composed of two factorial experiments examining effects of two methods of drug (2% Procaine, 20 mg/mL) injection: intra-funicular (IF) vs. intra-testicular (IT), four intervals between drug injection and castration (2.5, 5, 10 and 30 min), and two drug volumes (0.3 vs. 0.5 mL) on piglets' acute responses and post-procedural behaviours. In the first study, 597 3-4 day old piglets were subjected to 1 of 13 treatments: surgical castration without anaesthesia (CC), injection with local anaesthetic followed by castration involving all combinations of injection method and interval, and sham handling separated by the same intervals (SH). Study 2 involved 290 piglets and 5 treatments: castration without anaesthesia (CC), castration after intra-testicular injection of 0.5 (IT05) or 0.3 mL (IT03) per testis, and sham handling with one (SH1) or two stays in the castration bench (SH2). All piglets received analgesia (NSAID) after data collection. Piglets' acute responses were evaluated based on intra-procedural vocalisations and front leg movements, and saliva cortisol concentrations before and after castration. Immediately after castration, a 3 min social motivation test and 10 min of continuous behavioural observations upon return to the home pen were done. All indicators were analysed using relevant statistical models (two-way ANOVA or survival analysis) accounting for piglet weight, age, and duration of procedures. Overall, no significant differences were observed between the methods of drug injection, while intervals of 5 and 10 min between injection and castration were superior for pain mitigation. IT03 and CC led to comparable responses at castration, and saliva cortisol concentrations 17 min after the procedure were comparable across all treatment groups. IT05 procedure seemed most effective at mitigating indicators of acute pain during castration, but still led to measurable signs of pain and stress (e.g. number of resistance movements at castration: IT05: 24±2; CC: 40±3; SH2: 11±1). However, social motivation of IT05 piglets seemed impaired compared to control groups as shown by increased latency to contact littermates during the test. Upon return to the home pen, IT05 piglets showed reduced activity at the udder compared to IT03 or the controls, and spent the most time huddled up of all treatments. Pharmacokinetic studies would be a further step to better comprehend and evaluate the welfare impact of the procedure.

The influence of procaine hydrochloride plus meloxicam on the behaviour, feed intake and weight gain of dairy calves following hot-iron disbudding

Nnenna Ugwu[1,2*], Joanna Murrell[1], Emma Love[1], Toby Knowles[1], Helen Whay[1,3], Suzanne Held, Jo Hockenhull[1]

[1]Bristol Veterinary School, University of Bristol, UK
[2]Department of Veterinary Surgery, University of Nigeria, Nsukka, Nigeria
[3]National University of Galway, Ireland
[*] Presenting author: Nnenna.ugwu@bristol.ac.uk

Pain associated with disbudding in horned calves is a key welfare issue. To mitigate disbudding-induced pain and improve welfare, it is recommended that this procedure be performed under pain relief (local anaesthesia with or without additional analgesics). At present, lidocaine is the most utilized local anaesthetic for disbudding unlike procaine hydrochloride whose use is not popular. However, procaine hydrochloride is the only licenced local anaesthetic for disbudding in some countries and the use of lidocaine is prohibited in animals meant for human consumption according to the EU regulation. Thus, this study evaluated the influence of procaine hydrochloride (4% Pronestetic®; 2.5ml/horn based on manufacturer's recommendation) plus meloxicam (2% Metacam®; 0.5mg/kg based on manufacturer's recommendation) on the behaviour, feed intake and weight gain of dairy calves following hot- iron disbudding. Fifteen female Holstein dairy calves (5.40 ± 0.33 weeks) were assigned into one of three groups (n = 5): A (Disbudded; post-disbudding meloxicam), B (Disbudded; pre-disbudding meloxicam) and C (Sham; no treatment). Procaine via cornual nerve block was administered ten minutes prior to disbudding. Calves in groups B and A received meloxicam ten minutes pre- and five minutes post-disbudding, respectively. Behavioural indices including postures (location in the pen, interaction with pen mates, head, tail, standing & lying posture) and events (head shake, head rub, ear flick head scratch and tail wag) were recorded as frequency while movements & activities (standing, walking, lying, and grooming) were recorded as duration. Postures were determined using live scoring while events and movements & activities were determined retrospectively from video recordings. Apart from struggling behaviour assessed during disbudding, all indices were obtained pre-disbudding (day. -5 to -1), the day of disbudding (day. 0) and post-disbudding (day. 1 – 5) at 10:00; 13:00; 16:00 (five min/calf/timepoint). These were compared using repeated measures ANOVA while struggling behaviour, feed intake and weight gain (obtained daily for the entire study duration) were analysed using One-way ANOVA. Results revealed that calves in groups A and B displayed more ear flicks ($P < 0.001$) and tail wags ($P = 0.002$) than group C up to day 3.The findings of this study imply that the use of procaine hydrochloride and meloxicam was not sufficient to mitigate behavioural response in the early post-disbudding period. With respect to other indices, it is possible that sample size and treatment may have played a role or that these indices may not be very sensitive to disbudding.

Behavioural changes in the first 3 weeks after disbudding in dairy calves

Sarah J.J. Adcock[1*], Blair C. Downey[2], Cassandra B. Tucker[2]

[1]Department of Animal and Dairy Sciences, University of Wisconsin, Madison, WI, USA;
[2]Center for Animal Welfare, Department of Animal Science, University of California, Davis, CA, USA
[*] Presenting author: sarah.adcock@wisc.edu

Hot-iron disbudding, the practice of cauterizing horn bud tissue to prevent horn growth in dairy calves, results in behavioral changes indicative of pain in the first few days after the procedure. However, few studies have quantified behavioral changes in the following weeks, while the burn wounds are still healing. Female Holstein calves were disbudded with a heated iron and pain relief (5.5 mL lidocaine cornual nerve block and 1 mg/kg oral meloxicam) at 4 to 10 days of age (n = 15) or not disbudded (n = 15). Calves wore ear tag accelerometers that reported the dominant behavior being performed at 1-min intervals beginning 2 days before until 21 days after disbudding. Generalized linear mixed models with negative binomial distributions were used to test the effect of treatment, days since treatment (day 3 to 21), and their interaction on the daily counts (min/day) of 3 behaviors identified by the accelerometer: low activity, ruminating, and suckling. In each model, calf was fitted as a random effect and the average of daily counts in the 2 days before disbudding was included as a baseline covariate. Days 0, 1, and 2 after disbudding were not included in the models to avoid possible confounding effects of the pain medication on behavioral outcomes. Compared to age-matched controls, disbudded calves tended to spend more time inactive throughout the 3- to 21-day observation period (691 ± 63 min/day vs 629 ± 23 min/day; Treatment: $P = 0.078$), ruminated less in the first 3 to 11 days after disbudding (mean ± SE: 85 ± 14 min/day vs 140 ± 23 min/day; Time x treatment: $P < 0.001$), and suckled more from the milk bottle beginning 5 days after disbudding until the end of the observation period (29 ± 3 min/day vs 20 ± 2 min/day; Time x treatment: $P = 0.013$). An increase in low activity and decrease in rumination may reflect the calves limiting head movement that could aggravate the disbudding wounds, whereas calves may increase suckling to receive analgesic or soothing effects elicited by the gustatory and tactile stimulation. The delayed onset of the increase in suckling may reflect the time needed to form an association between the behavior and its benefits. We conclude that disbudding alters daily behavior patterns for at least 3 weeks, far beyond the duration of recommended pain medication, raising additional welfare concerns about the procedure.

Evidence of social buffering benefits to castration stress in beef calves housed with familiar pen-mates

Caleb M. Brezina[1*], Grant A. Dewell[1], Renee D. Dewell[2], Rebecca L. Parsons[1], Anna K. Johnson[3], Derek B. Haley[4], Suzanne T. Millman[1,5]

[1]*Veterinary Diagnostic and Production Animal Medicine,*
[2]*Center for Food Security and Public Health,*
[3]*Department of Animal Science*
[5]*Department of Biomedical Sciences, Iowa State University, Ames, IA USA;*
[4]*Department of Population Medicine, University of Guelph, ON, Canada.*
[*] *Presenting author: cbrezina@iastate.edu*

Commingling of beef feeder calves from different sources results in biological and behavioral stressors. The objective of this study was to explore whether preferential relationships among beef feeder cattle may produce social buffering that result in positive animal welfare, health and performance outcomes. Weaned calves (n=102) from 23 source farms were randomly assigned to 17 pens, each comprised of 3 familiar (F) calves from the same source farm and 3 unfamiliar (U) calves from 3 different source farms. We hypothesized that F calves would experience less stress than U calves during weekly handling events (D7, D14, D21, and D28 relative to feedyard arrival) and castration surgery (D14). All calves were surgically castrated using the Henderson Castrating Instrument, with local lidocaine block and oral meloxicam for pain mitigation. Outcomes included chute calf order into the handling chute, vocalizations in the chute, exit speed, and average daily gain (ADG). Models included a day by treatment interaction and cohort as a fixed effect; for ADG, D0 weight was included as a covariate. A Friedman test ranked calf chute order across all handling events and compared them across treatment groups.Based on our preliminary data, we found no evidence F calves stayed in closer proximity to one another than U during handling events ($p>0.11$). However, F calves displayed fewer vocalizations ($p=0.01$) and faster chute exit speed ($p<0.02$) than U calves on Day 21 when castration effects were greatest; other handling days did not differ. Additionally, F calves showed a higher post-castration ADG than U calves at D21 ($p<0.02$). Based on our preliminary results, we found some evidence suggestive of social buffering benefits for F calves in response to castration stress.

The impact of clamp castration on the behavior and body temperature of reindeer (Rangifer tarandus tarandus) – effects of local anesthesia and non-steroidal anti-inflammatory drug

Hanna Nurmi*, Sauli Laaksonen, Taija Häätylä, Anna Valros, Mikaela Sauvala, Laura Hänninen

Faculty of veterinary medicine, University of Helsinki, Finland
**Presenting author: hanna.k.nurmi@helsinki.fi*

Yearly 2500-4000 reindeer bulls are castrated in Finland, mostly without pain alleviation. To our knowledge, there is no previous research about pain- related behaviors during castration in reindeer. Our aims were to investigate the effects of castration on reindeer behavior and body temperature during the procedure, and how these are affected by handling, local lidocaine anesthetic (LA) and non-steroidal anti-inflammatory drug meloxicam (NSAID). We clamp castrated 45 1.5-year-old-reindeer with either (n=11 in each) no pain alleviation (TRAD), perioperative NSAID (NSAID), local anesthetic 5 min prior castration (LA) and with LA and NSAID (LA+NSAID) and used 11 non-castrated reindeer as controls (CONTROL). There were no need to use reserved rescue analgesia (levomethadon 0.05 mg/kg iv). We report here results from behaviors scored from video recordings (head, neck and leg movements, nostril closure, defecation, abdominal muscle contraction), rectal temperature (BodyT), and the number of reindeer reaching at least 39.5 ºC (T39.5). We analyzed the differences between the treatments with Kruskal-Wallis and Mann-Whitney U-tests tests, between sampling intervals (before and during castration/LA application) with Wilcoxon signed rank tests and between treatments in No of T39.5 with a CHI2 – test. There were no differences in behaviors between treatments prior to castration nor during injecting LA. However, during castration, nostril closures and abdominal muscle contractions occurred more often and for longer duration in TRAD, NSAID, LA and LA+NSAID than CONTROL ($p<0.05$ for all). BodyT increased during the experiment for all treatments. Overall, 25 animals reached BodyT39.5, and treatments differed ($p<0.05$): higher No for LA+NSAID (11/11) than TRAD (2/10), NSAID (3/11), LA (4/11), or CONTROL (5/11). Reindeer appear to express pain during clamp castration by closing their nostrils and contracting their abdominal muscles. Local lidocaine anesthesia failed to significantly reduce the procedure related behaviors, at least with the 5-minute effect time used in this study. Moreover, long handling time increased reindeer body temperature, especially if combined with other stressors such as injecting NSAID.

Previous experience in the restraining chute affects beef cattle chute scores

Clara W. B. Lachica, Francisco A. R. Catalano, Luiz E. Kozicki, Ruan R. Daros*

Graduate Program in Animal Science, School of Medicine and Life Sciences, Pontifícia Universidade Católica do Paraná, Curitiba, PR, 80215-901, Brazil
** Presenting author: r.daros@pucpr.br*

Beef cattle chute scoring is widely used to assess cattle temperament; however, few studies evaluated the impact of animals' previous experience during management in the chute on their chute score. The aim of this observational study was to develop a scoring system to assess animal experience in the chute and evaluate if the experience influences cattle chute score during handling. The study was approved by the institution's animal care committee (#15259-2020). The experience scoring developed ranges from 1 (positive – the animal stays calm, and ranch staff do not touch or yell at the animals) to 5 (negative – the animal is reactive, balks, fall in the chute, ranch staff yell and poke or push the animal). None of the cattle handling was performed by the researchers and ranch staff was not identified. A total of 282 female animals (*Bos taurus indicus*) from four ranches in Paraná State – Brazil, were enrolled. All animals passed through a restraining chute 3 times (d0, d8 and d10) for a timed AI protocol. All passages in the chute were video recorded. Two previous trained observers (kappa = 0.92) scored the animals using a previously described chute score (1 = passive to 5 = reactive); only footage from chute entering to restraining was used. One observer scored the animals for the experience score; only footage from restraining to release was used. Statistical analysis was performed in R; a multivariable mixed linear regression was built to assess the effect of previous experience (binarily categorized as neutral/good [scores 0-3] and bad [scores 4- 5]) on d0 and d8 on the chute score of d10. Chute score on d0 was included as covariate and farm included as a random effect. The correlation between chute score and experience score was assessed through Spearmen's correlation. Overall 22 animals had a bad experience in the chute in d0 and d8, and 258 animals had a neutral/good experience on both days or a single bad experience before d10. As expected, chute score and experience score were moderately correlated (s = 0.65; p-value <0.01). Animals that went through two consecutive bad experiences in the chute had a chute score on d10 on average 0.35 points (SE ± 0.16; p-value = 0.03) higher compared to animals that had less aversive experiences during handling. Future studies should include the use of naïve animals to validate our findings. Animals' previous experience should be considered when assessing cattle chute scores.

Long-term effects of early maternal deprivation on goat social behaviour and stress coping abilities

C. Toinon[1*], S. Waiblinger[1], R. Palme[2], J.-L. Rault[1]

[1] Institute of Animal Welfare Science, University of Veterinary Medicine Vienna, Veterinaerplatz 1, 1210 Vienna, Austria
[2] Institute of Physiology, Pathophysiology and Biophysics, Unit of Physiology, Pathophysiology, and Experimental Endocrinology, University of Veterinary Medicine Vienna, Veterinaerplatz 1, 1210 Vienna, Austria
[*] Presenting author: claire.toinon@vetmeduni.ac.at

Early maternal deprivation disrupts goat kids' social behaviour and coping strategy, but its long- term effects are not fully understood. We studied the differences in social behaviour and stress- coping abilities between 18 goats separated from their dams three days after birth and artificially reared together, isolated from any other individual (AR goats), and 17 goats raised together with their dams (DR goats) and other goats and kids until weaning. We observed: 1) each 18-month-old goat's affiliative, playful, and agonistic behaviours in its home pen by 14 sessions of 10-min continuous live focal sampling over 14 consecutive days, 2) its social interactions with peers following social separation for three minutes, and 3) its social interactions with peers following restraint and manipulation by humans for three minutes. Saliva samples were collected before and after the social separation to measure cortisol. Two weeks later, the goats were: 4) introduced in groups of four (two AR and two DR goats) in a herd of unknown multiparous goats for 35 hours. Each goat was observed through 32 sessions of 10-min continuous focal sampling, and faecal samples were collected before and 24 hours after introduction in the herd to measure faecal glucocorticoid metabolites. Finally, 5) avoidance distance tests were conducted by one familiar and one unfamiliar human to assess the human-animal relationship. In the home-pen [1)], AR goats were involved in less low-intensity agonistic behaviour than DR goats ($p = 0.05$), but other social behaviour did not significantly differ according to treatment or stressor type [2), 3)], nor did salivary cortisol concentration. After the goats were introduced in the multiparous goat herd [4)], AR goats received more threats from multiparous goats than DR goats ($p = 0.01$) but were involved in less clashing ($p = 0.02$), and both treatments showed a similar increase in faecal glucocorticoid metabolite concentration. Finally [5)], AR goats let both familiar and unfamiliar humans approach closer than DR goats ($p < 0.001$). Although there were only few and subtle differences in agonistic behaviour between AR and DR goats and none in affiliative behaviour or physiology, these support previous findings in cattle suggesting long-term effects of early maternal deprivation on social competence, even if the differences found at an earlier age were not detected or were partly compensated for. Nevertheless, AR goats remained less fearful of humans and generalised it to an unfamiliar human 18 months after their early experience of frequent human contact.

Hunger affects cognitive performance of dairy calves

Benjamin Lecorps*, Raphaela E. Woodroffe, Marina A.G. von Keyserlingk, Daniel M. Weary

Animal Welfare Program, Faculty of Land and Food Systems, 2357 Main Mall, The University of British Columbia, Vancouver BC V6T 1Z6
Current address: Bristol Veterinary School, University of Bristol, Langford House, Langford, Bristol, BS40 5DU, UK
**Presenting author: benjamin.lecorps@gmail.com*

Hunger remains an important animal welfare concern in most farm animal species. In dairy calves, hunger happens when milk allowances are reduced, a standard management step used to promote solid food intake in young dairy calves, and at weaning when milk is removed permanently. We explored the effects of milk restriction on dairy calf cognition. Hunger typically promotes performance in foraging tasks, but it may also have detrimental effects on cognition, especially when severe. We tested this hypothesis in two experiments using a modified hole-board test, requiring that calves remember the location of 'baited' bottles providing a milk reward. The test allows the assessment of working and reference memory (when locations of baits are not changed), and of behavioral flexibility (when changes occur). Experiment 1 (n = 12) assessed whether feed restriction (milk allowance reduced from 12L/d to 6L/d) affected working (i.e. are animals good at avoiding revisits?) and reference memory (i.e. do they focus on baited locations?). In Experiment 2 (n = 22), we assessed whether the same feed restriction affected behavioral flexibility. We predicted that feed-restricted calves would struggle to learn new locations compared to unrestricted animals. In both experiments, calves started testing around 15d old and experienced feed restrictions when approx. 35d old and were tested for a total of 18 days. Experiment 1 showed that all measures of cognitive performance were negatively affected by hunger (Mixed models for repeated measurements: WM: $F_{1,9} = 29.92$, $P < 0.001$; RM: $F_{1,9} = 7.36$, $P = 0.024$). Hungry calves also visited more bottles ($F_{1,9} = 17.27$, $P < 0.01$) and vocalized more often ($F_{1,9} = 8.02$, $P = 0.01$) during the test. Experiment 2 showed that hunger disrupted working ($F_{1,20} = 6.62$, $P = 0.018$) but not reference memory when locations of the baited bottles were changed, and hungry calves again vocalized more often during testing ($F_{1,20} = 4.78$, $P = 0.04$). These results indicate that hunger associated with reductions in milk can be emotionally distracting and reduce cognitive performance.

Cross-fostering impacts suckling activity of fostered piglets, but not residents

Lara Pajžlar, Maja Prevolnik Povše, Dejan Škorjanc, Janko Skok*

University of Maribor, Faculty of Agriculture and Life Sciences, Department of Animal Science, Pivola 10, 2311 Hoče, Slovenia
**Presenting author: janko.skok@um.si*

Cross-fostering (C-F) is a standard breeding procedure in which piglets are transferred from a biological to a foster litter. Such intervention represents a stressful event that affects the suckling activity of the fostered piglets, especially immediately after the relocation. In comparison, C-F is assumed to be much less stressful for resident piglets. However, this assumption is primarily based on the fact that foster piglets are perceived as inferior (lighter/weaker). However, there is a lack of studies on the initial effects of C-F on the suckling activity of resident piglets. Therefore, we aimed to investigate the suckling activity of fostered and resident piglets before and immediately after C-F and the factors influencing it. Piglets (n=435) from 42 litters of different sizes (median=12, 4-18) and ages (median=4d, 1-9) were included in the study. 168 piglets were experimentally C-F, the rest remained in the biological litter. Two litters were assigned to the single repetition, four piglets from each litter (two lightest and two heaviest) were mutually exchanged. Suckling activity (successful suckling, suckling attempt, inactivity) was recorded in one suckling session before (nearest reference point) and two after C-F (initial integration). We could confirm that the suckling activity of the resident piglets was not affected by C-F; their rate of successful suckling did not change after C-F, whether considered in general (96-100% suckled successfully throughout the experiment) or by age, litter size, body weight and sex of the fostered piglets. However, it is interesting to note that six residents were inactive in at least one of the sucklings after C-F, and this occurred when the fostered piglets were from the smaller litter (6/6) and had the same age (5/6). Furthermore, successful suckling of the fostered piglets decreased significantly in the new suckling environment (98% before to 51-66% after C-F). We found that sex and body weight had no influence on suckling activity. On the contrary, litter size and age difference significantly affect the integration of fostered piglets, with a higher rate of inactivity when piglets were transferred in the older or smaller litter ($p<0.05$). In conclusion, when applying C-F, breeders should consider age and size differences between the litters involved, in addition to body weight, which is usually the main criterion. A change in the C-F criteria should facilitate the integration of fostered piglets. However, regardless of the C-F criteria, it is unlikely that suckling activity and welfare of resident piglets will be affected.

Previous handling procedure affects flight speed test results when assessing cattle temperament

Maria C. Ceballos[1*], Aline C. Sant'Anna[2], Mateus J. R. Paranhos da Costa[3]

[1] Department of Production Animal Health, Faculty of Veterinary Medicine, University of Calgary, Calgary, AB, Canada.
[2] Núcleo de Estudos em Etologia e Bem-estar Animal, Departamento de Zoologia, Universidade Federal de Juiz de Fora, Juiz de Fora, MG, Brazil.
[3] Grupo de Estudos e Pesquisas em Etologia e Ecologia Animal, Departamento de Zootecnia, Faculdade de Ciências Agrárias e Veterinárias, UNESP, Jaboticabal, SP, Brazil.
[*] Presenting author: mariacamila.ceballos@ucalgary.ca

The flight speed (FS) test is used to assess cattle temperament by measuring the speed at which each animal leaves the squeeze chute after a handling procedure; the fastest cattle are considered the most reactive. The aim of this study was to assess if the handling procedure carried out before applying the FS test affects the results. This study was approved by the Committee for the Ethical Use of Animals (Faculty of Agricultural and Veterinary Sciences, São Paulo State University, Protocol Nº 020939/13). Flight speed test (FS) was used to assess the temperament of 1710 Nellore (1318 purebred and 392 crossbred) young bulls (averaging 23±5 months old), in two commercial farms located in Northeastern Pará state, Brazil. In Farm 1, one group of 567 purebred Nellore bulls were evaluated, whereas in Farm 2, three groups of purebred Nellore and one group of crossbreds were evaluated. The FS was assessed for each bull when subjected to two distinct handling procedures; bulls were either just weighed or they were weighed, vaccinated, and dewormed. In both situations, FS was determined when each bull exited the squeeze chute (after carrying out the handling procedures), by recording the time spent to move a known distance (expressed in m/s). Data were analyzed using generalized linear mixed models for repeated measures using animal as experimental unit. All models for purebred Nellore included handling procedure (weighing or weighing plus vaccination and deworming) and cattle group as fixed effects, and for the crossbred group, the model included only the handling procedure. The random effect of animal was considered as a repeated measure within the assessment day. There was an effect of handling procedure on FS for both, purebred and crossbred Nellore bulls ($F_{1, 2599} = 557.3$, $P < 0.001$ and $F_{1, 781} = 343.8$, $P < 0.01$, respectively). Purebred Nellore bulls had a 50.6% increase in FS when they were also vaccinated and dewormed, whereas for crossbred bulls, the increase was even higher (71.3%). We concluded that FS was affected by the handling procedure carried out before the test application. Therefore, the effects of aversive management must be considered when using this method for assessing cattle temperament.

Is it social restriction or space constraint that determines a sow's posture immediately post-weaning when confined to a stall?

Jen-Yun Chou[1,2,3*], Thomas D. Parsons[1]

[1] Swine Teaching and Research Center, Department of Clinical Studies - New Bolton Center, University of Pennsylvania, 382 West Street Road, Kennett Square, Pennsylvania, USA
[2] Institute of Animal Welfare Science, University of Veterinary Medicine, Veterinärplatz 1, 1210, Vienna, Austria
[3]Pig Development Department, Animal & Grassland Research and Innovation Centre, Teagasc, Moorepark, P61 C996, Co. Cork, Ireland
[*] Presenting author: Jen-Yun.Chou@vetmeduni.ac.at

Post-weaned sows are still commonly housed in individual stalls for at least a week, and often longer, on most farms. Housing sows individually during this critical period ensures adequate feed intake, reduces the risk of injuries due to mixing aggression with unfamiliar sows when their physicality is more fragile, and facilitates insemination. However, the impact of this confinement on sow behavior is not well understood as the stall deprives the sow of both space and social contact. We investigated the posture changes between three housing conditions for post-weaned sows. Fifty primiparous stall-naïve sows were housed in individual stalls ("ST," 2.3 × 0.7 m^2, limited social contact and unable to turn around, n = 17), individual pens ("PEN," 3.2 × 1.2 m^2, limited social contact, but free to turn around, n = 16) or group pens of six ("GP," 2.2 m^2/sow, full social contact and freedom of movement, n = 17) for eight days post-weaning. Continuous 24h focal behavior sampling was conducted on D1, 4 and 7 post-weaning to record their postures (standing, sitting, and lying laterally/ventrally). Mixed model was used to include the predictors of housing treatment, batch and observation day, the repeated factor of observation day and the random factor of sow on the posture outcome variables. We hypothesized that ST sows would spend longer time sitting and less time lying laterally due to physical restriction from confinement, while PEN sows would display similar posture patterns as GP sows. Overall ST sows spent the longest time sitting (1.22%, compared to PEN 0.59% and GP 0.73%, $P < 0.01$), whereas PEN sows spent the longest standing (15.48%, compared to ST 9.50% and GP 10.20%, $P < 0.01$). Space restriction due to stall confinement may be frustrating and induced more dog-sitting behavior in sows; however, with the freedom of movement but without the appropriate social contact with other sows, PEN sows also increased standing time which may be due to anxiety or insecurity. Housing treatment had no effect on sows' lying behavior. There were clear differences between observation days: sows spent the longest time lying ventrally, the least lying laterally ($P < 0.001$), and stood longer on D4. These were likely due to the onset of estrus which made them restless. This study demonstrated the importance of disentangling physical and social restriction when investigating sow confinement and understanding the physiological dynamics for sows during the post-weaning period to provide adequate housing.

Behaviour and welfare impacts of water provision via misting in commercial Pekin ducks

Dana L.M. Campbell*, Sue Belson, Jim M. Lea

Agriculture and Food, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Armidale, NSW, Australia
** Presenting author: dana.campbell@csiro.au*

Ducks are motivated to access water to maintain feather condition and exhibit natural water-related behaviours such as wet preening. Providing water to ducks on commercial farms is challenging as it can reduce litter and air quality and may increase bacterial contamination leading to increased duck mortality or illness. The aim of the research was to measure the behavioural and welfare impacts of water provision via a misting system for commercial Pekin grower ducks in Victoria, Australia (Animal Ethics: 2020-32). A total of 7 grower flocks were observed (4 misted, 3 non-misted, open-sided sheds) during May and November 2021. From 26 until 33 days of age, treatment ducks were provided one hour of misting with shed curtains closed in both treatment and control sheds. To represent the start and end of the misting treatment period, external health and welfare measures were taken directly on the ducks at 26 and 33 days of age via transect walks throughout each shed and catch-and-inspect observations on a sample of 150 ducks from each shed. Video recordings were also made of the control and treatment ducks for three hours representing time periods of prior, during, and after the misting treatment across all sheds for all 8 days of the treatment period. Observations were made of all behaviours ducks were exhibiting at 10-min scan samples across 4 cameras per shed, totalling 4198 scans across the 7 sheds. Analyses using General Linear Mixed Models or Pearson's Chi- square tests in JMP 16.1.0 showed the misting application predominantly had impacts on the patterns of behavioural change across the treatment time periods between the misted and non- misted ducks rather than increasing or decreasing overall expression of specific behaviours. There were significant treatment x time period interactions (all $P < 0.0001$) for the proportion of ducks exhibiting drinking, preening, tail-wagging, and walking. This may have in part been related to the curtain closure. There were also some differences between the treatment groups in feather cleanliness on the back and wings (both $P < 0.0001$), but these may have partly resulted from pre-existing differences between sheds in blood from pin feathers. The majority of welfare indicators showed no positive or negative effect of the misting treatment. These results indicate overhead misting does affect duck behaviour without compromising their welfare, but further research with larger water droplet sizes resulting in greater accumulation of surface water may have greater impact on the ducks.

Digital Livestock Technologies as boundary objects: impacts on management practices and on stakeholders' perception of animal welfare

Juliette Schillings*, Richard Bennett, David Rose

University of Reading Reading, United Kingdom
**Presenting author: j.schillings@pgr.reading.ac.uk*

Digital Livestock Technologies (DLTs) are designed to assist farmer decision-making and promise benefits to productivity and improved animal health and welfare. The extent to which animal welfare can be improved will depend on their ability to act as boundary objects; facilitating discussions and increasing shared understanding of animal welfare. This, in turn, can encourage changed management practices with the potential to enhance animal welfare. These changes may depend on the type of learning processes involved, i.e., whether the focus is on improving existing practices and strategies (single-loop learning), as opposed to initiating reflection on how these are framed initially (double-loop learning). Impacts may be limited to incremental improvements, or even be regressive, if important aspects of animal welfare are ignored (e.g., the human-animal relationship (HAR) or positive welfare). The way DLTs may act as boundary objects in changing farmers' perceptions of animal welfare and management practices has not been explored before. This study thus focuses on two case studies in which two DLTs were tested on farms, and on a UK farmers' survey (N=145) to complement our findings. The DLT in the first case study uses smart, cloud-based algorithms to monitor lameness and body condition score in dairy cattle. The second, simpler in design, is used to assess animal emotional wellbeing. In-depth, semi-structured interviews with farmers, developers, and retailers from both case studies (N=24, TBC) are conducted to explore how the use of DLTs influences understanding of animal welfare, and how this relates to changes in management practices. Preliminary findings (additional data expected by June 2022) suggest that impacts of DLTs range from improved management strategies with no changes in perception of animal welfare, to initiating reflection around animal behaviour and positive expressivity. Survey results indicate that most respondents using DLTs (n=76) observed changes to farm management, including in routine tasks or time spent using DLTs. A decrease in time spent assessing animal health and welfare was observed, although most did not observe changes in human-animal interactions (HAIs). Most, however, perceived improvements to the HAR and animal welfare. This suggests that while technology can assist farmers in welfare assessment tasks, farmers may re-direct this time to other tasks which still involve human- animal interactions. This may help improve farmer perceptions of the HAR and levels of welfare, particularly if those tasks assisted by DLTs were of repetitive or difficult nature, thus benefiting both farmers and animals.

Preliminary results on the use of geolocation collars on extensive reared livestock to assess health state and predators' attacks in mountainous areas (above 2000 meters) in Spain

Roger Vidal-Cardos*, Emma Fàbrega, Antoni Dalmau

Animal Welfare Program, IRTA, Veinat de Sies, s/n, 17121, Monells, Girona, Spain
**Presenting author: roger.vidal@irta.cat*

In extensive livestock reared on mountainous areas with difficult access, locating all individuals is often challenging and regular monitoring is time consuming and laborious. In this context, the capacity to detect remotely illness and other livestock welfare concerns becomes critical. The aim of this study was to evaluate the efficacy of a geolocation system to identify welfare and illness problems in animals reared in the Spanish Pyrenees in order to integrate this technology to an app warning system for farmers. A total of 228 animals among bovine, equine and ovine were monitored during summer 2020 and 2021 and equipped with geolocation collars programmed to transmit a position and superficial temperature every 30 minutes. Standardised animal activity was calculated as the Euclidean distances travelled between localisations in a day. A logistic mixed effect model (GLMM) was used to analyse activity (km/day) as a function of time and herd as the experimental unit. The data provided by the app allowed to identify a case of mastitis in a cow by means of an alarm through a mobile app, and the animal could be treated. In fact, the activity of this cow the month prior to the problem (average of 1.72 km per day) was higher ($P<0.001$) than when affected (0.81 km/day), and this was lower too ($P<0.001$) than the month after being treated (2.78 km/day). The value of 0.81 km/day was also lower ($P<0.001$) to the mean activity of the rest of the herd during the same period (2.02 km/day). An increase of activity was found in a cattle herd that was in close contact with a brown bear. This could be observed in comparison to the same herd the previous days (3.2 km/day vs. 1.8 to 2.1 km/day, $P<0.001$;) and to another herd the same day of the incident but without a predator contact (3.2 km/day vs 2.0 km/day, $P<0.001$). These preliminary results suggest that tracking position and related activity might help to monitor health and welfare status of livestock reared in extensive conditions with difficult access. Few events were detected, therefore collection of data is being continued to improve the system and verify that it was not due to a problem of detection, but rather to a real low incidence. The next step would be to model these movement patterns to make them as accurate and reliable as possible.

Developmental changes in humming in a captive polar bear (Ursus maritimus) cub at the Tennoji Zoo

Homare Yamamoto[1*], Yusuke Sano[2], Kenji Aburaya[2], Masayuki Nakamichi[1], Kazunori Yamada[1]

[1]*Graduate School of Human Sciences, Osaka University*
[2]*Local Independent Administrative Agency Tennoji Zoo (Osaka Zoo)*
[*]*Presenting author: otyaotya1600ih@gmail.com*

Captive polar bears (Ursus maritimus) give birth and rear their cubs in a maternity den. Caretakers set cameras in the den to provide a quiet environment and monitor the nursing behavior. However, it is difficult for caretakers to see nursing because the cubs are often covered by their mother's forelimbs. In most Ursidae, cubs produce humming, which is common during nursing. In our polar bears' observation at a zoo, the humming was produced when the cub held her mother's nipple in her mouth. This study proposes a method that utilizes humming to monitor the nursing and cubs' development even when the caretakers cannot see the nursing behavior in the den. The subjects were a polar bear mother and her female cub at Tennoji Zoo, Osaka, Japan. The mother was 6 years old and the cub was born on November 25, 2020. We observed them from the cub's birth for 4 months. We set a camera on the ceiling of the den and recorded the video continuously. For analysis, we sampled 24 h of continuous videos twice a week. The total observation time was 720 h. We investigated the structural characteristics of humming using spectrograms. A Pulse (< 0.1 s) was a rapidly repeated single sound and Pulses composed a Pulse train (range: 1.1–8.0 s). A Series comprised more than one Pulse train and short inhalations (< 0.4 s). In this study, we analyzed Series as humming. We obtained 1297 pictures through instantaneous sampling every 34 min; however, only 2.9% of the pictures captured the cub. We recorded 2248 humming instances through the observation period and investigated the developmental changes in humming by cub's age in months. The short-duration humming (< 10 s) significantly steadily decreased with age ($\chi^2 = 38.88$, df = 3, $p < 0.01$). The frequency of humming per hour significantly decreased with age (Kruskal-Wallis, $p < 0.01$). The inter-humming time significantly increased with age (Kruskal-Wallis, $p < 0.01$). The humming structure of the polar bear was similar to that of other Ursidae. With increasing cub's age, short-duration humming and frequency of humming per hour decreased, whereas inter-humming time increased. Although we observed a single subject, the results suggest that these changes in humming may reflect nursing behavior in polar bears and can be used as an appropriate indicator of cubs' development despite the caretakers' inability to see cubs in the den.

Development of acoustic sensors for detecting individual cow vocalizations

Laura Hunter[1*], Paul Shorten[2]

[1]*Animal Behaviour and Welfare, AgResearch Ltd, Hamilton, New Zealand.*
[2]*Digital Agriculture, AgResearch Ltd, Hamilton, New Zealand*
[*]*Presenting author: laura.hunter@agresearch.co.nz*

Cattle have three distinct vocalization types (Closed mouth, open mouth & mixed) which vary with situation or arousal level and could be used to assess cow emotional states. However, these currently rely on direct live observation or microphone recording at herd level. The aim of this study was to develop and test acoustic models to identify cow vocalizations and type of vocalization from individual collar attached acoustic sensors. Ten non-lactating dairy cows were fitted with collar attached commercially available sensors (Olympus™WS-853 digital voice recorder (Tokyo, Japan)). The cows were managed on pasture according to typical NZ pastoral practices and the study was approved by the Ruakura Animal Ethics Committee. Live observations over four days were conducted to record the study cow and start time for a total of 709 vocalization signals (average 70.9, range 3-452 vocalizations/cow). Vocalization signals were isolated and labelled as open, closed, or mixed type through spectral analysis. An augmented data set of 36,868 signals was stochastically generated from the original vocalization signals by altering signal stretch, pitch, volume, noise, and time-shift. Classification models using convoluted neural network and bidirectional long short-term memory network algorithms were developed using MATLAB (MathWorks). The models aimed to identify cow vocalizations from background noises (other animals, vehicles, environmental noises, and human voices), to differentiate between vocalization type and to identify and correctly assign a vocalization to the cow that generated it. The accuracy of classification was calculated for each model. Cow vocalizations were identified from background noises extremely well and the overall accuracy of the vocalization classification model was 99.5% in the test dataset. The algorithms developed to differentiate between vocalization types had a model accuracy of 85% in the test dataset. A model for vocalization assignment to an individual cow had an accuracy of 80% in the test dataset. As all sensors picked up on all vocalizations made close by in the group, a prototype spectral unmixing algorithm was developed to assign each cow vocalization to the cow that generated it from the ensemble of acoustic recordings. These results demonstrate the feasibility of acoustic-based determination of vocalization traits which may be used to provide information on the state of the animal. Further studies are required to refine these models with larger datasets. However, in future they could be used to assess an individual animal's affective state, offering an account of an animal's experience and consequently their overall health and welfare.

Using precision technology to investigate personality and predictability of movement and space use in farmed calves and their associations with production.

Francesca Occhiuto*, Jorge. A. Vázquez-Diosdado, Charles Carslake, Jasmeet Kaler

School of Veterinary Medicine and Science, University of Nottingham, Sutton Bonington Campus, Leicestershire, LE12 5RD, United Kingdom.
**Presenting author: Francesca.Occhiuto@nottingham.ac.uk*

Consistent individual differences in behaviour within a population, called personality types, and different levels of variation in behaviour, called predictability, can impact individual disease susceptibility, welfare and social network structure. To date these variations and their consequences are not well understood in farm animals, owing to a difficulty in collecting the necessary data. Recent improvements in precision livestock technologies have created an opportunity to collect large amounts of high-quality data for extended periods of time on the behaviour of farm animals. Understanding this variation can help when using behaviour as indicators for early disease detection or as welfare measures. Differences in movement are often used to describe personality types and modern location sensors provide a great tool for investigating farm animal movement. In this study we measured inter-individual variation (personality) and intra-individual variation (predictability) in movement and space use using location sensors that continuously recorded the location of 60 individual calves for 40-48 days. The data were analysed by fitting mixed- effects models for the following variables: walked distance, area used, site fidelity and time spent in the feeder area. Using double-hierarchical models we calculated repeatability (the proportion of total variation explained by the difference between individuals) and coefficient of variation in predictability (CVp). A multivariate model was used to measure the correlations between the behaviours. The results showed consistent differences in average behaviour and in predictability between individuals. The behaviour with the highest repeatability and CVp was area used (R=0.78, CVp=0.41), indicating the existence of an "exploratory" personality. We also found intra- individual correlations between the different behaviours, constituting a behavioural syndrome: individuals with a higher distance travelled also had a higher area used (cor=0.29), and spent more time near the feeder (cor=0.31). The distance travelled was also positively correlated with the weight gained by calves during the trial, indicating a connection between personality types and growth rate.
Overall, these results demonstrated the efficacy of using sensor data to detect personality types and behavioural syndromes in farm animals. There is also novel evidence for individual differences in predictability. The different movement and space use patterns might affect the ability of individuals to cope with space availability or to adapt to changes in the environment. This highlights the importance of accounting for individual variation in behaviour in the management of farm animals, and the potential of using these measures to improve their welfare and health.

Personality traits are associated with precision technology measures of feeding and activity behaviors within the home pen in dairy calves

Megan M. Woodrum Setser[1*], Heather Neave[2], Joao H.C. Costa[1]

[1]*Department of Animal and Food Sciences, University of Kentucky, Lexington, Kentucky*
[2]*Department of Animal Science, Aarhus University, Tjele, Denmark*
[*]*Presenting Author: mmwoodrum@gmail.com*

Personality in dairy calves is mostly measured in a controlled experimental setting. Precision technologies measure behaviors on-farm that may be associated with personality traits. The aim of this study was to investigate the relationship between the behavioral response of dairy calves to standardized personality tests and activity and feeding behaviors measured by precision technologies. Holstein calves (n=23) were subjected to personality tests at 24±3 d of age including an isolation box test, novel person, novel object, and startle tests. Activity of the calf inside the isolation box (e.g., placement of animals in a dark enclosed box with an electronic measurement of movement) was measured via tri-axis accelerometers (2Hz frequency) attached to the box in 5 positions [left, right, back, top-back, top-front]. The total acceleration of the 3 axes were summed for the 5 positions through the test, to create a 'total movement index' for each calf. During the novel person, novel object, and startle tests, 9 behaviors were scored and summed across the tests: time spent exploring the environment, inactive, touching the novel person, novel object and umbrella, lying, attentive, and latencies to approach the person, object, closed and open umbrella. A principal component analysis revealed 3 factors (1: "fearful", 2: "bold", and 3: "active") that explained 62% of the variance. All calves were equipped with a leg accelerometer and were trained on an automatic feeding system (AFS) that had both a milk and starter feeder to measure both daily activity and feeding behavior from 4-81 d of age. From the AFS, the behaviors including total milk intake, rewarded visits, unrewarded visits, and starter intake were calculated. From the accelerometer, total steps, activity index, lying time, and lying bouts were determined for each calf. Regressions were conducted to assess the associations between personality and precision technology measures. The 'total movement index' had significant positive associations with both the milk intake (F=5.66; P=0.03) and lying bouts (F=6.56; P=0.02) for calves. Factor 1 ("fearful") had a significant positive association with the milk intake (F=6.59; P=0.02), steps (F=4.46; P=0.05), and the activity index (F=5.75; P=0.03). Factor 2 ("bold") had a significant positive association with steps (F=4.81; P=0.04). Finally, factor 3 ("active") had significant negative associations with milk intake (F=5.72; P=0.03). These relationships between personality traits and the behaviors measured by precision technology indicate that the stable differences of dairy calves can be measured and identified early in life.

New approach suggests that dairy heifers do not show stable circadian rhythms upon entry to the milking herd.

Teresa Johansson[1*], Maya Gussman[2], Keni Ren[1], Svenja Woudstra[2], Lars Rönnegård[1], Carsten Kirkeby[2], Per Peetz Nielsen[3]

[1]Department of Animal Breeding and Genetics, Swedish University of Agricultural Sciences, Sweden
[2]Department of Veterinary and Animal Sciences, University of Copenhagen, Denmark
[3]RISE Research Institutes of Sweden, Sweden
[*]Presenting author: teresa.johansson@slu.se

In dairy farm management, the introduction of newly calved cows to the milking barn is common practice. This can be stressful and potentially negative for the welfare of the cows, especially those in first lactation as they need to learn the milking routines, adjust to an unfamiliar environment, and make new social contacts all at once. Previous studies following the behaviours after introduction to new environments or social groups have seen that cows return to baseline behaviours within a few days, however these studies were short and did not necessarily investigate the longer-term effects on their behaviours. Real time Location Systems (RTLS) can be used to follow the behaviours of dairy cows 24/7 to ensure that adequate rest and feeding time are being achieved for good well-being and production. The daily duration of these behaviours can give us insight to how the cow is adjusting to the milking barn. This study aimed to investigate how long after introduction it takes for newly introduced first lactation cows to have stable daily behaviours, specifically resting, feeding, and walking. Using RTLS, 30 heifers at two commercial free-stall dairy farms housing roughly 200 lactating cows each, one with parlour milking and the other with automatic milking, were monitored. Using the locational data of the cows, the proportion of the daily activity that was spent in the resting, feeding, and walking areas was determined for the 45 days following introduction to the milking barn. We assumed that the behaviour of the cow corresponded to her location in the barn i.e. feeding while in the feeding area. The 45 days were split into three periods (day 5-20, 20-30 and 30-45) chosen to eliminate the effects of heat (day 20-30) in the results. To establish stable behaviours, we observed how many times an individual's daily behaviour fluctuated more than +/- one standard deviation from her previous five-day-mean. We found that approximately 30% of the cows on both farms fluctuate more than 1 std from the five-day- mean for all three behaviours throughout all periods, indicating that a stable behaviour has not been achieved during the first 45 days after calving. We conclude that even though the previous shorter-term studies using direct observations have shown stable behaviours occurring within the first week, when collecting data 24/7 over a longer period the cows do not appear to reach a stable circadian rhythm.

Monitoring synchronous lying time in commercial dairy herds using accelerometers

Akke Kok[1*], Ariette van Knegsel[1], Eddie Bokkers[2], Vivi Thorup[3]

[1]*Adaptation Physiology group, Wageningen University and Research, The Netherlands*
[2] *Animal Production Systems group, Wageningen University and Research, The Netherlands*
[3] *Department of Animal Sciences, Aarhus University, Denmark*
[*] *Presenting author: akke.kok@wur.nl*

Synchronous lying behaviour may be an indicator of positive welfare in dairy cows. Low values of synchronous lying, despite sufficient lying space, might indicate reduced cow comfort, disturbances, or competition for resources. However, little is known about whether farms differ in the level of lying synchronicity and how consistent this is within a farm. Moreover, the level of synchrony may vary within the day. Accelerometers used for estrus detection of cows enable continuous recording of lying behaviour, thus enabling continuous monitoring of synchronous lying of dairy herds. We studied the timing and duration of synchronous lying in 8 Dutch Holstein Friesian dairy herds across 1 year, in relation to grazing and milking management (robotic milking, 2x and 3x daily milking). In 'winter' months (November-March), herds were housed; in 'summer' months (May-September), 6 of 8 herds had access to pasture for 5-8 hours per day. April and October were excluded because of variable management. Herds had 1-1.4 cubicles available per cow. After cleaning individual accelerometer data, herd average lying time was computed per 15-min (900 s) interval. An interval was defined as synchronous lying when the herd average lying time > 630 s (i.e. assuming 70% of the herd was lying; threshold based on literature). Daily synchronous lying time was defined as the number of synchronous intervals × 15 min. A general linear model was used to assess effects of farm, season and their interaction on synchronous lying time per day; with Tukey-adjusted pairwise comparisons. Spearman rank correlations were made per farm per season to assess the association between total daily lying time and synchronous lying time. Most synchronous lying occurred between 2AM and 6AM, though this was not true for all farms. Across farms, average synchronous lying time was 2.3 h in summer (range: 1.4 – 4.8 h) and 1.7 h in winter (range: 0 – 5.0 h). Robotic milking did not result in lower synchronous lying time. In 4 out of 6 farms with grazing, synchronous lying time was about 1.5 h higher in summer due to synchronous lying on pasture. On 3 of these farms, synchronous lying time in winter had a median value of 0 h. Total lying time and synchronous lying time showed only low to moderate correlations. Monitoring synchronous lying in dairy herds using accelerometers is feasible and the measure seems consistent over time. Its validity as positive or negative welfare indicator requires further study.

Perception of laying hen farmers, poultry veterinarians and poultry experts on sensor-based continuous monitoring of health and welfare of laying hens

Lara A. van Veen[1,2*], Anna C.M. van den Oever[1] , Henry van den Brand[2], Bas Kemp[2]

[1] *Vencomatic Group, the Netherlands*
[2] *Adaptation Physiology Group, Wageningen University and Research, the Netherlands*
[*] *Presenting author: lara.vanveen@vencomatic.com*

Traditionally, laying hen farmers monitor health and welfare of their flock based on flock productive output, feed and water intake, climate factors, and behavioural observations. Due to the growing number of hens per farm and the decreased availability of personnel with sufficient knowledge on poultry, it becomes increasingly difficult to safeguard and control bird health and welfare. To keep up with the global trend towards more sustainable livestock farming, farmers could benefit from state-of-the-art sensor technology, serving as artificial nose, ears and eyes that gather 24/7 data on flock health, welfare and productivity. This project aims to improve laying hen welfare by early stress-detection based on continuous assessment of reliable, predictive indicators. At first, a qualitative, multi-stakeholder survey was prepared to determine current and future sensor use and automation in aviaries to support on-farm health and welfare assessment. Knowledgeable laying hen farmers, practicing poultry veterinarians and experienced poultry experts specialised in e.g. nutrition and genetics, working in West-Europe and Canada, were selected. A purposive heterogenous sampling approach created maximum diversity among the homogenous candidate group. Ultimately, twenty farmers, nine veterinarians and fifteen experts completed an online questionnaire and participated in a semi-structured interview, consisting of narrative questions and follow-up probing questions. The questionnaire aimed to identify several (sociodemographic) variables that could underly the answers given during the interview. Farmers were additionally asked about farm (management) characteristics, while veterinarians and experts were asked about details on their profession and frequency of contact with commercial poultry (farmers). The interview encouraged participants to identify relevant health and welfare issues, including their causal stressors and predictive indicators, and to describe current sensor (data) use for health and welfare assessment and interest in future technologies. Currently, qualitative content of the interviews is analysed, using an inductive coding approach, and summarized per stakeholder group. Quantitative analysis includes variable ranking and comparison between stakeholders, a binary logistic regression and a Fishers test. Preliminary results confirm that production results, behaviour and sound of chickens are commonly used to assess health and welfare. Odour is more difficult to observe and is mainly used by practicing veterinarians with over twelve years of work experience. The most frequently-mentioned problems are related to intestinal health, suggesting an opportunity to study the potential of odour sensors to detect intestinal problems. Moreover, farmers should receive more guidance to use sensor (data) to its full potential. Final results are shown during the ISAE 2022 Congress.

Detection of climate-induced behavioural changes through elevated platforms with an integrated weighing system in broiler chickens

Julia Malchow, Helen Schomburg*, Jonas Knöll, Oliver Sanders, Lars Schrader

Friedrich-Loeffler-Institut, Institute of Animal Welfare and Animal Husbandry, Germany
**Presenting author: helen.schomburg@fli.de*

Automatic early detection of animal welfare and animal health problems in livestock farming can support farmers and animals. In broiler chickens, elevated structures can be offered to enrich the environment, supporting behaviour such as perching and resting. By integrating a weighing system, the overall weight on the elevated structure can be recorded continuously, and the daily mean weight as well as the usage behaviour and different activity measures can be automatically calculated from the data. In order to detect behavioural changes, a total of 1200 fast-growing broiler chickens (Ross 308) were kept in compartments of 200 each for a fattening period of 35 days in two consecutive trials (1st trial: June to July, 2nd trial: September to October; 2 trials x 3 compartments x 200 broiler chickens). The compartments (length x width: 5 m x 3 m) were equipped with a littered floor, feeding troughs and round water dispensers. Feed and water were given *ad libitum*. Additionally, an elevated perforated platform (height x length x width: 0.5 m x 4 m x 0.6 m) with an integrated weighing system was offered with two ramps on the long side to assist climbing. A computer outside the barn continuously recorded the overall weight on the platform. Algorithms for estimating the (1) daily mean weights through analysis of the differences of subsequent measurement values, (2) number of chickens on the platform, and two additional activity measures, (3) movement on the platform and (4) number of changes to and from the platform, were developed using Python. Daytime use of the elevated platforms in the 2nd trial increased until the end of the third week of life, followed by a downward trend until the end of the fattening period. During the 1st trial, despite ventilation system, the intended reduction of barn temperature could not be maintained due to summer heat. Around days 13, 24, and 32, where abnormally high barn temperatures were measured, a reduction in the usage of the platform could be detected. The presented framework combined enrichment of the housing environment with the possibility for automatic detection of animal health and welfare problems, in this instance during heat stress. Through automatic detection of deviations from normal activity and weight development, this method further may be developed as a generalized early warning system for animal welfare and health concerns, such as infections, during the fattening period of broiler chicken.

Individual-level variation in movement within a commercial aviary

Matthew B. Petelle*, Camille Montalcini, Michael J. Toscano

Center for Proper Housing: Poultry and Rabbits (ZTHZ), Division of Animal Welfare, VPH Institute, University of Bern, 3052 Zollikofen,Switzerland
**Presenting author: matthew.petelle@vetsuisse.unibe.ch*

Individuals in cage free systems have the increased ability to choose where they move within a barn. These movements can provide important insights into individual resource requirements, social environment, and welfare. Quantifying within-and among-individual variation in movement is a necessary first step to understand the link between movement and these different aspects. Additionally, if individuals within a population are consistently different from one another, we are then able to determine potential phenotypic and genetic correlations between movement and welfare. In this study, we quantified the within- and among-individual differences in daily movement of 80 DeKalb White hens up to 53 days post-transfer to a commercial-like barn. The barn consists of 20 identical pens using a three-tier Bolegg Vencomatic Terrace system of which 8 were used in this study (~10 birds/pen). Upon transfer to the laying barn, focal individuals were outfitted with backpacks containing a transponder that detected presence across five different zones within the pen using a low-power tracking system. Each pen was then populated with non-focal birds for a total of 225 birds/pen. We conducted a PCA that combined 13 movement metrics into an aggregate component that we interpreted as an overall movement variable within the aviary. Using a double hierarchical model, we partitioned the combined variable into within- and among-individual variation while controlling for time in the barn, temperature, and whether individuals were hatched on farm or transported. Our effort is the first to show consistent among-individual differences in average movement (repeatability = 0.44), temporal plasticity, and predictability (coefficient of variation = 0.25). We found a negative correlation between intercept and linear slope, suggesting that individuals with less relative movement had a greater increase in their movement over time. Additionally, individuals with higher overall movement had a larger quadratic slope. We did not find a correlation between predictability and either averages or plasticity, highlighting the importance of investigating multiple individual-level metrics to understand the dynamics of individual movement. In addition to our individual-level measures, we also found a population-level trend of increased movement in the first month followed by a decrease in movement after 40 days in the barn. Future studies are needed to determine the relationship between individual-level metrics in movement, resource use, social environment, and welfare and relating these to the population-level.

The use of eggshell quality as a measure of stress in laying hens

Helen Gray[1*], Emma Malcolm[1], Katherine Herborn[2] and Lucy Asher[1]

[1] *School of Natural and Environmental Sciences, Newcastle University, UK*
[2] *School of Biological and Marine Sciences, University of Plymouth, UK*
[*] *Presenting author: helen.gray@newcastle.ac.uk*

In the UK, free range hens spend around 60 weeks of their lives producing eggs and experience a range of potentially stressful events. However, flock sizes can reach up to 16,000 birds, making on-farm welfare assessments practically challenging. As eggs are a daily output of a commercial laying farm, and their formation is governed by multiple physiological processes, we explored whether eggshell quality could be used as a proxy measure of stress. To test this, we housed 240 laying hens in 16 pens across four rooms. After habituating for 17 days, hens experienced a 7-day control period. For the following three days, eight pens experienced a temporary increase in temperature to 30°C and eight pens experienced a one- hour social isolation by removing birds from pens and placing them in crates. Temperature increase stopped when birds showed signs of heat stress with a time limit of two hours. We had planned for a matched 7-day treatment phase, but this was cut short by extreme weather conditions.
Eggs were scored daily by two researchers for defects in: texture; shape; colour; wrinkles/ corrugations; soft shells; missing shells; cracks. Eggs were given a score of 0 (no defects), 1 (minor defects), or 2 (unsuitable for sale as a whole egg in the UK). Texture, shape and wrinkle characteristics showed enough variation for analysis. In total, 1350 eggs were scored from the control period (7 days) and 595 eggs from the treatment period (3 days). Bayesian cumulative ordinal models were used to estimate the probability of an egg having each type of defect. The probability of eggs scoring 0 for texture was higher on control days than on treatment days, indicating an increase in defects in both heat and isolation treatments (estimate: 0.30, 95% highest density internal [HDI]: 0.10, 0.50). The probability of eggs with no shape defects was higher in the isolation group but only during the control period (estimate: 0.24, 95% HDI: 0.00, 0.49). For wrinkles, hens in the isolation treatment showed fewer defects than hens in the heat treatment (estimate: -0.28, 95% HDI: - 0.47, -0.10). We suggest that using visible characteristics of eggshells could be a valid and useful addition to assessing changes or known stresses in a hen's environment for both research and commercial purposes. Specifically, changes in texture seem to be most promising but further validation is needed to understand the generalizability of these results to other stressors.

Estimation of resilience parameters in pigs based on activity measured with computer vision

Lisette. E. van der Zande[1], Oleksiy Guzhva[2], Séverine Parois[1,3], Ingrid A. van de Leemput[4], J. Elizabeth Bolhuis[1], T. Bas Rodenburg[1,5,*]

[1] Adaptation Physiology Group, Wageningen University & Research, Wageningen, The Netherlands
[2] Swedish University of Agricultural Sciences, Department of Biosystems and Technology, Box 190, 23422 Lomma, Sweden
[3] Agence Nationale de Sécurité Sanitaire de l'Alimentation, de l'Environnement et du Travail (ANSES)
[4] Department of Environmental Sciences, Wageningen University, Post Office Box 47, NL-6700 AA Wageningen, Netherlands.
[5] Animals in Science and Society, Faculty of Veterinary Medicine, Utrecht University, Utrecht, The Netherlands
[*]Presenting author: t.b.rodenburg@uu.nl

Resilience could be referred to as the animal's ability to successfully adapt to a challenge. This is typically displayed by a quick return to initial metabolic or activity levels and behaviours. Pigs have distinct diurnal activity patterns. Deviations from these patterns could potentially be utilized to quantify resilience. However, human observations of activity are labor intensive and not feasible in practice. In this study, we show the use of a computer vision tracking algorithm to quantify resilience based on activity patterns following an LPS challenge. We expected this challenge to induce a mild sickness response and a dip in activity in LPS-treated pigs. The institutional Animal Care and Use Committee of approved the experiment. We used 121 pigs housed in barren or enriched housing systems. The enriched housing consisted of delayed weaning in a group farrowing system and extra space and environmental enrichment after weaning. The barren housing consisted of a conventional farrowing pen and a barren environment after weaning. Based on a previously developed computer vision algorithm, pigs were tracked for 24 hours per day for eight days around LPS injection. The location of each individual was used to calculate activity expressed in meter/hour. Statistical analyses were performed with the software R 4.1.0. Resilience parameters were analyzed using (generalized) linear mixed models with the function 'glmer' and 'lmer' from the R package 'lme4'. Parameters were log transformed to obtain normality if needed. Housing, sex and their interaction were included as fixed effects in each model and pen and batch as random effects. Concerning the response to LPS, first, the effect of the challenge treatment (LPS injected vs. control) on the probability to show a dip was analyzed. This study found that enriched housed pigs were more active pre-injection of LPS, especially during peak activity times, than barren housed pigs ($P < 0.001$). Four pigs per pen received an LPS injection in the ear vein with 2 µg of LPS/kg BW and two pigs a saline injection. As expected, LPS injected animals were more likely to show a dip in activity than controls ($P < 0.001$). Duration and area under the curve (AUC) of the dip were not significantly affected by housing, but the AUC:duration ratio was higher in enriched housed pigs compared to barren housed pigs (9.7 vs. 6.2). This effect might reflect a different strategy to cope with an LPS sickness challenge in enriched housing.

Validation of non-invasive sensor technologies to measure use of enrichment material in weaned piglets

Fleur Veldkamp[1,2*], Tomas Izquierdo Garcia-Faria[1], Vivian L. Witjes[3], Johanna M.J. Rebel[1], Ingrid C. de Jong[1]

[1] Wageningen Livestock Research, Wageningen University and Research, Wageningen 6700 AH, The Netherlands
[2] Adaptation Physiology Group, Wageningen University and Research, Wageningen 6700 AH, The Netherlands
[3] Farm Animal Health, Department Population Health Sciences, Veterinary Medicine, Utrecht University, Utrecht 3584 CL, The Netherlands
[*]Presenting author: fleur1.veldkamp@wur.nl

Measuring animal behaviour is important in the assessment of animal welfare. In this study, novel non-invasive sensor technologies were validated for measuring use of enrichment material (EM) in pens with weaned fattening piglets. The experiment was carried out in four pens (2.61 m2) with six weaned piglets per pen (until a bodyweight of ±25 kg) at a semi-commercial farm. Pens were provided with EM (a ball and piece of wood connected to a chain). Four different sensor technologies were tested: passive infrared detectors (PID's), tri-axial accelerometers (TAA, not yet analysed), neural network model algorithm (NNMA) and radio frequency identification system (RFID, data not shown). Per pen, a PID was placed above the EM which measured movement around the chain (ø20 cm) in Volts every second. A TAA was attached to the EM (top of the chain) and measured acceleration based on x-, y- and z-axis every second. A video camera was placed above each pen to record video images that were used to feed the NNMA and for validation of the sensor technologies. A RFID antenna was placed above the EM in two pens. Use of EM was manually scored per second per pig (pooled per pen afterwards) for 30 minutes of video footage per pen per week (for week one, three and five after weaning) which resulted in 21612 observation points in total, of which 4032 points were active use of EM (shake, carry, nose, bite, chew, root or >1 type). Manually scored use of EM (gold standard) was compared with data from PID's and the NNMA. F1 score and Matthews Correlation Coefficient (MCC) were calculated to measure performance of the sensor technologies. The NNMA performed better in pens without RFID antenna (F1 score = 0.6059, MCC = 0.5345) than in pens with RFID antenna (F1 score = 0.5054, MCC = 0.3991) because of a better view on EM in pens without RFID antenna. PID's overestimated active use of EM (F1 score = 0.3802, MCC = 0.1921) which might be due to relatively small pen sizes, resulting in piglets lying under or standing/walking/running against the EM without active use of EM. PID's performed better in measuring all contact with EM (active use + touching EM with body; F1 score = 0.5660, MCC = 0.2510) compared to measuring only active use of EM. Further analysis will determine if TAA's or a combination of sensor technologies will show improved performance.

Investigating intention in non-human animals: a need for a new theoretical and methodological framework

Anne-Lise Dauphiné-Morer[1,2*], Alain Boissy[1], Franck Zenasni[2], Muriel Mambrini-Doudet[3]

[1] INRAE, UMR1213 Herbivores, F-63122 Saint-Genès-Champanelle, France
[2] Université Paris Cité, Univ Gustave Eiffel, LaPEA, F-92100 Boulogne-Billancourt, France
[3] INRAE, CODIR - Collège de Direction, F-75007 Paris, France
[*] Presenting author: anne-lise.dauphine-morer@inrae.fr

While intentions are commonly assessed in humans, this is not the case in non-human animals, which may limit the accuracy of the assessment of their welfare, which depends, among other things, on whether their expectations are met. Our hypothesis is that current approaches in ethology do not consider the possibility that animals have intentions. Our aim is to find a way to assess the intentions of animals. To this end, in a team of ethologists, psychologists and epistemologists, we developed a two-stage method: i) a bibliometric survey to identify and select key approaches to studying intention. ii) These approaches were confronted with current practices in ethology through three one-day interdisciplinary workshops, bringing together 21 researchers in ethology, psychology, law, philosophy, veterinary science, learning science, management science and design. Each workshop had three stages: a disciplinary review, an interdisciplinary perspective and a collective design. In the Scopus database over the years 2016-2020, we extracted 89,000 articles with intent in the title and keywords. Only 1% of them explicitly addressed intention in non-human animals. We analysed the co-occurrence of the keywords of the authors of these articles (the 1%), to specify the scientific approaches with the CorText platform. We found 10 divergent approaches: behavioural flexibility & social context; human-animal interaction & domestication; mirror neuron & language; flexibility & meaning; self-domestication & disease; comparative cognition & auditory; handedness & manipulation; brain evolution & cultural evolution; antiphony & duets and teaching & tradition. All relate to what we know about human intention, none were specific to what non-human animal intention might be. These elements were successfully addressed in all 3 workshops. In the disciplinary assessment, all participants translated the ten approaches into concepts, methods and scientific questions relevant to their own discipline. Then, during the interdisciplinary prospect, the participants co-developed hypothesis for studying animal intentions based on the combination of the concepts, methods and questions collected in the 10 approaches. Examples of hypotheses obtained: “Intention is not directly accessible, but it can be expressed through behavioural adaptations in the relationship.”; “Studying the effects of the environment on interactions reveals intentions.”; “Interactions have different effects on the maintenance, emission or valence of intentional behaviours”. Finally, the collective design resulted in 7 protocols to test these hypotheses. We will present the results of the workshops and discuss the power of these hypotheses and protocols to avoid anthropocentric approaches when studying animal intention.

How do goats read 2D-images of familiar and unfamiliar conspecifics?

Jan Langbein[1*], Mauricio Moreno-Zambrano[2], Katrin Siebert[1]

Research Institute for Farm Animal Biology (FBN),
[1] Institute of Behavioural Physiology and
[2] Institute of Genetics and Biometry
[*]Presenting author: langbein@fbn-dummerstorf.de

Sheep, cattle and horses have advanced abilities to discriminate familiar and unfamiliar conspecifics presented as 2D pictures. We hypothesized that if goats are able to represent 2D images as real conspecifics, performance on a discrimination task should differ depending whether showing 2D images of familiar or unfamiliar conspecifics. We tested 24 goats (mean age=103d) in four consecutive 4-choice discrimination tests using an automatic learning device integrated into the animals' home pen. We used portrait photos (Test 1), profile photos (Test 2), and photos of the goats' body without the head (Test 3). Test 4 was a reversal task of Test 1. We split goats into two groups: Group A was trained to discriminate a photo of a familiar conspecific from three photos of unfamiliar conspecifics, while Group B was trained to discriminate a photo of an unfamiliar conspecific from three photos of familiar conspecifics. Each test ran for six days and was preceded by a one-day pretest where all photos were rewarded equally. To analyze spontaneous preferences for specific photos in the pretests, separate two-way ANOVAs (SYMBOL and GROUP) for each test followed by Tukey multiple comparisons was done. To analyze differences in the number of trials to reach the learning criterion (TtC), a linear mixed model (GROUP and TEST) was used. Then proceeded to make Tukey multiple comparisons. All statistical analyses was done using R. In none of the pretests did we detect differences between the groups in terms of preference for a specific photo. Moreover, in none of the pretests was the photo to be chosen in the following test spontaneously preferred. There was no difference in learning performance (TtC) between the groups in Test 1 to 4, however, significantly higher TtC in Test 4 with respect to all previous tests ($F_{3, 65.2} = 43.96$, $p < 0.001$) was found. The lack of spontaneous preferences for the photo of the familiar conspecific in the pretests in group A, as well as the lack of differences in TtC between both groups in all tests, do not at first glance suggest that our goats established a correspondence between real conspecifics and their 2D representations. However, the higher TtC in the reversal test (Test 4) suggests that both groups previously formed the learning rule of choosing either the familiar or unfamiliar goat in the image, and thus provide some evidence that goats form 3D representations of conspecifics from 2D images.

Goats may recognise humans cross-modally

Marianne Mason[1*], Harry Marshall[1], Stuart Semple[1], Alan McElligott[2, 3]

[1] School of Life and Health Sciences, University of Roehampton, London, UK
[2] Department of Infectious Diseases and Public Health, Jockey Club College of Veterinary Medicine and Life Sciences, City University of Hong Kong, Hong Kong SAR, China
[3] Centre for Animal Health and Welfare, Jockey Club College of Veterinary Medicine and Life Sciences, City University of Hong Kong, Hong Kong SAR, China
[*] Presenting author: masonm@roehampton.ac.uk

Recognition is a key requisite in animal social lives as it allows them to tailor behaviour among individuals. In the domestic environment where animal movement is restricted, and close-contact husbandry tasks are commonplace, repeated interactions (a prerequisite for recognition) between livestock and humans are a frequent occurrence. Given this close proximity over many generations, we might expect mechanisms animals use to discriminate between conspecifics should also be applied in recognizing humans. Goats can combine visual and vocal cues to recognize other goats. We investigated whether this cross-modal recognition extends to discriminating among familiar people. A photograph of a familiar person's face was placed at the front of the experimental arena. When the goat (n=28) approached and was facing the front, two repeated playbacks of a voice, which was either congruent (from the same person) or incongruent (from a different person) with that photograph were broadcast from a speaker hidden directly behind the photograph. Goats experienced four trials each: two congruent and two incongruent, with all face-voice combinations from two familiar people. We predicted that goats would look sooner and for longer and be more likely to look after playbacks when the photograph and voice were incongruent, relative to when they were congruent, reflecting a violation of expectations. Goat arousal in relation to differences in congruency was also examined, with increases in heart rate and decreases in heart rate variability expected when cues were incongruent. Responses were analysed using generalised and linear mixed models, except for duration and likelihood of looking which due to the distribution of the duration data, were analysed using a single zero-inflated mixed model. We found goats took longer to respond to voices with increasing playback number, but this increase in latency was greater when the face and voice presented were incongruent (GLMM: congruency x playback number: $\beta \pm$s.e.$=1.761 \pm 0.009$, $Z=186.13$, $p<0.0001$). Differences manifested in only one of the responses measured and patterns do not strictly conform to those predicted. However, the fact that we did observe a change in goat behaviour with face-voice congruency could suggest cross-modal recognition extends to humans. If so, this would infer the presence of an internal cognitive representation of familiar people, a prerequisite for individual recognition. Given the importance of human-animal relationships for animal welfare, understanding how well goats and other livestock distinguish between humans is vital as it affects the extent to which they can attribute positive and negative interactions to individuals.

Measuring motivation for Sudan grass hay in finishing cattle using voluntary interaction with an aversive stimulus

Rachael Coon*, Cassandra B. Tucker

Center for Animal Welfare, Department of Animal Science, University of California, Davis, CA, USA
** Presenting author: recoon@ucdavis.edu*

Finishing cattle fed high-concentrate diets may be motivated to access additional forage, particularly to offset acidosis. Previous research used weighted gates and found ceiling effects of physical strength underestimated their motivation for forage, while other options, like operant tasks are difficult to interpret in terms of what they mean to the animal. To overcome these limitations, we measured cattle motivation for Sudan grass (SG) hay using electric current, a universal adverse stimulus which can be finely controlled. We recognize the potential ethical concerns of using electric current and took this very seriously. This experiment was designed to allow cattle to touch the electrified barrier *entirely voluntarily*. Our approach was approved by the UC Davis IACUC and it follows the ISAE ethical guidance regarding aversive stimuli. Twenty-seven steers were assigned 2 automated feed bins. One bin contained their primary diet (TMR) and the other contained either 0.2kg SG hay (n=14) or ~2kg of additional TMR, measured to match the SG by volume (n=13). To ensure that animals were not visiting the treatment bin because of hunger, the primary diet was fed ad-libitum (115% of previous day's intake). To access a bin with a treatment, steers voluntarily pushed against an electrified barrier at the opening, lifting it above his head. The current was initially 0μA for 48h then increased exponentially every 24h (156, 312, 625, 1250, 2500, 5000μA) until they ceased accessing it. We deliberately chose a starting current that was as low as possible. To provide context for these values, to humans, 156μA is not perceptible, and levels above 3000μA are painful. In pilot testing, cattle touched 5000μA, but in this experiment no animals visited at 5000μA; 19% accessed treatment bins at 2500μA, and 48% accessed them at 1250μA. Overall, steers had 5.4±2.6kg of "free" TMR available when they chose to touch the current to access additional TMR or SG. Using survival analyses, we found that the probability of advancing to the next current level was higher for TMR than SG animals (P=0.009). A Wilcoxon-rank-sum test detected treatment differences between maximum currents: TMR animals accessed it at higher levels than SG (mean±SE:1380±878 vs. 469±169μA, respectively; P=0.012; 1-β=0.74). Surprisingly, these results indicate that working for additional TMR is more important to finishing cattle than forage. Cattle are highly motivated to contrafreeload and these findings raise new questions about what these curious animals experience in barren feedlot environments.

Heart rate variability response in horses during immediate and withheld food reward

Sarah Kappel[1*], Marco A Ramirez Montes De Oca[2], Sarah Collins[1], Katherine Herborn[1], Mike Mendl[2], Carole Fureix[1,2]

[1] *School of Biological and Marine Sciences, University of Plymouth, Devon, UK*
[2] *Bristol Veterinary School, University of Bristol, North Somerset, UK*
[*] *Presenting author: sarah.kappel@plymouth.ac.uk*

Changes in heart rate (HR) and heart rate variability (HRV) reflecting sympathovagal balance are mainly used to assess negative states in animals, including horses. Here we measured cardiac response to varying rewarding stimuli (offered vs withheld food). We recorded cardiac activity using ECG in 25 horses (9 females, 12.7±5.1 years, various breeds, from two riding schools) subjected to immediate (IR) or withheld food reward (WR). Horses were trained to muzzle-touch a target (either one of two objects of similar size) to receive a reward. Twelve animals (group A) received IR during three consecutive 5-min sessions (two blocks of 10 target trials separated by a 2min-break). In session 4, otherwise identical to the other sessions, reward was withheld. Controlling for potential timing effects, group B horses received IR in session 1, 3 and 4 with reward withheld in session 2. Baselines (5-min) was recorded prior to testing. Mean HR and HRV indices (standard deviation of inter- beat intervals SDNN, root mean square of successive inter-beat interval differences RMSSD) were condition-blinded extracted via Kubios software. We used linear mixed models to test how reward (IR/WR), group (A/B) and individual features (age, sex, yard, target object, general learning ability (*i.e.* number of trials needed to reliably discriminate between the two objects) and welfare score derived from housing aspects (social/environmental resources) and individuals' health status) influence HR and HRV indices. We expected HR to increase in both conditions due to heightened overall arousal. We predicted SDNN and RMSSD to increase during IR reflecting greater shift towards parasympathetic PNS dominance, and to decrease during WR due to frustration-induced sympathetic dominance. All horses touched the target throughout IR and WR. As predicted, mean HR significantly increased from baseline during both situations (IR: $z=6.76$, WR: $z=4.22$, both $p<0.001$), without however significantly differing between IR and WR phases ($z=1.59$, $p=0.24$). Reward did not significantly predict RMSSD ($X^2_2=3.85$, $p=0.14$). For SDNN ($X^2_2=12.64$, $p<0.001$), IR ($z=3.4$, $p<0.01$) and WR ($z=2.77$, $p=0.01$) significantly increased SDNN vs baseline, but IR and WR did not significantly differ ($z=0.05$, $p=0.99$). Faster learning and better welfare state predicted significantly higher RMSSD (LA: $X^2_1=12.56$; WS: $X^2_1=23.68$, $p<0.001$) and SDNN (LA: $X^2_1=14.12$; WS: $X^2_1=19.31$, $p<0.001$). During IR and WR, arousal and PNS activation thus significantly increased, but HRV did not significantly differ between IR and WR, suggesting both situations induced states of similar emotional valence. We will discuss future work, e.g. more contrasting test conditions. Ethical approval: This study complies with the ISAE Ethical Guidelines and received ethical approval by the Animal Ethical Review Committee of the University of Plymouth (ETHICS- 42-2020).

Welfare status of dairy cattle managed under extensive and intensive systems in hill state of Uttarakhand, India

Mayamitta Saini*, Madan Lal Kamboj, Arun Kumar Mishra, Ajmer Singh, K.Pannusamy

ICAR- Natioanl dairy Research Institute, Karnal, Haryana, India 132 001
**Presenting author: saini32064@gmail.com*

Animal welfare is considered as major issue in intensively managed cattle with concerns regarding inadequate housing, climatic stress, overcrowding, production stress and disease. Extensively managed cattle face unique welfare challenges especially in hill regions where resource poor farmers graze animals on naturally growing vegetation. Major welfare challenges under such conditions may be uncertain pasture availability, inadequate housing and healthcare facilities, low management input and predation. In Uttarakhand there is existence of intensive systems (IS) in plains areas in foothills and extensive system (ES) in upper hills. The aim of this study was to assess and compare the welfare status of dairy cattle under these two systems. Welfare was assessed based on 20 indicators (10 input and 10 output based) in 3 components (A: housing and other facilities B: feeds and feeding practices and C: performance, behaviour and health) using Integrative Diagnostic System Welfare protocol (Calamari and Burtoni, 2009) modified by Kamboj and Kumar (2014). A total of 60 farms (30 each from IS and ES) from four districts, 2 each from intensive (Haridwar and Udhamsingh Nagar) and extensive (Uttarkashi and Tehri) system were selected. Differences among means of variables were tested using one-way ANOVA with DMRT in SPSS 22. Welfare score of A out of 30 in IS (13.20±0.94) was greater ($P<0.05$) than ES (9.36±0.81). Scores of individual indicators in A including housing system, feeding and watering space; and availability of milking parlour were higher ($P<0.05$) in IS than ES. Score of B out of 30 was higher ($P<0.05$) in IS (15.08±1.00) than ES (6.06±0.39). Scores of individual indicators in B, namely availability of feed and fodder, feeding practices and colostrum feeding were lower ($P<0.05$) in ES than IS. Score of C out of 40 was not different in IS (21.94±1.33) and ES (24.56±0.37) but ES farms performed better in cow comfort index, cow cleanliness score, hock injury score and mastitis incidence than IS farms. Overall integrated welfare score of IS (50.16±2.83) was greater ($P<0.05$) than ES (40.00±1.24) farms. Overall welfare was acceptable (score > 60) at 23.3% of IS farms and none of ES farms. In conclusion, welfare status of cattle at most of farms under intensive system and at all farms under extensive systems was unacceptable. Intensively managed cattle had better welfare due to better housing and feeding facilities than extensive farms. Extensively managed cattle, however, had better comfort, cleanliness and feet health due to freedom of movement.

Cattle behaviour in silvopastoral systems: integrating animal welfare and the provision of ecosystem services

Francisco Galindo

Faculty of Veterinary Medicine, National Autonomous University of Mexico
**Presenting author: galindof@unam.mx*

Cattle production has been associated with unsustainable practices. Consumer concerns over the sustainability of livestock production systems, such as their carbon footprint, impact on biodiversity, and animal welfare, demand research to explore trade-offs between these aspects. This paper refers to three separate studies as part of an ongoing research project carried out in Yucatan, Mexico, including silvopastoral systems (SPS) composed of trees, shrubs, and pastures. The aim of the three studies were: 1) to compare the behaviour and physiology of cattle in monoculture (MS) and silvopastoral (SPS) systems; 2) to assess the welfare of cattle using the Welfare QualityÒ protocols in 10 farms, and 3) to integrate cattle welfare and biodiversity (bats, rodents, birds) measurements in 9 farms using the *Sustainability Assessment for Food and Agriculture* (SAFA-FAO) framework in order to assess sustainability in MS and SPS. Study 1 revealed that the temperature-humidity index (THI) was higher in the MS than in the SPS ($F=37.61$, $P>0.001$) and the frequency of non- agonistic interactions was higher in the SPS ($P<0.05$). Heifers in SPS had a more linear and non-random dominance hierarchy in both seasons of the year (dry season: h'=0.964; rainy season: h'= 0.988), than heifers in the MS (dry season: h'=0.571, rainy season: h'=0.536). Daily foraging times were significantly longer in the MS than in the SPS ($t=9.50$, $P<0.001$) while daily ruminating times were significantly longer in the SPS than in the MS during both seasons (dry: $t=-13.09$, $P<0.01$; rainy: $t=-11.30$, $P<0.01$). Study 2 revealed that body condition was better in SPS ($P<0.05$) and flight distances of cattle were reduced in the SPS ($P < 0.05$). In Study 3 we found that SPS had positive ratings for Biodiversity and Animal Welfare. The species richness of bats, rodents, and birds was higher in SPS, and the abundance of species susceptible to being hosts for zoonotic diseases (West Nile Virus) was higher in MS. Overall, SPS had higher percentages of themes according to the SAFA protocol, that were positively scored compared to monocultures which scored the lowest. Our results show that SPS are a good alternative to improve cattle welfare and to maintain biodiversity with the potential of acting as buffers for the transmission of disease. This information is useful for elaborating science-based policies for the implementation of more sustainable practices in livestock production.

How behavioural robustness in sheep reared in rangeland can be impacted by early rearing conditions and genetics?

Nadège Aigueperse[1], Cécile Ginane[1], Sara Parisot[2], André Guittard[1], Gaëtan Bonnafe[2], Sébastien Douls[2], Flavie Tortereau[3], Xavier Boivin[1*]

[1] Université Clermont Auvergne, INRAE, VetAgro Sup, UMR Herbivores, F-63122 Saint Genès- Champanelle, France
[2] UE0321 INRAE La Fage, Roquefort sur Soulzon, France
[3] UMR1388 (GenPhySE) INRAE, Institut National Polytechnique de Toulouse - INPT, Ecole Nationale Vétérinaire de Toulouse, Université de Toulouse Paul Sabatier 31326- Castanet Tolosan - France
[*] Presenting author: xavier.boivin@inrae.fr

Sheep flocks are often located in disadvantaged areas with a lower human control. They are exposed to various challenges (feeding, predation…). So, animal adaptability is strongly requires in such conditions. The genotype/environment interaction is known to have durable effects on the development of behaviour. So, part of a project about sheep efficiency/resilience and genetics, this study aimed to explore the influence of two common early rearing types (indoor artificially feeding vs. outdoors dam rearing) and two genetic lines (high vs. low feed efficiency, HFE vs. LFE) on the development of behavioural robustness of individuals. Eighty Romane ewe lambs from these two lines were randomly allocated either indoors with artificial feeding (AR) or in the rangeland with their mothers (MR) from birth to weaning at 3 months of age. Then, they were randomly grouped in 4 experimental rangeland plots for 3.5 months: 2 AR and 2MR groups of 20 lambs mixing equally genetic lines. Three types of behavioural tests were performed in order to determine either their adaptability to sudden events, or their risk- taking capacity or their response to humans. Response to a sudden event was evaluated during a session of daily concentrate feeding. The risk-taking test, assessed the ewe lamb ability to take a risk in order to cross a barrier. Lambs responses to humans were evaluated during a human choice test which, after a learning process, assessed lamb capacity to choose between two familiar or unknown persons. Results suggested that AR lambs were less avoiding a sudden disturbing stimulus during regular feeding (a moving experimenter disguised to hide his human shape) than MR lambs ($P<0.001$). AR lambs explored more and crossed easier the barrier than the MR ones ($P<0.001$). They also approached longer humans whatever their familiarity level ($P<0.001$) except for ARLFE who approached more the familiar human ($P<0.05$). In both tests, we observed an interaction effect on bleating expression: AR bleated more than MR ($P<0.05$) but ARLFE lambs bleated the most and AMHFE the least ($P<0.05$). In conclusion, despite 3.5 month of range conditions after weaning, lambs artificially reared in early age appeared more robust when coping to artificial disturbing events. Selection for feed efficiency seems to induce an interaction effect with rearing conditions on vocal behaviour and response to familiar human that needs to be further analysed. This work has received funding from the EU Horizon 2020 research and innovation programme under grant agreement n°772787 (SMARTER).

The impact of gastrointe stinal parasitism on lamb behaviour and welfare

Michelle C. Reeves[1,2,3*], Naomi Booth[1], Naomi J. Fox[1], Jo Donbavand[1], Mhairi Jack[1], Fiona Kenyon[2], Jessica E Martin[3], Emma M Baxter[1], Cathy M. Dwyer[1]

[1] SRUC, Midlothian, UK
[2] Moredun Research Institute, Midlothian, UK
[3] Royal (Dick) School of Veterinary Studies, University of Edinburgh, Midlothian, UK
[*] Presenting author: michelle.reeves@sruc.ac.uk

Gastrointestinal parasitism is an important health and production concern in farmed ruminants, yet its impact on sheep welfare is unclear and its effect on behaviour has only briefly been described, especially at the sub-clinical level. The levels of discomfort experienced by sheep during subclinical infections remain unknown. This study applied quantitative and qualitative behaviour and welfare assessment techniques to examine the effects of sub-clinic al *Teladorsagia circumcincta* infection on 96 lambs (24 pens of 4 lambs) divided into three treatment groups at the pen level: AC=ad-lib fed control group, RC= restricted-fed controlsAP=ad-lib fed parasitised group. Parasitised lambs were trickle dosed three times weekly with 7000 larvae as part of a larger study having received ethical approval from SRUC's Animal Ethics Committee. Previous studies have shown that this dose causes sub-clinical infection in lambs. RC lambs were fed the amount that AP lambs voluntarily consume d to separate the effects of infection-induced anorexia from the potential direct welfare impacts of infection. Weight loss and parasitism-related humane endpoints were stated in protocols. Scan samples and focal samples were taken from video recordings to monitor behaviour, while animal-based measures such as faecal soiling score (FSS) were recorded as welfare indicators. Qualitative behaviour assessment (QBA) was conducted to gain insight into the lambs' affective states over the course of infection. There were no statistically signific ant differences in behaviour across treatment groups, although there was a trend for longer pla y bouts, described as head-butting, mounting and running, in RC lambs than in AC lambs (est=- 8.36, SE=3.14, 95%CI=-17.6-0.887, p=0.07). There was no significant difference in FSS across treatment groups, although AC lambs tended to have higher scores than AP (OR=1.28, SE=0.56, 95%CI=-0.04-2.60, p=0.06). Analysis of the QBA data revealed that treatment group had no significant effect on the affective state of the lambs. All lambs' scores increased along the Activity dimension in Week 3 compared to Week 1 (est=-0.724, SE=0.262, 95%CI= -1.410 to -0.0373, p=0.03). These results suggest that the early stages of sub-clinical T. *circumcincta* parasitism did not have a statistically significant impact on lamb behaviour and welfare in this experimental environment.

Influence of weaning age and naturally acquired nematode infections on behaviour of lambs

Lena Lidfors[1*], Niclas Högberg[2], Anna Hessle[1], Johan Höglund[2]

[1] Department of Animal Environment and Health, Swedish University of Agricultural Sciences, Sweden
[2] Department of Biomedical Sciences and Veterinary Public Health, Swedish University of Agricultural Sciences, Sweden
[*] Presenting author: Lena.Lidfors@slu.se

The aim was to investigate how behaviour and body weight gain (BWG) in naive grazing lambs were influenced by weaning age when exposed to contrasting levels of gastrointestinal nematodes under natural grazing conditions. The study took place at Götala Beef and Lamb Research Centre in Southwest Sweden. Forty-one multiparous Dorset ewes with two lambs from the same commercial herd were included. They were released into two permanent pastures, naturally contaminated by sheep with strongyle nematode larvae the previous year. One group of ewes and their lambs were dewormed before turn-out and at weaning with 0.2 mg ivermectin per kg body weight (low parasite load, LP). The other group of ewes and lambs got no treatment (high parasite load, HP). Treatment groups were based on parasite load (HP or LP) and weaning age (10 weeks, EW or 14 weeks, LW) (EW-HP n=12; EW-LP n=13; LW-HP n=11; LW-LP n=13). BWG and faecal egg counts (FEC) were monitored every fourth week from 36-105 days on pasture. Behavioural observations were conducted from 08.30-11.00 on day 1, 2, 3, 8, 9, 15, 16, 23 and 24 after weaning by the same observer. Behaviour were recorded instantaneously at every second minute at individual level for 60 minutes each day. A generalized mixed model (SAS vers.9.7) tested if there were any effects of treatment group, weeks after weaning and their interactions. No lambs became sick during the four weeks after weaning. EW-LP had a higher proportion of grazing/browsing (55.5%) than the other three treatments (EW-HP 33.2%, LW-LP 33.8%, LW-HP 40.1%, $p<0.0001$), and LW-HP had a higher proportion of grazing/browsing than EW-HP ($p<0.01$). LW-LP had a higher proportion of rumination (28.8%, $p<0.0001$) than LW-HP (14.7%, $p<0.0001$). EW- HP had a higher proportion of rumination (25.1%) than EW-LP (13.4%, $p<0.0001$) and LW- HP ($p<0.001$). LW-HP had a higher proportion of lying (27.2%) than LW-LP (23.0%, $p<0.01$) and EW-HP (22.1%, $p<0.0001$). LW-LP had a higher proportion of lying than EW- LP (21.1%, $p<0.001$), and EW-HP had a higher proportion than EW-LP ($p<0.0001$). Average BWG was 11 % higher ($P<0.01$) in EW-LP (229±18 g) compared with EW-HP (207±20 g), but there was no difference in BWG between LW-LP (265±6 g) and LW-HP (231±17 g) day 36-105. The average FEC was higher ($p<0.05$) in EW-HP than in the other treatment groups 36 days after turnout. In conclusion, lambs with HP were more affected by early weaning than lambs with LP concerning their behaviour and BWG.

Welfare and parasitology condition of extensively reared sheep during winter

Katarina Nenadović[1*], Marijana Vučinić[1], Nemanja Jovanović[2], Dejan Bugarski[3], Tamara Ilić[2]

[1] University of Belgrade, Faculty of Veterinary Medicine, Department of Animal Hygiene, Serbia
[2] University of Belgrade, Faculty of Veterinary Medicine, Department of Parasitology, Serbia
[3] Scientific Veterinary Institute ''Novi Sad", Serbia
[*] Presenting author: katarinar@vet.bg.ac.rs

While the welfare of sheep is largely positive when assessed according to natural living in an extensive system, they may face a range of compromises to their wellbeing, principally related to nutritional stress, inadequate water supply, climatic extremes, parasitical diseases, lameness, and inappropriate management. Grazing sheep are therefore exposed to a huge diversity of parasites since natural pastures are the main source of internal and external parasites. The aim of this study was to identify the main welfare issues during winter with an emphasis on parasitological infections in extensive sheep farming systems. The study was conducted during the winter season of 2022 on three farms of native sheep breed Vlašićka zackel in the mountain region Fruška gora. All year round, the flock of ewes grazes in fenced paddocks where shelter is provided by trees, shrubs and other vegetation. A total number of sheep included 550 ewes, 12 rams and 300 lambs. We observed 82 ewes, aged 2-7 years. For welfare assessment, animal-based indicators from the AWIN protocol for sheep were used. All fecal samples for parasites were qualitatively and quantitatively examined. Results were described by descriptive statistics and as prevalence. Relationships between the different welfare indicators and endoparasites were examined by Spearman's Rank correlation. The main welfare issues identified were fleece cleanliness (84.14%), nasal discharge (45.12%), ocular discharge (19.51%), respiratory problems (18.29%, 15/82), body condition score-BCS (15.85%), fleece quality (20.73%-some loss) and borderline anaemia (9.76%). Lesion on legs and minor lameness was present in 4.88% ewes. In the examined feces of ewes, seven endoparasites were identified in the form of coinfections - protozoa (Coccidia and *Buxtonella sulcata*), nematodes (strongylides, *Trichuris ovis*, and Protostrongylidae), cestodes (*Moniezia* spp) and trematodes *Dicrocoelium dendriticum* with a total prevalence of 100%. The most prevalent coinfections were Coccidia and strongylides (12.20%), Coccidia, strongylides and Protostrongylidae (12.20%), and Coccidia, strongylides and Dicrocoelium dendriticum (12.20). The most common was coccidiosis, in the form of infections of medium and high intensity. Parasite infection was identified as an important and prevalent welfare problem across all farms, with a weakly significant ($r=^{-}$ 0.24, $r=0.22$, $p<0.05$) correlation between certain parasites (*Buxtonella sulcata* and Protostrongylidae) and welfare indicators such as nasal discharge and borderline anaemia. Also, a significant ($r=0.30$, $p<0.001$) correlation between BCS and fleece quality was found. The findings provide useful information on the main welfare issues that can occur in extensive sheep farming and can help farmers to improve animal welfare.

Association of range use, individual behavior, and welfare indicators of two laying hen hybrids housed under organic conditions

Kaitlin E. Wurtz [1*], Fernanda M. Tahamtani[3], Leslie Foldager[1,2], Karen Thodberg[1], Anja B. Riber[1]

[1] Department of Animal Science, Aarhus University, Blichers Allé 20, P.O. Box 50, DK-8830 Tjele, Denmark
[2] Bioinformatics Research Centre, Aarhus University, Universitetsbyen 81, DK-8000 Aarhus C, Denmark
[3] Animalia, Norwegian Meat and Poultry Research Centre, Lørenveien 38, 0513 Oslo, Norway (currently)
[*] Presenting author: kwurtz@anis.au.dk

Access to an outdoor range provides laying hens with increased space and improved opportunities for performing natural behaviors. However, not all hens utilize the range to the same extent and this may be associated with the welfare of the individual bird. The aim of this study was to assess if extent of range use was associated with several clinical welfare indicators or individual time budgets. 120 hens (Bovans Brown, n=60; Dekalb White, n=60) were housed across 12 pens according to EU organic standards. Clinical welfare indicators including plumage condition, foot health, keel bone damage, and body weight were assessed upon arrival at 18 weeks of age, and again at weeks 23, 28, 33, and 38. Over six three-day periods at corresponding weeks, behavior was recorded by instantaneous scan sampling from 8:30 to 15:30 in the house and on the range. Behavior recorded included comfort behaviors, drinking, dust bathing, eating, foraging, locomotion, nest use, pecking, perching, resting, and standing. Frequency of passes through the pophole and duration of time outdoors were also determined through video observations. Generalized linear mixed effects models included week, hybrid and range use as fixed effects and either pen and bird-id (or only pen) as random effects. Binary responses were examined by binomial models with logit link (mixed effects logistic regression), ordinal variables by cumulative logit (proportional-odds) models, counts of behavioral observations by Poisson models with log link and log(N observations) as offset, and body weight by a normal linear mixed model. None of the clinical welfare indicators were significantly associated with either range use variable. Time on the range was negatively associated with drinking ($P<0.001$), eating ($P=0.021$), and perching ($P<0.001$) and positively associated with foraging ($P<0.001$) and standing behavior ($P=0.008$). Number of pophole passes was negatively associated with perching ($P=0.009$) and resting behavior ($P=0.016$), and positively associated with locomotion ($P=0.017$). In summary, individual time budgets vary depending on extent of range use, but the clinical welfare indicators did not appear to be associated with the proportion of time that birds chose to spend outdoors.

Animal welfare in changing agricultural landscapes of Ethiopia: a mixed-methods approach

Gezahegn Alemayehu[1*], Mulugeta Mokria[2], Tsega Berhe[1], Eyob Gelan[1], Knight – Jones Theodore[1], Rebecca Doyle[1,3]

[1] *International Livestock Research Institute, Ethiopia*
[2] *World Agroforestry Centre, Ethiopia*
[3] *University of Edinburgh, UK*
[*] *Presenting author: gezahegn.alemayehu@cgiar.org*

Livestock in Ethiopia is an extremely important sector as they serve a wide variety of socio-cultural, economic, and ecological functions. Agroforestry is a system that interfaces between agriculture and forestry are a promising and sustainable land use approach to improving animal welfare and environmental wellbeing. A mixed-methods approach (household survey, animal welfare measurement and community conversations (CC)) were used to understand livestock production trends, identify managemental gaps to improve animal welfare, and compare animal welfare status under agroforestry and mono-cropping systems. Both resource and animal-based measurement were conducted to determine the welfare status of animal using objective measurement tools. A total of 197 households were interviewed and 84 households' herd/flocks were visited for resources assessment. Animal-based assessments were conducted on five animal species (276 cattle, 141 sheep, 200 goats, 44 donkeys and 11 camels). The CC were employed to identify and explore issues on animal welfare from both male and female community members who participated in the previous household survey. The results of CC revealed that livestock production is highly challenged by agricultural landscape change where land that can be potentially used for animal rearing such as grassland, shrub/bushland, and forest land was transformed into cultivated land. These changes significantly affected livestock production, nutrition, health, behavioral state of the animal. The household survey results indicated that 50% and 27.5% of the farmers mainly use communal and private pastureland for animal grazing, respectively. However, 90% of the respondents feel that their animals did not get enough feed from existing resources and only 43% of them acted to improve animal hunger. In 67% of the households, it was common for animals to get sick. Despite this, only 31% of the animal owners consulted trained health service providers when their animals get sick or injured. In most of the households, animal spent their night in the yards without a roof which exposed them to extreme weather conditions. Animal welfare assessment results showed that the diversity of feeds was significantly higher ($P < 0.05$) in a household that have more tree species in their farm/backyard. The odds of cattle being in good body condition was 2.039 times higher when reared in agroforestry systems than a mono-cropping agricultural system. There is a need to adapt knowledge-intensive and site-specific sustainable agricultural landscape management options, such as agroforestry to improve farm animal welfare.

Changing milking and feeding times to reduce heat stress in a pasture-based dairy system

Karin E. Schütz[1*], Neil R. Cox[1], Vanessa M. Cave[1], Frances J. Huddart[1], Cassandra B. Tucker[2]

[1] AgResearch Ltd, Ruakura Research Centre, Hamilton 3214, New Zealand
[2] Center for Animal Welfare, Department of Animal Science, University of California, 1 Shields Avenue, Davis 95616, USA
[*] Presenting author: karin.schutz@agresearch.co.nz

Management strategies to reduce heat stress are needed, especially when there is no or little shade in pasture-based dairy systems. We investigated management practices used to reduce heat load in summer: milking later when it is cooler, feeding later, and milking only in the morning. Fifteen groups (n=4 pregnant Friesian-cross cows/group) were managed on pasture and milked at 0700h followed by a new pasture allocation including silage and one of five afternoon/evening treatments: 1) Late milking (1935h)/early feed (1630h), 2) Late milking (1935h)/late feed (2015h), 3) Early milking (1550h)/early feed (1630h, control), 4) Early milking (1550h)/late feed (2015h), 5) Once-a-day milking (OAD): cows were milked only in the morning and provided feed at 1630h. Lying, grazing and ruminating were recorded using validated accelerometers over 25 days (mean temperature: 19°C, range: 5-32°C). Body temperature (BT) was recorded using vaginal temperature loggers and respiration rate (RR) was recorded manually 3 times/day. Individual milk production and water intake (group level) were recorded daily. Data were analysed using REML with group as experimental unit (n=3/treatment). Lying time differed between treatments (P=0.053); OAD cows spent the most and Late milk/early feed cows the least amount of time lying. There were no treatment differences for grazing, ruminating or RR, however, there was often an interaction between treatment and time of day (grazing: P=0.035, ruminating: P=0.013, RR: P=0.019). For example, cows milked early in the afternoon and OAD spent more time grazing between 1800- 2100h and more time ruminating between 2100-0600h than cows milked in the evening. Cows milked in the evening had highest RR at that time whereas OAD cows and cows milked early/fed later consistently had lowest RR. Water intake tended to differ between treatments (P=0.075); cows milked early in the afternoon consumed most water. OAD cows tended to have lowest maximum BT, and Late milk/early feed cows the highest maximum BT (P=0.087). Cows milked late/early fed also had the greatest peak in BT in the morning and in the afternoon/evening, whereas OAD and Late milk/late feed cows had the lowest BT in the afternoon/evening. Milk production declined over time, which is normal in summer, however this decline was lower for OAD cows (P=0.031). Modifying milking and feeding times can be used to change diurnal patterns of behaviour but more information is needed to understand what this means for welfare and heat generation. Both OAD milking and delaying milking and feeding may reduce cattle heat load.

Shelter-seeking behaviour in horses during summer – do weather conditions and horsefly (Tabanidae) activity matter?

Janne Winther Christensen[1*], Henrik Skovgård[2]

[1] *Dept. Animal Science, Aarhus University, Tjele, Denmark*
[2] *Dept. Agroecology, Aarhus University, Slagelse, Denmark*
[*] *Presenting author: jwc@anis.au.dk*

Blood-sucking insects, such as horseflies (Diptera: Tabanidae) are generally considered a threat to the welfare of grazing animals and disturbs their feeding, movement and resting behaviour. Further, insects may act as vectors of bacteria and virus causing contagious and parasitic diseases as well as allergies. Previous studies found reduced insect harassment of horses with access to shelters. However, in many countries there are currently no requirements for shelter access for horses during summer. We investigated voluntary use of artificial shelters by 10 horse groups during eight summer weeks (2019: 5 groups, 2020: 5 groups, n = 42, 3 – 5 horses per group). The groups represented a variety of compositions (horse breed, age, gender) and shelter types (design, size). Shelter use was recorded every 30 min, using photos from wildlife cameras mounted inside the shelters, i.e. 48 recordings per group per day for 56 days where the number of horses inside as well as their ID and behaviour were noted. Daily weather conditions were recorded, and horsefly prevalence was quantified one day per week using H- traps (i.e., total eight trap catches per group). Data were analysed using an ANOVA model considering repeated measures. Daily average shelter use, i.e. percentage of horses inside, increased with increasing temperature ($F_{1,534}$ = 92,73, $P < 0.001$) and decreased with increased humidity ($F_{1,534}$ = 19.89, $P < 0.001$) and wind speed ($F_{1,534}$ = 132.8, $P < 0.001$). Warm days resulted in a shift in the daily rhythm of shelter-seeking behaviour: Night-time shelter use did not differ between the seven coldest and seven warmest summer days, whereas daytime shelter use increased markedly, and there was a significant interaction between summer days (warm vs. cold) and time of day (Two-way RM ANOVA, $F_{3,27}$ = 9.36, $P < 0.001$). Further, more horses were inside on days with the highest outdoor trap catch of tabanids compared to days with the lowest catch ($F_{3,27}$ = 14.56, $P < 0.001$). We conclude that horses made increased use of artificial shelters on warm summer days. Since all horses had access to natural shade in their pastures and shelter temperatures were generally higher than outdoor temperatures, we suggest that the main driver of increased shelter use on warm summer days was insect avoidance. We therefore recommend provision of shelter access to horses during summer, particularly if kept in areas with limited opportunities to seek natural refuge from insect harassment.

Jet aircraft flights over sheep on pasture: how do sheep respond?

Judit Vas[1*], Ruth Newberry[1], Ståle Otervik[2], Inger Lise Andersen[1]

[1] *Norwegian University of Life Sciences, Faculty of Biosciences, Department of Animal and Aquacultural Sciences, Norway*
[2] *Multiconsult, Norway*
[*] *Presenting author: judit.vas@nmbu.no*

Unexpected loud noises can be stressful for animals. Noise from jets around military airfields is of concern to farmers, especially those with animals on pasture. Responses of sheep to jet aircraft have not, to our knowledge, been previously documented. Therefore, in this study, we investigated behavioural responses of pastured sheep to unpredictable military jet overflights. During a six-day period, eight flocks of pastured domestic sheep (various breeds and ages, previously exposed to overflights by regular civilian flights and occasional F-16 jets) were observed during overflight by previously unencountered F-35 jets (which have a distinctive noise level and spectrogram) versus at other times. Behaviours in the regular behavioural time budget (lying, grazing, walking), and those indicating vigilance (head lifting, ear orientation) or alarm (vocalization, running), were registered during 10-second scans on 2-4 days per flock (53.2±5.0 total scans per flock, 243 and 183 scans with and without overflight). Decibel readings were also taken. Generalized linear mixed models with binomial distribution were used to evaluate associations between behaviour and overflight, day of observation, time of day (morning, early afternoon, late afternoon), overflight*day and overflight*time of day, with flock as a random factor. The maximum noise levels were in the range of 83-111 dB. During overflights, less lying was observed in the morning observations (Chi^2=21.0, df=2, P<0.001), more grazing during the morning and early afternoon observations (Chi^2=7.0, df=2, P=0.030), less walking in general (Chi^2=75.7, df=1, P<0.001) and less ear orientation in the late afternoon (Chi^2=8.9, df=2, P=0.012) compared to observations without overflight. There was no association between overflight and the proportion of sheep showing head lifting or vocalization either generally or during specific times of day (P>0.05). Running was observed sporadically (in 8 out of 426 scans), and was not associated with any of the predictive variables (P>0.05). Across days, an increasing proportion of sheep were lying (Chi^2=117.6, df=1, P<0.001) and walking (Chi^2=71.8, df=1, P<0.001), and a decreasing proportion were grazing (Chi^2=126.4, df=1, P<0.001), especially during observations without overflight (Chi^2=23.4, df=1, P<0.001). Ear orientation, head lifting and vocalizations were not affected by day of observation (P>0.05). We conclude that overflights had some effects on sheep behaviour, but these were mild and not consistently present in this sample of aircraft-experienced animals. Across the week of observation, the sheep also showed some signs of familiarisation to overflights by jets of a type they had not previously encountered.

Long-term consequences of forage presentation on horses' welfare

Marie Roig-Pons[1,2*], Hanno Würbel[1], Sabrina Briefer[2]

[1] *VPHI, Animal Welfare Division, University of Bern;*
[2] *Agroscope, Swiss National Stud Farm (SNSF)*
[*] *Presenting author: marie.roig-pons@agroscope.admin.ch*

Slowfeeding dispensers have been developed to tackle one of the equine husbandry's dilemmas: fulfilling the horses' behavioural and physiological needs in terms of feeding behaviour, without risking obesity. Slowfeeders' (SF) effects on horses remaining unknown for a long- term use, we aimed at exploring long-term associations between forage presentation and horses' welfare, using health and behavioural indicators. 354 horses from two cohorts (SF users, n=182; Control horses, n=174) were sampled, based on the proportions of a preliminary survey (1'444 horse caretakers) about the target population (4 strata identified in the literature: age, housing, training and shoeing). 346 additional horses will be assessed in Spring 2022 (nSF=168; nControl=176). Health data comprised vibrissae and gums' evaluation, pictures of the incisors and a musculoskeletal health assessment (MHA) performed by an osteopath. Owners of the horses recruited had to fill a survey about their horse's personality, and reactivity to humans was assessed using two tests of voluntary and forced approach. Feeding management details (e.g. dispensers' characteristics, SF or not, period of use) were also recorded. Inter- and intra- assessor reliability for the MHA protocol was verified ($r_{pearson}$ > 0.72 for all pairs of osteopaths involved and Gwet's index = 0.91 for the recruited osteopath) and the sample size needed to reach significance level was calculated ($N_{totneeded}$ = 671). Interim analysis on data collected in 2021 showed that vibrissae length and use of slowfeeders are significantly associated: SF horses are 6 times more likely to display cropped vibrissae, compared with control horses (χ^2-test, p = 1.55e-12). Univariate analysis revealed that the use of SF is not associated with the total MHA score (t-test, p = 0.37). Of all of our variables, only age (r = 0.35, p = 1.4e-10, *Pearson correlation*) and housing (one-way ANOVA, p = 0.024) had a significant effect on the MHA score, which underlines the need for stratification. However, horses using dispensers higher than 60% of their size (e.g. above their shoulder's height) tended to display more osteopathic issues (p = 0.10). Our preliminary results show that forage presentation has an impact on horses' vibrissae length but data from the second batch will be needed to draw conclusions about the effect on horses' personality and musculoskeletal health. By the time of the conference, we expect to evaluate how the horses' behaviour can be related to the use of slowfeeding dispensers and to compute associations between the overall feeding management and the horses' welfare.

How much is too much? Feeding live black soldier fly larvae to laying hens.

Fernanda M. Tahamtani[1,2*], Emma Ivarsson[1], Viktoria Wiklicky[3], Cecilia Lalander[3], Helena Wall[1], T. Bas Rodenburg[4], Frank A.M. Tuyttens[5,6], Carlos E. Hernandez[1]

[1] Department of Animal Nutrition and Management, Swedish University of Agricultural Sciences, Uppsala, Sweden
[2] Norwegian Meat and Poultry Research Centre, Lorenveien 38, 0513 Oslo, Norway (present address)
[3] Department of Energy and Technology, Swedish University of Agricultural Sciences, Uppsala, Sweden.
[4] Animals in Science and Society, Faculty of Veterinary Medicine, Utrecht University, Utrecht, The Netherlands
[5] Animal Sciences Unit, Flanders Research Institute for Agriculture, Fisheries and Food (ILVO), Scheldeweg 68, 9090 Melle, Belgium
[6] Department of Veterinary and Biosciences, Faculty of Veterinary Medicine, Ghent University, Heidestraat 19, 9820 Merelbeke, Belgium
[*] Presenting author: fmt@animalia.no

The use of insects in animal feed has the potential to reduce the demand for soybean production and reduce the deforestation and loss of natural resources. In particular, black soldier fly (BSF, *Hermetia illucens*) larvae have received attention due to their ability to convert organic waste into high-value biomass. Several studies have investigated the effects of providing BSF larvae to both broilers and laying hens. However, knowledge gaps regarding hens' voluntary intake of live larvae and the effects of larvae consumption on egg production still remain. Therefore, the aim of the present study was to determine the effects of the provision of four different amounts of live BSF larvae on laying hen feed consumption, hen health and fearfulness, and egg production and quality. To this end, 40 Bovans White laying hens were housed individually and provided with 0%, 10%, 20% or *ad libitum* daily portions of live larvae (relative to expected dry matter intake) plus a complementary concentrated pelleted feed from 18 to 30 weeks of age. Larvae consumption and concentrate consumption, hen weight, egg production and egg quality were monitored. Overall, differences were found between the hens given ad libitum access to larvae compared to the other treatments. *Ad libitum* hens, consumed 163 ± 41 g larvae/hen/day, consumed less concentrates ($P = 0.03$) and gained more weight ($P = 0.0002$) than all other treatments. They also had an overall higher consumption of protein, fat and energy ($P < 0.03$). There was no effect of larvae provision on egg production, egg weight, shell thickness, shell breaking strength, or Haugh unit ($P > 0.05$). Furthermore, there was no effect on hen behaviour towards a novel object or in an open field test. This study shows that *ad libitum* feeding of live BSF larvae had no strong effects on egg production or egg quality, but did reduce feed consumption and increased hen weight, which can have health consequences in the long term. Nevertheless, including BSF larvae in the diet of hens could be an interesting option for the future.

Effects of a rearranged drinking system on the behavior of turkeys (*Meleagris gallopavo*)

Stephanie Schäfers*, Nicole Kemper

Institute for Animal Hygiene, Animal Welfare and Farm Animal Behaviour, University of Veterinary Medicine Hannover, Foundation, Hannover, Germany
** Presenting author: stephanie.schaefers@tiho-hannover.de*

In this study, the influence of differently arranged drinkers in a turkey house on the turkeys' behavior was tested. The hypothesis was that the new arrangement leads to an increased resting area and thus less agonistic and more comfort behavior. The study was performed on a conventional turkey farm in two barns with 3,600 male B.U.T 6 turkeys each. In the trial barn (T), 40 Plasson bell drinkers were arranged into drinking bars of five drinkers to increase the free floor space. In the control barn (C), drinkers were kept in lines. An area covering half of the drinking bar and half of the increased resting area in T and the corresponding area in C were video-recorded continuously from week five until removal (week 21). Videos were evaluated using the spot sampling method. For one day weekly, ten minutes of every hour were evaluated. Until week 17, 50 animals per barn were examined bi-weekly for signs of pecking. Three batches of turkeys were analyzed. The number of observed agonistic, comfort, resting and drinking events was analyzed using linear mixed models with barn, week, phase of day (d; with night: 11 PM to 7AM, early day: 7 AM to 3 PM, late day: 3 PM to 11 PM) and their interactions as factors. An interaction between barn, week and d was found for all variables. From week 17 on until removal, an increased number of agonistic behavior during nights was found in T (2.8 (T) vs. 0.9 (C); $p=0.02$). From week 17 on during late days and increased comfort behavior (5.2 (T) vs. 3.1; $p=0.003$) and reduced resting behavior (15.9 (T) vs. 23.8 (C); $p<0.001$) was found in T. From week 16 on, drinking events were increased during late day (9.0 vs. 6.7; $p=0.03$) and night (6.4 vs. 4.2; $p=0.01$) in T. No difference in signs of pecking between barns until week 17 was found. T and C were not changed. Therefore, above results might show an effect of barn, which could not be tested statistically. These results indicated that while an increased free floor space offers more surface, the arrangement of drinkers in T was suboptimal. Due to drinkers being that close together, animals had less space around drinkers during late fattening. This resulted in less animals being able to drink simultaneously, which increased approaches to drinkers during late days and nights and thus reduced resting behavior during late days.

Evaluating the temperature preferences of sexually mature Duroc, Landrace, and Yorkshire boars

Rebecca Pritchett[1*], Victoria Raber[1], Lindsey Robbins[2], Kara Stewart[2], Brianna Gaskill[2], Angela Green-Miller[3], Jay Johnson[1]

[1] USDA-ARS Livestock Behavior Research Unit, West Lafayette, Indiana, USA 47907
[2] Purdue University Department of Animal Science, West Lafayette, Indiana, USA 47907
[3] University of Illinois Department of Agricultural and Biological Engineering, Urbana, Illinois USA 61801
[*] Presenting author: Rebecca.Pritchett@usda.gov

An accurate understanding of boar temperature preferences may allow the swine industry to more precisely design and utilize environmental control systems in boar facilities. Therefore, the study objective was to determine the temperature preferences of sexually mature Duroc, Landrace, and Yorkshire boars. Eighteen, 8.6 ± 0.4-month-old boars (n = 6 Duroc, 6 Landrace, and 6 Yorkshire; 186.25 ± 9.29 kg) were individually tested in thermal apparatuses (12.2 m x 1.52 m x 1.86 m) that allowed free choice of their preferred temperature within a 8.9 to 28.3ºC range. For analyses, the apparatuses were divided into 5 thermal zones (3.71 m2/thermal zone) with temperature recorded 1.17 m above the floor in the middle of each zone. Target temperatures for thermal zones 1 to 5 were 10, 15, 20, 25, and 30ºC, respectively. All boars were given a 24 hr acclimation phase followed by a 24 hr testing phase within the thermal apparatuses. Daily feed allotments (3.63 kg/day) were provided to each boar and all boars were allowed to consume all feed prior to entering the thermal apparatus. Water was provided *ad libitum* within the thermal apparatuses with one waterer per thermal zone. During testing, boars were video- recorded continuously to evaluate behavior (inactive, active, or other), posture (lying, standing, or other), and thermal zone the boar occupied. All parameters were recorded in 15-min intervals using instantaneous scan sampling. Data were analyzed using GLM in JMP 15. For the analyses, only time spent lying or inactive were used as an indicator of thermal preference because they were observed most frequently (lying 80.02%, inactive 77.64%) and were deemed to be associated with comfort. Percent time spent active (19.73%) or standing (15.87%) were associated with latrine or drinking activity and were too low to accurately analyze as an indicator of thermal preference. Breed did not affect temperature preference ($P > 0.05$). A cubic regression model determined that boars spent the majority of their time inactive at 25.5ºC ($P < 0.01$) and lying (both sternal and lateral) at 25.9ºC ($P < 0.01$). These data suggest that boar thermal preferences do not differ by breed and that boars may prefer temperatures at the upper end of current guidelines (10 to 25ºC).

Light intensity preference of broilers is affected by breed, age and behaviour

Jerine A.J. van der Eijk*, Stephanie Melis, Tomas Izquierdo Garcia-Faria, Johan van Riel, Ingrid C. de Jong

Wageningen Livestock Research, Wageningen University & Research, the Netherlands
** Presenting author: jerine.vandereijk@wur.nl*

There are still many questions on how to provide light to broilers. This especially relates to light intensity, spectrum and source (daylight vs. artificial). Preference testing for light intensity has been scarce. Therefore, we determined preferences of fast- and slower-growing broilers for different light intensities, taking into account their age, time of day and behaviour. Day-old chickens from a fast- (Ross 308) and slower-growing breed (Hubbard JA757) were housed in groups of 12 per pen ($8m^2$) with 8 pens per breed. Each pen was divided into 4 areas of $2m^2$ with all resources provided (feed, water, lucerne, perch) and one light intensity per area (0.2, 20, 50 or 1000 lux). Areas were separated from each other using black plastic, with a central opening to all areas. Cameras were installed for continuous recordings and an algorithm was developed to automatically count the number of broilers per area. Group observations were performed via scan sampling at 5 target weights per breed, with a total of 15 scans per area per target weight. Behaviours were analysed as percentage of the total number of broilers in a specific area. Behaviour data was analysed using generalized linear mixed models with a binomial distribution, and included light intensity, breed, target weight and two-way interactions as fixed factors, and pen and area within pen as random factors. Count data needs to be analysed, but both fast- and slower-growing broilers seemed to prefer the 1000 lux at a young age, and gradually moved to darker intensities at an older age, with fast-growing broilers showing equal preference for 0.2, 20 and 50 lux, and slower-growing broilers showing a preference for 0.2 lux. No clear interaction effects were found on any of the behaviours. With regard to light intensity, broilers showed more ingestion ($F_{3,45} = 9.77$, $P < 0.01$), active ($F_{4,301} = 6.28$, $P < 0.01$), and foraging behaviour ($F_{4,55} = 14.12$, $P < 0.01$) and less inactive behaviour ($F_{4,52} = 24.61$, $P < 0.01$) with increasing intensity. For comfort behaviour there was no difference between light intensities. Thus, fast- and slower-growing breeds seem to differ in their light intensity preference with age, whereas breeds did not differ in their light intensity preferences with regard to behaviours. These findings indicate that it might be important to adopt age- and breed-specific light intensities, and that light intensities can stimulate or inhibit behaviours, which will be further studied.

Photovoltaic panels as a strategy for enhancing animal welfare and sustainability of sheep farming in tropical environments

Vinicius de França Carvalho Fonsêca[1*], Eric de Andrade Culhari[1], Gustavo André BernardoMoura[1], Hugo Maia Milan[1], Marcos Chiquitelli Neto[2], Alex Sandro Campos Maia[1]

[1] Innovation Group of Thermal Comfort and Animal Welfare (INOBIO-MANERA), Biometorology Laboratory, São Paulo State University, Jaboticabal, Brazil.
[2] Innovation Group of Thermal Comfort and Animal Welfare (INOBIO-MANERA), Biometorology Laboratory, São Paulo State University, Ilha Solteira, Brazil.
Presenting author: vinicius.fonseca@academico.ufpb.br

While high levels of solar radiation compromise animal welfare, they can generate clean and renewable electrical energy through photovoltaic panels, which in turn, can provide artificial shading for animals. These benefits foster the concept of livestock sustainable intensification. Here in this study we wish to examine benefits on behavioural and physiological welfare indicators of sheep grazing in a shaded area from photovoltaic panels. Procedures involving animals were approved by the Animal Care and Use committee at the São Paulo State University, Brazil (015314/18). Over twenty consecutive days, nine adult Corriedale ewes (Body mass: 78 ± 12 kg) were instantaneously scanned each 5-min from 08:00 to 17:00h to determine their time spent grazing, ruminating, idling, lying, standing, under the sun, and under the shade. Ewes had miniature temperature data loggers attached for samplings ofwool surface (ºC), skin (ºC) and vaginal temperature (ºC) at each 10 min. The respiratory rate (breath min-1) of ewes were visually recorded at each 20 min. Meteorological variables were recorded using a portable weather station. Least square means were used to test impact of classes of solar irradiance on behavioural responses of ewes. To test effect of shade use on body temperatures and respiratory rate, an algorithm grouped three classes of time (e.g., 5, 35, and 65 minutes) concerning time that an animal remained uninterrupted in the shade. Ewes in the shade of solar panels experienced 40% less radiant heat load than if they were in the sun. When levels of solar irradiance increased between 200 and 700 W m^{-2}, time spent by ewes in the shade increased ($P < 0.05$) from 5 ± 2.3% to 70 ± 5.0 %. Moreover, ewes spent close to 70% of the time that they remained in the shade lying ruminating or idling. Ewes had progressive drop ($P < 0.05$) in respiratory rate, wool surface, skin and vaginal temperature as the time remaining uninterrupted in the shade increased from 5 to 65 min, particularly if levels of solar irradiance were higher than 350 W m^{-2}. Over a period of one year (Jan to Dec, 2019), the set of photovoltaic panels produced 4.55 MWh of electric energy, while 2.32 tons of CO_2 were not emitted to the atmosphere. In conclusion, photovoltaic panels as shading resource is a promising environmental adaptation that buffer negative impacts of heat stress, enhance animal welfare and sustainability of sheep farming in tropical environments.

Pre-weaning social behaviour and peripheral serotonin levels are associated with behavioural and physiological responses to weaning in pigs

Caroline Clouard[1*], Héloïse Vesque-Annear[1], Colette Mustière[1], Françoise Thomas[1], Stéphane Ferchaud[2], Armelle Prunier[1], Elodie Merlot[1]

[1] PEGASE, INRAE, Institut Agro, 35590, Saint-Gilles, France
[2] INRAE, GenESI, 17700, Saint-Pierre-d'Amilly, France
[*] Presenting author: caroline.clouard@inrae.fr

In pig production systems, weaning is a major challenge, which may affect health and welfare of piglets. Yet, large differences exist between piglets in their responses to weaning. Research efforts have been devoted to characterising early predictors of adaptation to weaning, but focused mainly on aggressive and harmful social behaviours, whereas little is known on the importance of socio-positive behaviours. Furthermore, serotonin (5-HT), a neurotransmitter involved in the regulation of social behaviours, may also be a pertinent predictor of piglets' adaptation to social mixing. We aimed to assess whether pre-weaning social behaviour and blood 5-HT levels were associated with behavioural and physiological responses of piglets to weaning. Social behaviours (social exploration, aggression, play fight, social locomotor play) of 62 focal piglets from 12 litters were scored continuously for 8h at 42 days. At weaning (d48), focal piglets were allocated to 4 pens of approximately 30 piglets from 6 different litters. On the 2 days following weaning (d49-50), social behaviours were scored continuously and behavioural activities were scored with 6-min instantaneous scan sampling for 6h per day. Blood was sampled one week before (d41) and 24h after (d49) weaning to measure 5-HT levels and health parameters. Post-weaning data were analysed using linear mixed models including pre-weaning parameters and sex as fixed effects, weaning weight as covariate, and pen nested within batch as random effects. Social exploration of pen mates represented 57% and 77% of all social interactions one week before and directly after weaning, respectively. Social play was not observed on the 2 days following weaning. Exploration of pen mates one week before weaning was positively associated with exploration of pen mates ($p = 0.03$) and time spent active ($p = 0.05$) after weaning, while social locomotor play before weaning was positively associated with time spent walking after weaning ($p = 0.008$). Blood 5-HT levels before weaning were negatively associated with aggression ($p = 0.05$) and positively associated with blood 5-HT levels ($p = 0.003$), lymphocyte-to-neutrophil ratio ($p = 0.04$), and growth ($p = 0.004$) after weaning. A variety of pre-weaning parameters influenced oxidative status after weaning, with post-weaning hydroperoxide levels being associated positively with pre-weaning social locomotor play ($p = 0.006$) and negatively with pre-weaning blood 5-HT levels ($p = 0.003$). In conclusion, our findings suggest that pre-weaning socio-positive behaviours and blood 5-HT levels may be relevant predictors of piglets' adaptation to weaning stress and deserve more research attention.

Welfare and performance of finishing pigs are strongly affected by group size, density, and production system

Inger Lise Andersen*, Marko Ocepek

Department of Animal and Aquacultural sciences, Faculty of Biosciences, Norwegian University of Life Sciences, P.O. Box 5003, 1432 Ås, Norway
**Presenting author: inger-lise.andersenmbu.no*

The objective of the present work was to investigate effects of group size, animal density and production system (conventional, straw bedding, outdoor) on welfare and performance in finishing pigs following different feeding regimes. This is to our knowledge the first study that addresses these factors on commercial farms. We conducted an on-farm welfare assessment on 87 farms across Norway. Our data contain 7 farms with straw bedding concept and larger groups (Mean±SE and range: 71.4±8.9; 24 to 201), and only 2 with outdoor units with group size of around 250 pigs, and the rest were herds with traditional, rectangular pens typically with 1/3 slatted floors and 2/3 concrete floor that were cleaned and supplied with sawdust on the resting area (Mean±SE and range of group size: 9.6±0.1, 2 to 65). Mean±SE floor space per animal indoors was 1.3±0.0 m^2 (range: 0.8 to 3.8). We made individual welfare assessment of a sample of 10 pigs from each of maximum 8 pens per farm. A mixed analysis of variance (Proc mixed in SAS 9.4), including group size, animal density and feeding regime in different production systems, were used to analyze selected welfare parameters. Data from a sub sample of 44 herds with traditional pens that registered weight gain were analyzed with a generalized model (proc Genmod). In larger groups of pigs, there was a smaller proportion of pigs per pen with bite marks on tail ($P<0.0001$), ears ($P<0.0001$)) and body ($P<0.0001$)) than in pens with smaller groups. Proportion of pigs with bite marks on tail ($P<0.0001$) and rest of the body ($P=0.004$) were lower in farms with straw bedding and outdoor production than when pigs were housed indoors in traditional pens. A lower floor space per pig resulted in a greater proportion of pigs with bite marks on tail ($P=0.032$) and ears ($P<0.003$). Daily weight gain per pig was lower in pens with a greater proportion of pigs with bite marks on tail ($P<0.0001$), ears ($P=0.002$) or rest of the body ($P=0.004$) than in pens with no or a low proportion of pigs with bite marks. Daily weight gain declined with increasing group size ($P=0.0003$). In conclusion, larger groups, pens with straw bedding, and outdoor production improved welfare of the pigs, but larger groups in traditional pens had lower weight gain than smaller groups. Which combination of factors that may enhance production and welfare will be discussed.

Perch use in commercial broiler breeder pullet hens – effect of perch type, height and age

Guro Vasdal[1*], Sabine G. Gebhardt-Henrich[2], Kathe E. Kittelsen[1], Fernanda M. Tahamtani[1].

[1] *Animalia AS, Norwegian Meat and Poultry Research Centre, Lorenveien 38, 0515 Oslo, Norway*
[2] *Center for Proper Housing: Poultry and Rabbits, Division of Animal Welfare, University of Bern, Switzerland*
[*] *Presenting author: guro.vasdal@animalia.no*

An important behavioral need for poultry is perching, but few studies have investigated perching behaviour in commercial broiler breeder pullets. The aim of this study was therefore to investigate perching behaviour throughout the pullet period and preferences for different perch materials and heights. We also investigated the effect of genetic line on perching and the potential effect of perches on keel bone damage (KBD) and footpad dermatitis (FPD). We followed four commercial broiler breeder pullet flocks (n= 7 500 hens/flock) (Ross 308, n=2 and Hubbard JA 757, n=2), each with three groups of birds (n=2 500 hens/group); A-*group*; four A-frames consisting of four perch materials (plastic, steel square, steel round and wood) placed on different heights (35cm and 95 cm); S-*group*; Siesta perches (a plastic perch 15 cm high, Big Dutchman) and C-*group*; control group without perches. Perch use was recorded from pictures and videos by counting the number of birds on the perches during the last hour before the light went off, at week 2, 5, 6, 7, 10, 12 and 15. At week 16, leg health including footpad dermatitis, keel bone deformations and keel bone fractures was scored in 30 random birds in each group (n= 90 birds/flock). Use of perches was analyzed using the mixed procedure in SAS 9.4, with perch group (A-*group* vs S-*group*), week of age, hybrid and their interactions as fixed factors and flock as a random factor. Hubbard birds perched significantly more than Ross birds ($P < 0.0001$), and more birds perched on the Siesta perches than on the A frames ($P = 0.046$). Within the A-*group*, the birds showed no preferences for perch materials or heights. Perching increased with age for Hubbard birds ($P < 0.05$), but not for the Ross birds. There were no observed cases of bumblefoot, breast blisters, keel bone deformations or keel bone fractures at 16 weeks. The incidence of FPD was low, with 73.6% of assessed birds receiving a score of 0, and with no significant differences between perch groups or hybrids. In conclusion, perches were increasingly used with increasing age, and Hubbard birds perched more than Ross 308 birds. Access to perches had no negative effects on important health parameters. Broiler breeder pullets should be given access to perches from day 1 to promote training and perch use.

Enrichment preferences of beef cattle grazing at pasture

Emily J. Dickson[1,2*], Dana L.M. Campbell[1], Caroline Lee[1], Jim M. Lea[1], Paul G. McDonald[2], Jessica E. Monk[1,2]

[1] CSIRO, Agriculture and Food, FD McMaster Laboratory, Armidale, NSW, 2350 Australia
[2] University of New England, School of Environmental and Rural Science, Armidale, NSW, 2350
[*] Presenting author: emily.dickson@csiro.au

Interest in improving animal welfare through environmental enrichment has increased in recent years, particularly for intensively managed animals. However, there has been little research into the benefits for extensively managed grazing animals, potentially due to consumer and/or producer beliefs that a more natural pasture-based system is inherently better for welfare. Despite these perceptions, the range of environments these cattle are kept in may vary widely, ranging from bare pastures through to grassland with a wide range of naturally enriching objects, such as trees. Therefore, there is potential to improve the welfare of pasture-raised beef cattle by providing enrichments that allow the expression of natural behaviours, although it is not currently known which enrichments cattle prefer and will utilise in a paddock environment. In the current study eight groups of seven Angus steers (n=56) housed in bare pastured paddocks were presented with four types of enrichments simultaneously (cattle brush, tree stump, hanging rope, and a woodchip pile). Interactions with and displacements around each enrichment were recorded through both live and video observations over a period of three weeks during daylight hours. Generalised linear mixed models were fitted, with fixed effects as enrichment type and day number, and random effect as the group. Group was treated as the experimental unit. For duration of interactions and number of displacements at enrichments, both enrichment type and day number were significant ($P < 0.001$). Over the duration of the study, the woodchip pile had the highest average use and rope the least (97 vs. 13 minutes; $P < 0.001$). Time spent utilising the brush and stump were not significantly different (45 vs. 47 minutes; $P = 0.99$). The daily number of displacements at the rope was lower than at all other enrichments (0.59; all $P < 0.01$), but other enrichments did not significantly differ (woodchips = 5.19 vs. brush = 5.74 vs. stump = 2.55; all $P > 0.05$). There was a general pattern of enrichment use and displacements declining significantly over time. These early results indicate that although habituation may occur, cattle housed at pasture still utilise enrichments provided after a period of 3 weeks, particularly woodchips and objects that allow for grooming. As displacements still occurred later in the study, it is likely that these enrichments are of high value to the cattle. Their inclusion can add complexity and allow for increased expression of natural behaviours in a paddock environment.

Smell this! - pigs' interest in, and behaviour towards odours of non-social origin

Maria Vilain Rørvang[1,*], Anna Wallenbeck[2], Birte Nielsen[3], Anna Valros[4], Sarah-Lina Aagaard Schild[5], Rebecca Grut[1], Moses Gadri[1], Johanna Stenfelt[1]

[1] Swedish University of Agricultural Sciences, Dept. Biosystems and Technology, Lomma, Sweden
[2] Swedish University of Agricultural Sciences, Dept. Animal Environment and Health, Skara, Sweden
[3] The Universities Federation for Animal Welfare (UFAW), Brewhouse Hill, Wheathampstead, Hertfordshire, UK
[4] University of Helsinki, Dept. Production Animal Medicine, PL 57 (Koetilantie 2), Finland
[5] Innovation Centre for Organic Farming, Aarhus, Denmark
[*] Presenting author: mariav.rorvang@slu.se

Even though truffle-hunting pigs are well-known, research into the olfactory abilities of pigs is sparse. This study investigated olfaction by mapping the behaviour of pigs when exposed to non-social odours using a Habituation/Dishabituation test paradigm. The study included 96 pairs of Hampshire pigs, weighing 50-80 kg (13-16 weeks of age). Littermate pairs of opposite sex were tested in four experimental pens each equipped with two odour insertion points (55 cm apart). All pigs were habituated to the experimental pens, equipment and experimenters. Twelve odours were included (vanilla, musk, orange, thyme, jasmine, cinnamon bark, ginger, apple, lavender, cedar wood, aniseed and pine), and each pair was exposed to three odours (all possible combinations were tested), and one control (demineralised water). The three odours were presented during 3 consecutive tests (a total of 9 tests per pig pair, 3 for each odour). For each test, an odour was presented for 1 minute, 3 times in a row with a 2-min interval between presentations. Duration of sniffing (snout in proximity to the odour) was recorded, and all behaviour was continuously recorded throughout each 1-min odour exposure. Preliminary results based on 168 tests (112 pigs, ~ 60% of total trials, full data and analyses will be presented at the conference) show that habituation between same odours (Kruskal Wallis rank sum test: 1st vs 2nd vs 3rd presentations χ^2=27.5, p=0.004) and dishabituation between different odours (Pairwise Wilcoxon signed rank test: all 3rd vs 1st, p=0.01) occurred. Pigs sniffed thyme most and vanilla least (largest difference of multiple pairwise comparisons: p=0.0007). The most common behaviours were appetitive behaviours (licking, biting and rooting) (avg. (sec) per test: 2.5), and aggression and displacement, indicating guarding of the odours (avg. (freq) per test: 0.4), which were expressed for all odours except vanilla. Interestingly, rubbing against the odour (as seen in dogs) was also expressed when exposed to all odours except vanilla. This behaviour has never before been described in pigs, and we will thus propose a definition and show videos of this behaviour at the conference. As rubbing behaviour was correlated with appetitive behaviour (Pearson correlation: t=3.7, p=0.0002), this behaviour may be indicative of excitement or pleasure. Our experiment is the first to compare pigs' interest in different odours of non-social origin. Although individual differences exist, all odours except vanilla elicited both sniffing, appetitive, guarding and rubbing behaviour, indicating that these odours may have enriching properties to pigs' environment.

Let's mo(o)ve cows! Quantifying and optimizing locomotor activity by providing different modalities of exercise access

Marjorie Cellier[1*], Elise Shepley[2], Nadège Aigueperse[3], Marianne Villettaz Robichaud[4], Elsa Vasseur[1]

[1] Department of Animal Science, McGill University, Sainte-Anne-de-Bellevue, Québec, H9X 3V9, Canada
[2] Department of Veterinary Population Medicine, College of Veterinary Medicine, University of Minnesota, Saint Paul, MN 55108, USA
[3] Université Clermont Auvergne, INRAE, VetAgro Sup, UMR Herbivores, F-63122 Saint Genès- Champanelle, France
[4] Faculté de médecine vétérinaire, Université de Montréal, St-Hyacinthe, Québec, J2S 2M2, Canada
[*] Presenting author: marjorie.cellier@mail.mcgill.ca

The intensification of the animal industry is characterized by an increased indoor confinement, which is criticized as the public sees freedom of movement as one of the most important living conditions for farm animals. One way to assess restricted movement opportunities is to consider the locomotor activity of cows living in systems where movement is more or less restricted, ranging from tie-stall to pasture. This study seeks to evaluate the impact of a management practice aiming to reduce the level of movement restriction imposed to animals housed in such systems, and to promote solutions for on-farm implementation. The objectives of our study were to 1) quantify the locomotor activity of cows housed in a movement-restricted environment when provided opportunity for movement outside the stall with an exercise area (trials 1-6); 2) evaluate which modalities of access to exercise optimize locomotor activity: i. outdoor vs indoor access (trials 1-2), ii. a combination of different durations of outing (1 vs 2h) and sizes of the exercise area (20, 40, 60 and 80m²) (trials 3-4); and 3) investigate activities performed when cows have access to these areas (trials 1-5). A series of six trials involving different exercise modalities were conducted between 2018 and 2021, with between 18 to 30 tie-stall-housed lactating Holstein depending on the trial (n=141 cows overall), as a model for movement-restricted cows. A meta-analysis was conducted on the least square means of daily number of steps for the exercise vs non-exercise treatments, while generalized linear mixed models were utilized to determine the impact on the number of daily steps by the modalities. The activities performed when cows had access to the exercise area were also analysed by descriptive statistics. Providing access to an exercise area for 1h increased daily steps by 53% (304 steps; 95% CI: 215-393; $P<0.001$), with modalities such as type of access (167 more steps, around 20% outdoor vs indoor; $P<0.001$), space (146 more steps, around 16% for large vs small area; $P<0.001$) and duration of the outing (84 more steps, around 9% with 2h vs 1h; $P=0.002$), playing a role. Apart from locomotor activities, cows also spent 50-65% of their time idle; and engaged in other activities such as exploration (5-20% of time) or social behaviors (5%). Our study highlights that 1h of daily exercise has a major impact on the amount of locomotion performed, while allowing cows to engage a greater range of natural behaviors.

Importance of motherhood: how motivated are dairy cows (Bos taurus taurus) to nurse their calves?

Emma H. Jensen[1*], Melissa Bateson[2], Heather W. Neave[1], Jean-Loup Rault[3], Margit B. Jensen[1]

[1] Department of Animal Science, Aarhus University, Tjele, Denmark
[2] Centre for Behaviour & Evolution, Newcastle University, Newcastle upon Tyne, United Kingdom
[3] Institute of Animal Welfare Science, University of Veterinary Medicine Vienna, Vienna, Austria
[*] Presenting author: emma.hvidtfeldt@anis.au.dk

Prolonged contact between dam and calf has animal welfare benefits, and part-time cow-calf- contact is suggested to be a feasible solution. One of the challenges of cow-calf-contact is separating the two before the natural weaning age, and stepwise weaning, i.e. reducing nursing before complete separation, may mitigate separation stress. Therefore, this study aims to investigate the effect of gradually reduced calf contact on dairy cows' motivation to nurse their calves. Cows and calves were housed together with either full-time (23h/24h) or part- time (10h/24h) contact until the end of week 7 after calving. At week 8, cow-calf pairs were assigned to one of two weaning treatments: gradually increased fence-line separation over two weeks (IFS) or unchanged contact (UC) until complete separation at week 10. During week 8, IFS cows' opportunity to nurse (but not their opportunity to sniff and lick) their calves was reduced by 50%. The cows' motivation to nurse was assessed using pneumatic weighted gates. The cow was presented with a choice of either full access (nursing possible for 10 min) or partial contact to her calf (only sniffing and licking possible for 10 min). The weight on the pneumatic gate leading to full contact was 30 kg, while the gate leading to partial contact was 22 kg. Here we present preliminary results from 24 cow-calf pairs (6 pairs on each of the contact and weaning treatments). Half of all cows walked through the weighted gate for full contact (13/24 cows), with no difference between full-time and part- time contact treatments (6/12 vs. 7/12 cows, respectively; $X^2_{(df=1)}$=0.2, P=0.68). However, more IFS cows walked through for full contact than UC cows (9/12 vs. 4/12, respectively; $X^2_{(df=1)}$=4.2, P=0.04). Latency to walk through the 30-kg gate did not differ between IFS (median, IQR: 4.0 s, 4.0-4.0) and UC weaning treatments (6.5 s, 4.8-9.5; z=1.42, P=0.16). More IFS cows were observed nursing compared to UC cows (8/9 vs. 0/4, respectively; P<0.01). These early results suggest that irrespective of full- or part-time contact, cows experiencing increased separation from their calves show higher motivation to regain full contact. The higher tendency of calves to nurse upon reunion could be related to hunger for milk. However, half of all cows did not walk through the weighted gate, suggesting there is individual variation in motivation for reunion with the calf; this may be related to differences in the strength of the cow-calf bond or motivation to nurse.

Calf-mother-bull stimulus in buffaloes: effects on the behavior and welfare of dams and their calves

Sanjay Choudhary[1*], Madan Lal Kamboj[2], Pawan Singh[2], Anjali Aggarwal[2], Nishant Kumar[2]

[1]*Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, India*
[2] *ICAR – National Dairy Research Institute, Karnal, Haryana, India*
[*] *Presenting author: rajsaya07@gmail.com*

Suckling and limited cow-calf contact in buffaloes as opposed to complete separation have been reported to improve performance but do not fully satisfy behavioural needs of mothers and calves. This also results in delayed expression of estrus behaviours in mother buffaloes. Full time fenceline calf-mother contact may satisfy most of behavioural needs of both mothers and calves and bull contact through biostimulation may arrest delay in elicitation of estrus behavior in dams. Our aim was to investigate effect of fenceline calf-mother-bull contact on behaviour of mothers and their calves in buffaloes. Twenty-four mother-calf dyads were selected at birth and allotted to three treatments (8 pairs in each) as: no calf-mother-bull contact (NCB), restricted calf and fenceline bull contact (RC-FBC) and full-time calf-mother contact during colostrum period followed by fenceline calf and fenceline bull contact (FC-FBC). Behaviours were recorded using CCTV cameras for 24 hours from calving to five months of lactation. Data were analyzed using repeat measure ANOVA using SPSS. Times taken for first standing attempt after birth; for successful standing; and for first successful suckling were shorter ($P<0.05$) in FC-FBC and RC- FBC than in NCB calves. Colostrum suckling bouts on day 1, 2, 3, 4 and 5 were 19.5±0.6, 14.8±0.7, 11.7±0.4, 9.4±0.3 and 7.8±0.3 respectively in FC-FBC calves. Duration of colostrum suckling declined from day 1 to 5. Daily eating and rumination times were greater ($P<0.05$) in FC-FBC than in RC-FBC and NCB calves. Frequencies of licking inanimate objects and cross- sucking were lower ($P<0.05$) in FC-FBC followed by RC-FBC and NCB calves. Frequencies of head-outs and vocalization calls towards calf by mother buffaloes on d1, 6, 15 and 30 after parturition were greater ($P<0.05$) in RC-FBC and NCB than FC-FBC buffaloes. Daily eating, rumination and resting times were more ($P<0.05$) in FC-FBC than NBC and FC-NBC buffaloes. Duration from calving to expression of first estrus was 67.62±6.7, 62.50±5.8 and 60.37±5.4 in FC-FBC, RC-FBC and NCB buffaloes respectively which did not differ among treatments. Frequencies of allowing sniffing by bull, tail raising and urination before, during and after estrous were higher ($P<0.05$) in FC-FBC and RC-FBC than in NCB buffaloes. In conclusion, provision of full mother contact during colostrum period followed by fenceline mother contact remarkably improved behaviour and welfare of buffaloes and calves. Biostimulation through fenceline bull exposure helped in preventing the delay in elicitation of estrous behaviours in suckled buffaloes in fenceline contact with their calves.

Do cows see the forest or the trees? A preliminary investigation of attentional scope as an indicator of emotional state in dairy cows kept with their calves

Heather W. Neave[1*], Jean-Loup Rault[2], Melissa Bateson[3], Emma Hvidtfeldt Jensen[1], Margit Bak Jensen[1]

[1] *Department of Animal Science, Aarhus University, Tjele, Denmark*
[2] *Institute of Animal Welfare Science, University of Veterinary Medicine Vienna, Vienna, Austria*
[3] *Biosciences Institute, Newcastle University, Newcastle upon Tyne, United Kingdom*
[*] *Presenting author: heather.neave@anis.au.dk*

In humans, a positive mood broadens attentional scope (i.e. seeing the forest rather than the trees) while negative mood narrows it. For instance, humans in more positive moods will select an image showing a circle made of crosses as being more similar to a circle (global processing) than to a cross (local processing). Attentional scope tests have been used to explore visual hierarchical processing in several animal species, but may also be a promising method to assess affective state. We examined the attentional scope of dairy cows managed full-time or part- time with their calves (24 or 10 h daily cow-calf contact; 6 pairs each). Cows were trained to approach a positive image on a screen (rewarded with food), and to avoid approaching a negative image (else punished with waving bag). The positive image was 13 identical circles (local element) arranged in an overall circle (global element), while the negative image was 13 identical crosses arranged in an overall cross (cross or circle assignment was balanced across cows); thus, these images contained the *same* combination of local and global elements. Once learned (> 80% correct over 2 consecutive days), cows were presented two images showing *different* combinations of global and local elements: an overall circle comprised of crosses ('global' choice), or an overall cross comprised of circles ('local' choice). Each global and local image was presented 4 times, among 4 positive and 3 negative images, over two consecutive test days. Cows were 4 times more likely to approach the local image (odds ratio (95% CL): 4.4 (1.3–15.2); P=0.02), but took longer to do so, compared to the global image (14.8 (12.3–17.7) s; vs. 10.3 (7.6–13.7)s, respectively; P=0.03). This was driven by part-time cows who never approached the global image, and took longer to approach the local image (27.3 (16.3–45.7) s) compared to full-time cows (11.3 (6.1–20.8)s; P=0.01). However, cows approached global and local images much less often than the positive image (8.3±12.4, 29.2±27.9 and 96.9±5.7% of images approached, respectively). These results suggest cows may show a predominant narrow attentional scope by attending to the local elements of an image. This was especially evident in cows housed part-time with their calves, possibly indicating they may be in a more negative (or less positive) mood than full-time cows. Future research should explore the use of attentional scope to assess the affective state of dairy cows experiencing different management conditions.

Play behaviour of dam-reared dairy calves is affected by daily duration of contact with the dam

Elea Bailly-Caumette[1*], Maja Bertelsen[2], Margit Bak Jensen[2]

[1] Ecole Normale Supérieure de Lyon, Department of Biology, 46 Allée d'Italie, 69007 Lyon, France
[2] Aarhus University, Department of Animal Science, Blichers Allé 20, 8830 Tjele, Denmark
[*] Presenting author: elea.bailly@ens-lyon.fr

Dam rearing of dairy calves reduces negative welfare signs, e.g. abnormal behaviour, and may increase positive welfare. Part-time dam-calf contact may be more feasible than full-time contact and this study investigated the effect of full-time contact (with dam for 23h/d) and part-time contact (with dam for 10h/d) on calf play behaviour, which is a positive welfare indicator. Calves were housed with their dam and three other dam-calf pairs in a 68 m^2 straw-bedded pen. All cows were milked twice daily in a parlour and part-time cows were away from the pen during the night. Forty- eight calves were included and the play behaviour of 24 calves (2 calves in each of 12 pens) were observed during 24 hours when three and seven weeks old. The effect of dam-calf-contact on the daily duration of locomotor play (parallel and individual) and social play (frontal pushing and head butting) was analysed using a mixed model including the fixed effect of treatment, week and treatment × week interaction, and the random effects of pen and calf within pen. The total duration of locomotor play did not differ between the two treatments [205 (±56) s/24h], but full-time calves performed less locomotor play in parallel with other calves than part-time calves [63 (±16) vs. 107 (±18) s/24 h; $p < 0.01$]. Full-time calves performed less frontal pushing with another calf [136 (±65) vs. 254 (±74) s/24h; $p < 0.05$], but more head butting on another calf [219 (±31) vs. 144 (±35) s/24h; $p < 0.05$] than part-time calves. Irrespective of treatment, calves performed more parallel locomotor play [108 (±17) vs. 63 (±17) s/24h; $p < 0.05$] and less frontal pushing [157 (±67) vs. 233 (±67) s/24h; $p < 0.05$] at 3 weeks than 7 weeks of age. A higher level of parallel locomotor play and frontal pushing with part-time contact may be explained by more space being available for the calves when the dams were away from the pen during the night. No difference in the total duration of play behaviour between the two treatments were found. However, parallel locomotor play and frontal pushing, that require more space, were higher among part-time calves that spent more time alone in the pens. This could emphasise the importance of space for the expression of play behaviour, but the possible interaction between space and maternal care requires further study.

Is calves' motivation to play affected by milk allowance and social environment?

Verena Größbacher[1,2*], Christoph Winckler[1], Marek Špinka[3,4], Alistair Lawrence[5,6]

[1] University of Natural Resources and Life Sciences, Vienna, Department of Sustainable Agricultural Systems, 1180 Vienna, Austria
[2] Recipient of a DOC-Fellowship of the Austrian Academy of Sciences
[3] Czech University of Life Sciences, Department of Ethology and Companion Animal Science, 165 00 Prague, Czechia
[4] Institute of Animal Science, Department of Ethology, 104 01 Prague, Czechia
[5] Scotland's Rural College (SRUC), West Mains Road, Edinburgh EH9 3RG, UK
[6] University of Edinburgh, Roslin Institute, Penicuik, EH25 9RG, UK
[*] Presenting author: verena.groessbacher@boku.ac.at

Play is a strongly emotive behaviour and assumed to be a rewarding experience. In calves, play increases with enhanced milk feeding but is also affected by the play-levels of conspecifics. This study aimed to investigate if joining a playful situation is rewarding for calves and if anticipatory behaviours and consummatory play behaviours in an arena differ with low or high milk allowance and similarity or dissimilarity of milk allowance within group. Sixty-six Holstein Frisian calves were housed in groups of three and submitted to one of three treatments in their homepens: all three calves receiving 6 l milk/day (UniformLow, n=5), one calf receiving 6 l milk/day and two calves receiving 9-12 l milk/day (Mixed, n=12), all three calves receiving 9-12 l milk/day (UniformHigh, n=5). One focal animal per group was selected, balanced by sex, age and weight (always 6l-calf in Mixed group). Focal animals were trained to anticipate access to a play arena holding their pen-mates. Testing was twice per week at four and eight weeks of age. Focal calves spent 3 min solitarily in a holding pen before joining their partners in the arena for 9 min (analysed as 3x3 min=Timepoint).
Anticipatory behaviours in the holding pen and play behaviours in the arena were recorded per calf using one-zero-sampling in six-second-intervals. Behaviours were analysed using general and generalized mixed effects models (fixed effects: Treatment, Week, Role (focal/partner) and their 2-way interactions; random effects: day nested in week, calf and group; date); corrected for multiple testing. During the anticipatory phase, frequency of behavioural transitions ($F_{2,15}$=1.26, p=0.376) and duration of gazing towards the arena ($F_{2,15}$=0.06, p=0.938) did not differ between treatments. During the consummatory phase of playing in the arena, Uniform High calves performed more social play than Mixed calves ($F_{2,565}$=4.04, p=0.044), while locomotor play did not differ between treatments ($F_{2,565}$=1.82, p=0.254). Focal animals performed more locomotor play than partners ($F_{1,565}$=27.48, p=0.006) but did not differ in social play ($F_{1.565}$=0.09, p=0.822). There was no difference between treatments within focal animals or partners (interaction Treatment* Role: locomotor play $F_{2,565}$=2.24, p=0.201, social play $F_{2,565}$=1.32, p=0.367). The lack of treatment effects in the anticipatory phase and in play behaviour of focal animals as well as the increased locomotor play of focal animals could have resulted from the motivation to engage in play overriding treatment effects. Increased social play in UniformHigh calves compared to Mixed calves indicates the significance of the social environment with similarly high-playing conspecifics.

Do cows need to be social to be happy?

Björn Forkman[1*], Linda Keeling[2], Ronja Landvogt[2]

[1] Dept. Vet. Anim. Sciences, University of Copenhagen, Denmark.
[2] Dept Anim. Env. Health, Swedish University of Agricultural Sciences
[*] Presenting author: bjf@sund.ku.dk

The aim of the study was to study the relationship between a personality assessment and a measure of emotion and welfare (the latter assessed by a Qualitative Behaviour Assessment (QBA)). Personality can be viewed as a propensity to feel and behave in a given way in a range of situations and over time. It is therefore possible that one or more personality traits affect how an animal perceives its environment and therefore affects its welfare. In the current study the personality of dairy cattle was assessed according to the taxonomy proposed by Finkemeier et al (2018; DOI:10.3389/fvets.2018.00131) and the results compared with those of a QBA done on the same animals (21 cows, 12 heifers, 10 calves, by three observers). The five personality traits assessed were Sociality, Exploration, Boldness, and Activity as well as a proposed sixth trait (Dominance). The list of adjectives used for the QBA was the one proposed by Welfare Quality® for cattle. Two approaches were used for the QBA analysis. In the first a PCA of the QBA data was calculated. This analysis yielded somewhat poorly defined components with 9 of the 20 adjectives loading more than 0.3 on both components. Multiple regressions with either PC1 or PC2 as dependent variables, the personality traits as independent variables, and animal category and observer as factors, showed a high R2, 0.49 for PC1 and 0.69 for PC2. The second analysis instead used the QBA loadings suggested in the Welfare Quality® protocol for cattle. The multiple regression between the personality traits and this assessment also showed a high R2 (0.59). In a QBA the first component is often found to be associated to the valence of the emotions and hence the welfare of the animals, while the second is often related to the level of arousal. For both the regression based on the loadings from the current study as well as for the regression using the WQ loadings, the personality trait of sociability was the one with the highest correlation to the component traditionally associated with animal welfare (R2=0.49, p=0.004). The results of the study is that of the five personality traits of Finkemeier et al (2018) the one most significantly associated with positive emotions, and hence welfare, is sociality.

Effects of musical instrumentation on emotional responses of growing pigs

Juliana Zapata Cardona[1], Maria Camila Ceballos[2], Ariel Marcel Tarazona Morales[3*], Berardo de Jesús Rodríguez[1]

[1] Grupo de Investigación en patobiología QUIRON, Escuela de Medicina Veterinaria, Universidad de Antioquia, Calle 70 No. 52-21, Medellín, Colombia.
[2] Faculty of Veterinary Medicine, University of Calgary, Clinical Skills Building, 11877–85th Street NW, Calgary, AB T3R 1J3, Canada.
[3] Grupo de investigación BIOGEM. Departamento de producción animal, Facultad de ciencias agrarias, Universidad Nacional de Colombia, Sede Medellín. Cra. 65 No. 59A - 110, Medellín, Colombia.
[*] Presenting author. amtarazonam@unal.edu.co

Sensory environmental enrichment based on musical stimuli has been proposed as a strategy to reduce stress in pigs. We previously demonstrated the capacity of music to modulate emotional responses in pigs. Our objective was to evaluate if there is association among the type and number of instruments in musical pieces on pigs' emotional responses. Thirty-nine musical pieces were composed with various types (keyboards, winds, strings, and percussion) and number (into 3 categories, 1-3, 4-6, and 7-8) of instruments. During the nursery phase, ten litters were exposed to musical pieces (randomly presented - 5 pieces per replicate, on average). Recordings were gathered, and emotional responses were evaluated using the Qualitative Behaviour Assessment (QBA). The PCA analysis yielded the following: PC1 (positive, high-arousal index) explained 46.7% of the variance and included the terms content, friendly, playful, positively occupied, lively, sociable, and happy with positive loadings, whereas with negative loadings, the terms were fearful and uneasy; PC2 (negative, high-arousal index) explained 16.6% of the variance and had the highest positive contributions for terms active, fearful, agitated, and uneasy; and PC3 (positive, low-arousal index) explained 9.1% of the remaining variance and had terms relaxed and calm. To analyze the effect of the number of instruments in each PC, a general linear mixed model (GLMM), including the categories number of instruments, was fitted as fixed effects. To evaluate the effect of instrument type on each PC, an analysis of variance (ANOVA) was performed followed by Tukey's post-hoc comparisons tests. The number of instruments affected the low-arousal emotional index ($P<0.0001$); music with less than three instruments was associated with this index. The type of instrument influenced ($P<0.001$) all indexes. High- arousal emotional index with responses like content and happy was associated with strings, whereas percussion instruments were related to a negative index, with responses like fearful and agitated. In contrast, the positive low-arousal index was associated with keyboards. We concluded that the type of instrument should be considered when creating music for pigs, as they are associated with the modulation of their emotional states. Those variables are related to the timbre, the perceived sound quality of a musical note, sound, or tone, which is multidimensional and has numerous attributes. This is the first step to understanding how acoustic elements influence emotions, and further studies are required to comprehend its relevance in animals. This knowledge is important to design species-specific stimuli and optimize environmental enrichment.

The use of positive associations to strengthen the effects of auditory enrichment

Richard Mott[1*], Scottish SPCA[2], Fiona Dowell[3], Neil Evans[1]

[1] *Institute of Biodiversity, Animal Health and Comparative Medicine, University of Glasgow*
[2] *Scottish Society for the Prevention of Cruelty to Animals, Dunfermline, UK*
[3] *School of Veterinary Medicine, University of Glasgow, UK*
[*] *Presenting author: Richard.Mott@gla.ac.uk*

Auditory enrichment can improve the quality of life of captive animals, but effects can be small. This study hypothesised that the formation of a positive association with specific music can increase the effectiveness of that music to reduce arousal in domestic dogs. The study used 19 mixed breed dogs (11 male, 8 female, 7.4 ± 3.5 years) in the care of the Scottish SPCA Animal Rescue and Rehoming Centres. Effect was assessed as changes in heart rate variability (HRV) (RMSSD and HF Power), collected using either Polar V800 heartrate monitors or Actiheart 5 electrocardiograms. Raw data were processed in Kubios (Standard) 3.5.0 software. Baseline HRV was assessed on Day 0 (12-12.30 am), with no music being played. At the same time the following day (Day1) HRV was assessed whilst dogs were exposed to a novel piece of music (Mozart K448). On the evenings of Days 1-7, Mozart K448 was played for 30 min to coincide with the quietest time of day when the dogs were normally relaxed. On Day 8, HRV was again assessed (12-12.30 am), whilst the Mozart K448 was played in the kennels. Data were analysed using a mixed effects linear model (nlme), with dog ID fitted as the random effect, and the effsize package, in R 4.1.2. Novel music led to significantly higher RMSSD (Day 1: 95 ± 12.8 ms vs Day 0: 75 ± 9.3 ms, t=2.63, p=0.0196). Conditioning led to significant higher RMSSD (Day 8:118 ± 14.5 ms vs Day 1: 95 ± 12.8 ms, t=2.45, p=0.0272) and HF Power (Day 8: 5919 ± 1478 ms^2 vs Day 1: 4813 ± 1242 ms^2, t=2.96, p=0.0097), which indicated an increase in parasympathetic activity. The effect size (Cohen's d) of initial presentation of the music was 0.5 (medium) for both RMSSD and HF Power. However, on Day 8, the effect size had increased to 'large' for both RMSSD (1.1) and HF Power (0.8). There was no significant effect of age, sex, size or gonadal status on the effectiveness of the auditory stimulation. Conditioning dogs for 7 days to associate a specific auditory stimulus with a quiet time of day increased the effectiveness of that stimulus to reduce arousal when used during a more stressful time of day. Longer periods of conditioning and different reinforcement schedules may further increase this arousal-reducing effect, improving the quality of life for dogs in rescue centres and beyond.

Influence of the movement of social partners on housed dairy cows' decisions to use an outdoor space

Emeline Nogues*, Marthe Bourg, Borbala Foris, Daniel M. Weary, Marina A.G. von Keyserlingk

Animal Welfare Program, Faculty of Land and Food Systems, The University of British Columbia, Vancouver, BC Canada
** Presenting author: enogues@mail.ubc.ca*

Providing dairy cattle with free access to the outdoors can benefit their health and welfare. Some pairs of cows show high spatial synchronization in the barn and on pasture, but it is not clear whether the decision to go outside or come back inside is influenced by the movement of social partners. We observed a dynamic group of 36 lactating Holstein cows housed in a freestall barn, 18 of which were also allowed access to an outdoor woodchip pack through an automatic selection gate for on average 77 d (range: 74 – 80). The selection gate recorded when individual cows (n = 18) went outside (exit); similar data were obtained via video for cows returning to the barn (entry). A total of 4,846 exit and entry events were recorded, averaging 270 events per cow (range: 68 – 474). Each time a cow was recorded as exiting or entering the barn, the time intervals between her and the next three cows were calculated. To determine follower relationships, a Gaussian mixture model was applied to the log of the frequency distribution of time intervals; this model identified a threshold of 78 s between consecutive exits or entries. Using this threshold, we found that 17% of exit events and 28% of entry events were in association with the movements of another cow. Each cow was recorded on average 45.7 times exiting (range: 9 – 97) and 76 times entering (range: 16 – 158) in association with another cow. Out of 153 possible between-cow pairings, 5 pairings were identified as being particularly close; these pairs were at least three times more likely to associate exits and entries with each other than with other cows in the group. We created leader-follower matrices for the exit and entry events and built two directed and weighted social networks to explore any similarities between these events. We found a moderate positive correlation between these networks using the permutation- based quadratic assignment procedure (RQAP = 0.67, $p < 0.001$); indicating that these cows express consistent associations when moving to an outdoor pack or re-entering the barn. We conclude that the use of an outdoor space can be influenced by the movements of other group members, and that these associations are especially strong for certain pairs of individuals and consistent between exits and entries.

Temporal dynamics in chicken dominance hierarchies over maturation

Klara J. Grethen*, Yamenah Gómez, Michael J. Toscano

ZTHZ, Division of Animal Welfare, VPH Institute, University of Bern, Switzerland
** Presenting author: klara.grethen@vetsuisse.unibe.ch*

In small chicken groups a dominance hierarchy, the so-called 'pecking order', is established and upheld by agonistic interactions. It forms at 8-10 weeks of age (WoA) and is considered to remain stable within unchanged groups. The dominance rank is a crucial factor when investigating the impact of the social environment on an individual hen, as it affects access to resources and productivity. To further study the effects of social dynamics on individual laying hens, we therefore identified dominance ranks by observing social interactions. Hens (Lohmann Selected Leghorn) were housed in 3 groups of 20 animals and 3 groups of 120 animals and individually marked. Each group was observed for 15-20 min on 12 days between 10-12 WoA. To confirm stability of dominance rank, the observations were repeated at 24 WoA (4 days of 10-20 min/pen). Dominance rank was calculated across all observations via the Elo-rating system. Analysis of the underlying hierarchies revealed an unexpected temporal dependency manifesting in weak correlations between rankings of median split data sets (mean $r = 0.29$), low repeatability of Elo-ratings for individuals across randomised observations (mean repeat. = 0.76), and weak correlations between rankings of original vs. randomised order (mean $r = 0.67$). Evaluations of data exclusively after maturation showed better splitting performance (mean $r = 0.44$), reliable repeatability (mean repeat. = 0.9), and higher correlations with randomised data (mean $r = 0.87$). The comparison suggests temporal dynamics in ranking before 24 WoA. Surprisingly low number of interactions in young hens did not allow robust rank estimations to test the dynamics, except for one pen, in which rankings before and after maturation were of high certainty but not correlated significantly ($r = 0.12$, $p = 0.61$), suggesting changes in rank across maturation. Testing how behaviour before maturation related to dominance ranking later, revealed an interaction between wins and losses (estimate: 0.12, CI[0.04, 0.2], $p = .004$). Interestingly, hens winning often but seldom losing were more likely to rank low after maturation, while experiences of both winning and losing predicted a higher rank. Animals with many losses and few wins were predicted to rank low. Reasons for the apparent dynamics throughout maturation could be hormonal changes or rehousing between rearing and lay. It is also possible that ongoing selection processes for productivity have altered social dynamics. Further research is necessary to understand the underlying mechanisms and implications of the temporal dynamics of laying hen social structures.

The inter-relationship between housing, pain, inflammation and vaginal microbiota on the welfare of sows and their offspring

Adroaldo José Zanella

Centre for Comparative Studies on Health, Sustainability and Welfare, Department of Preventive Veterinary Medicine and Animal Health, School of Veterinary and Animal Science, University of São Paulo, Brazil
**Presenting author: adroaldo.zanella@usp.br*

Over the past nine years our studies are building a strong body of evidence on the role of good housing, freedom from pain and environmental enrichment on pregnant sows as promotor of resilience in their offspring. We also demonstrated that poor welfare caused by hunger, poor housing conditions, barren environment, disease challenge and pain in pregnant sows, compromised resilience in their offspring. Contrary to our original hypothesis, in our studies, glucocorticoids failed to explain changes observed in social behavior, nociceptive thresholds, fear and methylation patterns in the amygdala, hippocampus and frontal cortex in the less resilient offspring, born from challenged sows. Very recently our published data demonstrated a complex interaction between poor welfare and inflammation were associated with changes in vaginal microbiota in sows, likely through a cytokine-based mechanism. The cytokine-based mechanism is a very good candidate to explain the changes in fear, social behavior and nociceptive thresholds that we reported in the prenatal and neonatal periods of piglets, which can disrupt their resilience and welfare outcomes. Moreover, we demonstrated that environmental enrichment mitigated the negative consequences of inflammation on vaginal microbiota of sows and preserved brain methylation patterns in the offspring of challenged sows. When sows were exposed to challenge with LPS, improved welfare represented by environmental enrichment and appropriated housing conditions eliminated the consequences of the challenge on the microbiota. Our studies are building evidence, slowly, to resolve the puzzle that attempts to explain the complex interaction between animal welfare and developmental outcomes in the offspring.

Peer Community In Animal Science: a free publication model for transparent and open science

C. Nawroth[1], M. Gagaoua[2], F. Gondret[3], M. Hess[4], D. P. Morgavi[5], I. A. S. Olsson[6], M. Taghipoor[7], L. Tedeschi[8], I. Veissier[5], R. Muñoz-Tamayo[7*]

[1] Institute of Behavioural Physiology, Research Institute for Farm Animal Biology (FBN), Wilhelm- Stahl-Allee 2, Dummerstorf, Germany
[2] Teagasc Food Research Centre, Ashtown, D15 KN3K Dublin, Ireland
[3] PEGASE, INRAE, Institut Agro, 35590 Saint-Gilles, France
[4] Department of Animal Science, University of California, 2251 Meyer Hall, Davis, CA 95616, USA.
[5] Université Clermont Auvergne, INRAE, VetAgro Sup, UMR Herbivores, F-63122 Saint-Genes- Champanelle, France
[6] i3S - Instituto de Investigação e Inovação em Saúde, Universidade do Porto, Rua Alfredo Allen 208, 4200-180 Porto, Portugal
[7] Université Paris-Saclay, INRAE, AgroParisTech, UMR Modélisation Systémique Appliquée aux Ruminants, 75005, Paris, France
[8] Department of Animal Science, Texas A&M University, College Station, TX 77843-2471, USA
[*] Presenting author: rafael.munoz-tamayo@inrae.fr

Ideally, the scientific publication system should evolve into practices that embrace free dissemination and full access to research findings. At the same time, it should ensure reproducibility and transparency and safeguard scientific integrity from the detrimental effects of the current "publish or perish" culture. We here introduce the Peer Community In (PCI) Animal Science initiative (https://animsci.peercommunityin.org/), which represents an alternative to the current publication system under the umbrella of the "Peer Community In" project (https://peercommunityin.org/). PCI Animal Science is an international community of researchers working in animal science and related areas and it promotes open science and research transparency. Although PCI Animal Science is not a scientific journal, it operates similarly with editors (here: recommenders) and reviewers. Currently, 64 recommenders from 20 countries are part of this initiative and the interest of the community to have their work submitted to and reviewed by PCI Animal Science has been increasing steadily. PCI Animal Science is a non-profit initiative, run and managed by researchers. The PCI Animal Science community performs, at no cost, rigorous open reviews of preprints that have been deposited on repositories such as bioRxiv and Zenodo from a wide range of research areas related to animal science. Based on independent reviews, a recommender decides whether a paper is recommended or not. Recommended preprints are peer-reviewed and citable stand-alone articles of high scientific value that do not need publication in traditional journals. However, if the authors wish, they can also publish their recommended preprint in the Diamond Open Access Peer Community Journal (https://peercommunityjournal.org/section/animsci/) at no cost. Authors can also submit their recommended manuscript to PCI-friendly journals (i.e., journals that consider the PCI evaluation in their own review processes) or to other journals accepting preprint publication in their policy. Here, we will discuss the workflow of the evaluation of manuscripts by PCI Animal Science and the advantages of adopting this new model of publishing scientific results.

What are indirect proxies worth?

Bernhard Voelkl

Animal Welfare Division, University of Bern, Switzerland
Presenting author: bernhard.voelkl@vetsuisse.unibe.ch

In applied animal behaviour science, researchers are often interested in behavioural strategies, mental processes, or emotional states of animals. However, as states and processes cannot be observed directly, behavioural scientists have to make indirect inferences about those by observing the animals' behaviour or the outcome of behaviour. These measurements are, then, taken as 'proxies' for the internal state of the animal. Furthermore, technical or ethical limitations often will not allow researchers choosing the proxy assumed to be most directly linked with the state in question, necessitating them to resort to indirect proxies which can be measured more easily or less invasively. For example, looking at a specific stimulus (an object or an individual) is suggested as an indicator for attention –the internal state a researcher might be interested in. Yet, as looking is difficult to measure directly researchers have resorted to measuring head orientation as an indirect proxy for attention. Similarly, metabolic rate is often approximated by measuring oxygen consumption. However, because oxygen consumption is difficult to measure without interfering with the animal's activities, it is often replaced by heart rate measurements on the basis that a relationship between heart rate and oxygen consumption has been established in terms of a calibration curve. While the necessity to use indirect proxies is uncontested, the consequences of using them are often ignored. The two main consequences of indirect measures are that (1) the likelihood of committing inference errors increases with the number of steps of the reasoning chain and (2) that estimation uncertainty adds up when indirect measures are used. Examples from published research, showing how these errors can add up will be given. I argue, therefore, that researchers should account for the increased uncertainty whenever indirect proxies are used. For inference errors I suggest that researchers should more explicitly discuss potential issues in their chains of reasoning, while for estimate uncertainty I propose to incorporate the uncertainty of the calibration curve (given by its confidence interval) in the confidence interval given for the indirect proxy by creating a joint confidence interval. Such an approach would give authors and readers a better basis for interpreting the outcomes of a study.

The best dad: how boars housing systems can shape their offspring's survival

Leandro Sabei[1*], Thiago Bernardino[1,3], Marisol Parada Sarmiento[1,2], César Gonçalves de Lima[4], Rosangela Poletto[5], Adroaldo José Zanella[1]

[1] University of São Paulo, Department of Preventive Veterinary Medicine and Animal Health, School of Veterinary Medicine and Animal Science, Pirassununga/SP, 13635-900, Brazil
[2] Università degli Studi di Teramo, Facoltà di Medicina Veterinaria, Località Piano d'Accio, 64100, Teramo, Italy
[3] University of Santo Amaro, Graduation Program of One Health, São Paulo/SP, 04829-300, Brazil
[4] University of São Paulo, Department of Basic Sciences, School Animal Science and Food Engineering, Pirassununga/SP, 13635-900, Brazil
[5] Federal Institute of Education, Science and Technology of Rio Grande do Sul, Campus Sertão, RS, 99170- 000, Brazil
[*] Presenting author: sabei_le@alumni.usp.br

Decades of genetic selection in pigs have focused on increasing prolificity, mainly concentrating selection efforts on sows. However, it is known that males contribute with genetic material relevant to developmental outcomes, but few studies investigated the relationship between boar management impacts on offspring performance. Thereby, we aimed to investigate the impact of different housing conditions for boars on the numbers of live and stillborn piglets and offspring sex. The Ethics Committee on the Use of Animals approved the present study (protocol n º 6555081018). All animals studied were Landrace x Large White breed. During four weeks, 18 boars, at 12 months of age, were housed in three different systems: crates (C; N=6), pens (P; N=6), and enriched pens (E; N=6). Environmental enrichment was provided twice daily, one hour after feeding (morning and afternoon), boars were brushed for 2 minutes, then showered for 30 seconds, and 0.5 kg of hay was provided to the animals. Thirteen gilts with14 months of age were housed in an outdoor system. Sequentially, a semen pool was prepared for insemination of the gilts based on boars treatment and seminal quality (high, medium, or low). Three types of semen pools were obtained: high-CPE (n=6), medium-CPE (n=6), and low-CPE (n=6). Four gilts were inseminated with high-CPE, four with medium-CPE, and five with low-CPE. Data collection included the number of live and stillborn piglets, sex, mortality rate, and the number of weaned piglets. Hair samples were taken at the end of the study for DNA paternity tests. For the statistical analysis to compare the number of live-born and weaned piglets in the three systems, we used a generalized linear model with a negative binomial distribution. In order to verify the impact of boars' treatment and compare the distribution in the sex of offspring, a chi-square test was used. A total of 171 piglets were born alive, with the average per sow being 13.2±4.1. Treatment E had a higher number of piglets born alive when compared to P (E=12.7±2.1; P=4.2±1.2; p=0.002). Regarding the number of weaned piglets, treatment E was higher than P (E=10.8±1.78; P=3±0.95; p=0.001). No differences were found in the remaining comparisons (p>0.05). Our results suggest that enriched environments, such as we provided, can influence the number of piglets born alive and weaned. However, further studies are needed to elucidate the mechanism of these findings.

Prevalence of keel bone fractures in hens and roosters from four non-commercial laying breeds

Käthe Elise Kittelsen[1*], Randi Oppermann Moe[2], Tone Beate Hansen[1], Ingrid Toftaker[2], Jens Peter Christensen[3], Guro Vasdal[1]

[1] Animalia—The Norwegian Meat and Poultry Research Centre; Lorenveien 38, NO-0585 Oslo, Norway;
[2] Faculty of Veterinary Medicine, NMBU—Norwegian University of Life Sciences, PO Box 8146 dep., NO-0033 Oslo, Norway;
[3] Department of Veterinary & Animal Sciences, University of Copenhagen, 1165 Copenhagen, Denmark;
[*] Presenting author: kathe.kittelsen@animalia.no; Tel.: +47-906-05027

Keel bone fractures (KBF) have been defined as fragmentation, shearing, or bending of the keel bone. The prevalence of KBF in modern laying hens in commercial production systems is alarmingly high, reported higher than 85% in some studies. Despite extensive scientific effort over the last decade, the etiology of KBF is still not clear. It seems likely that KBF is a multifactorial disorder. High prevalence of KBF have been reported in all commercial egg production systems, in different genetic lines and at different ages. Several of the proposed causal mechanisms behind KBF are linked to selection for efficient production. It is, therefore, of interest to explore whether less selected breeds have a lower occurrence of keel bone fractures compared to reports from highly selected, modern laying hen breeds. Thus, the aim of the current study was to investigate keel bones of hens from four non-commercial layer breeds (Islandic landrace, NorBrid 8, Minorca and Roko). Onset of lay varied from 16 to 22 weeks of age for the four breeds. Birds were housed in furnished cages and 24 hens and 4 roosters from each breed were examined at 30 and 63 weeks of age, using a portable x-ray equipment. The non-anesthetized birds were gently held upside down by a grip in both legs, inducing immobility. The left side of the bird was facing the digital flat panel detector and the keel bone was using a portable x-ray equipment. at a right angle. Digital radiographs were taken using a portable radiograph unit (Konica Minolta, Aero DR NS3543 mobil) with images obtained using a Poskom Vet20-BT. This study comprised non-invasive radiographic examination of keel bones of laying hens and roosters. Therefore, approval by an ethics committee for animal experiments was not required according to Norwegian legislation. The keel was scored for fractures, not for deformations. All radiographic images were scored by the same person for the absence (0) or presence of one or more (1) keel bone fractures (fracture defined as callus or gap in the keel). The results from this descriptive study indicate a low prevalence of KBF at both ages in all four breeds, with only five KBF detected in 213 x-ray pictures taken from 126 birds. Of these, four of the KBF were observed in the most genetically selected breed, with an early onset of lay. None of the roosters examined exhibited KBF. The overall low numbers of KBF found indicate that genetic factors may be involved in KBF and, thus that selective breeding may help to reduce the susceptibility to KBF. Finally, this study highlights the importance of poultry conservation of indigenous breeds to secure genetic diversity, which may be an important resource in future breeding for improved welfare.

Behavioural welfare indictors in conventional, intermediate, and slow growing broiler chicken strains: Slower growing strains have better mobility and utilise perching enrichment more

Charlotte James[1*], Dawn Scholey[1], Ashraf Alkhtib[1], Nicholas Ham[2], Keith Warner[2], Emily Burton[1]

[1] Nottingham Trent University, School of Animal Rural and Environmental Science, Brackenhurst Lane, Southwell, NG25 0QF
[2] Avara Foods Ltd, Willow Rd, Buckingham Road Industrial Estate, Brackley NN13 7EX
[*] Presenting author: charlotte.james02@nottingham.ac.uk

The rapid growth of conventional broiler strains is associated with welfare concerns. While evidence suggests slow growing strains have improved mobility and improved welfare, there has been little assessment of intermediate strains. This study investigated behavioural welfare indicators in commercial fast (F), intermediate (I), and slow growing (S) strains. Ethical approval was granted by Nottingham Trent University. Broilers (n =336) were housed in 48 pens for 35 (F), 45 (I) and 49 (S) days, fed on a high (H) or low (L) protein diet in a block randomised 3 x 2 factorial design. Brick and dowel perches were provided. Mobility was assessed before slaughter using the Bristol Gait Score (a score of 0 indicates no gait impairment). The number of birds perching was recorded 18 times between day 11 and 31. Novel object (NO) responses were observed on day 6 (cat toy), 20 (tin foil) and 34 (balloon). NO contact was recorded for 5 mins, along with the behaviour of a focal bird every 30s using an ethogram. Generalised linear mixed effects models were performed in R, investigating the effects of the independent variables on the probability for broilers to: 1) obtain gait scores ≥1 2) be observed perching 3) contact the NO and 4) perform alert behaviours during the NO test. Perch preference (brick or dowel) was determined using a Wilcoxon signed-rank test for each strain. Model outputs indicated Strain I ($p = 0.002$) and S ($p < 0.001$) had better mobility than strain F. Mobility was improved across all strains on the high protein diet ($p = 0.043$). Strain F perched less than strain I ($p < 0.001$) and S ($p = 0.043$). Strain F preferred the brick (5.5 ±3.2) to the dowel perch (1.5 ±1.6) ($p = 0.005$). Strain I preferred the dowel perch (8.8 ±2.8) over the brick (4.9 ±2.7) ($p = 0.004$) and there was a trend for strain S to prefer the dowel (7.0 ±3.6) to the brick (4.1 ±2.7) ($p = 0.054$). There was no strain effect on NO contact or alert behaviours. Slower growing strains (S and I) had improved mobility and used perching enrichment more than fast growing strains (F). Chickens are highly motivated to perch, so utilisation of both strains may facilitate opportunities for broilers to experience positive welfare states. The use of intermediate strains may help the industry meet consumers demands for higher welfare animal products with lower economic costs than a slow strain.

Artificial moving cues alter ramp use behaviour of laying hens in the early life period

Alex Johny[1*], Andrew Michael Janczak[2], Janicke Nordgreen[3], Michael Jeffery Toscano[1], Ariane Stratmann[1]

[1] Center for Proper Housing: Poultry and Rabbits, Division of Animal Welfare, VPH-Institute, University of Bern, Burgerweg 22, 3052 Zollikofen, Switzerland
[2] Department of Production Animal Clinical Science, Faculty of Veterinary Medicine, Norwegian University of Life Sciences (NMBU), Ås, Norway
[3] Department of Paraclinical Sciences, Faculty of Veterinary Medicine, Norwegian University of Life Sciences (NMBU), Ås, Norway
[*] Presenting author: alex.johny@vetsuisse.unibe.ch

Providing laying hen chicks with ramps during the rearing phase has been shown to benefit the birds as they show earlier and increased movements between aviary tiers, and distribute more uniformly in the aviary. We aimed to investigate if artificial moving cues increased ramp use during the rearing phase and whether this increase would benefit birds by improving their spatial cognition. We compared three artificial moving cues - a beak-shaped object that moved up and down to create a pecking motion and tapping sound (BEAK), a model hen made of wood that rocked horizontally (HEN), and a LED strip programmed to emulate a small object moving up and down the ramp (LED) - to a control with no cues (CONTROL). We used 16 identical pens (n = 4/treatment) with two vertically stacked tiers connected by two ramps with 22 Lohmann Selected Leghorn chicks per pen. The cues operated intermittently in four-minute bouts with a change of intra-bout speed every minute for approximately 6% of the total light period per day until 56 days of age (DOA). All active behaviours performed on the ramp (walk/run, wing assisted inclined running, jump/fly to and from ramps) were counted by scan sampling recorded videos at 4, 6, 10, 12, 20, 27, 41, and 55 DOA. We recorded the same behaviours when the cues were not running for BEAK, HEN, and LED to get a within cue treatment comparison. Three birds per pen underwent a holeboard test from 56 to 95 DOA to assess spatial cognition. GLMM analysis revealed an interaction between treatment and DOA ($\chi^2 = 11.184$, $p = 0.01$) with LED birds performing more behaviours on the ramp with increasing DOA, while CONTROL and HEN birds exhibited the opposite trend but showed more behaviours on ramp at earlier ages compared to LED birds. The within cue treatment analysis revealed an interaction between treatment and cue status (on/off) with BEAK birds performing more active behaviours on ramps when cues were off (t-ratio = 3.733, $p = 0.003$). No treatment effect was seen in the holeboard test. Our results suggest that age plays an important role in the response of birds to artificial cues, with HEN being effective earlier in life and LED at later ages. Further research to assess the commercial relevance of cues and implications for welfare, spatial cognition and bone health are planned.

Effects of the rearing environment complexity on laying hens' spatial cognition

Lucille Dumontier[1*], Andrew M. Janczak[2], Janicke Nordgreen[1]

[1] Department of Paraclinical Sciences, Faculty of Veterinary Medicine, Norwegian University of Life Sciences (NMBU), Ås, Norway
[2] Department of Production Animal Clinical Science, Faculty of Veterinary Medicine, Norwegian University of Life Sciences (NMBU), Ås, Norway
[*] Presenting author: lucille.dumontier@nmbu.no

The rearing environment of layer chicks can differ greatly in degree of complexity. With the industry moving towards cage-free housing systems, greater demands are placed on the birds' cognitive abilities in order for them to find resources such as food, water and nest-boxes. Because early environmental complexity can influence cognition, we aimed at increasing our knowledge of how two different rearing environments affect the cognitive abilities of the hens. We tested 14 cage- and 14 aviary-reared White Leghorn hens twice a day in a holeboard test from 32 to 40 weeks of age. The test consisted of four phases (uncued, cued, over-training and reversal) during which the hen had to find three mealworm-baited cups among the eight distributed in a 4x2 matrix. For the three first phases, the configurations of baits in the arena remained unchanged. Visual cues were added to the baited cups during the cued phase and removed for the over-training phase. During the reversal phase, the configuration of baits was changed to investigate cognitive flexibility. For each trial, the numbers of visits to the baited and non-baited cups were recorded and memory ratios were calculated. The latency to find the first bait and the trial duration were also recorded for each trial. Values were averaged per blocks of two consecutive test days, and we ran linear mixed-effects models (LMM) on the output variables for each phase separately. We also analyzed the transition between the different phases by running LMM on the blocks preceding and following the transition. We used the treatment group and the trial blocks as predictors. The individual was used as a random factor to account for repeated measures. Aviary-reared hens had a higher reference memory score in the first block of the cued phase, and showed a less pronounced reduction in performance from the cued to the over-training phase compared to cage-reared hens ($F_{1,26}$=4.144, $p<0.05$; $F_{1,26}$=4.387, $p<0.05$). Cage-reared hens also had a significantly higher latency to find the first bait than the aviary-reared hens for the uncued, cued and over-training phases ($F_{1,26}$= 5.177, $p<0.03$; $F_{1,26}$= 6.164, $p<0.02$; $F_{1,26}$= 6.085, $p<0.02$). The same was observed for the transition between them (uncued-cued: $F_{1,26}$= 6.048, $p<0.02$; cued-over-training: $F_{1,26}$= 5.739, $p<0.02$). No significant treatment effects were found for the reversal phase. In conclusion, cage-reared hens were slower to find the first bait than aviary-reared hens and seemed to be more sensitive to changes in the environment.

The relationship between age, fear responses, and walking ability of broiler chickens

Sigga Nielsen Rasmussen[1*], Dr. Marisa Erasmus[2], Dr. Anja Brinch Riber[1]

1Department of Animal Science, Aarhus University, Blichers Alle 20, DK-8830 Tjele, Denmark
[2] Department of Animal Sciences, College of Agriculture, Purdue University, 270 S Russell Street, West Lafayette, Indiana 47907, USA
[*] Presenting author: sira@anis.au.dk

Fear levels may constitute a severe welfare concern in broilers as exaggerated fear responses cause scratching, smothering, or even death due to suffocation. Many existing fear tests rely on the birds' ability to physically move in relation to whatever potential frightening stimuli they are presented with. However, as walking impairment is another well-known welfare concern in broilers, the walking ability of the birds may affect the outcome of the fear test. This study aimed to assess the relationship between age, fear responses, and walking ability in commercial broilers.
Our study included six flocks of Ross 308 broilers on two commercial Danish farms (n=12 flocks). Welfare assessments were performed at three ages (21, 27, and 33 days) and included two fear tests, the Stationary Person Test (SPT) and the Novel Object Test (NOT), in six locations and gait scoring of 120 birds/flock according to the Bristol scale. Statistical analysis was performed in R. We calculated the odds ratios to assess the relationship between age and walking ability. To test the effect of the interaction between age and walking ability on fearfulness, we formulated two generalized linear mixed models, one for each fear test. Our results demonstrated that walking ability decreased with age (χ^2_6=909.32, P<0.001). Age was also found to have a highly significant effect on the outcome of both fear tests as fear responses decreased overall when measured through both the SPT (χ^2_3=189.21, P<0.001) and the NOT (χ^2_3=79.50, P<0.001). When investigating the influence of the interaction between age and gait score on the fear responses of the birds, we found a significant effect of the interaction on the outcome of both the SPT (χ^2_2=11.13, P=0.004) and the NOT (χ^2_2=8.30, P=0.016). For the SPT, higher gait scores resulted in lower fear responses at ages 21 and 33 but higher fear responses at age 27. For the NOT, higher gait scores resulted in higher fear responses at ages 21 and 27, whereas gait score had no influence at age 33. Overall, these findings suggest that the SPT and the NOT may be influenced by poor walking ability.
In conclusion, our results suggest that walking impairment should be taken into consideration when performing the fear tests in question. However, as several conditions other than walking ability, e.g. space allowance, may affect the outcome of fear tests, we encourage future studies to investigate such conditions to ensure the applicability of the fear tests.

Laying hen chicks make earlier use of elevated areas and perform more intertier transitions when provided with ramps in the rearing aviary

Ariane Stratmann[1*], Janice Siegford[2], Michael J. Toscano[1]

[1] *Center for Proper Housing: Poultry and Rabbits, Animal Welfare Division, Veterinary Public Health Institute, University of Bern, Switzerland*
[2] *Department of Animal Science, Michigan State University, East Lansing, Michigan, USA*
[*] *Presenting author: ariane.stratmann@vetsuisse.unibe.ch*

Appropriate cognitive and bone development during rearing is critical to ensure laying hens can optimize resources within aviary systems. Given previous work documenting the benefit of ramps in the laying phase, our project evaluated provision of ramps during rearing. Two flocks of Lohmann Selected Leghorn chicks (LSL, N= 4800 chicks/flock) were reared from one day of hatch until 18 weeks of age (woa) in eight pens (N= 600 chicks/pen) of a semi-commercial rearing barn. Four pens contained an aviary system with tiers stacked in an alternating manner (offset) whereas the other pens contained an aviary with tiers stacked directly over each other (direct). Within each aviary type, two pens contained ramps connecting the different tiers in a continuous pathway between the highest and lowest tiers while control pens had no ramps between tiers (n= 2 pens/aviary/flock). The following behaviours were assessed by video: 1) use of top tier at 3, 4, 5, 8, 11 and 14 woa and 2) number of transitions between tiers at 3, 4, 8 and 14 woa. Use of the top tier was assessed four times per day (TOD) (i.e. lights on, mid-day, dusk, lights off) by counting the number of birds at the 1st, 8th and 16th minute at each TOD. Transitions between tiers were counted for 2 minutes continuously at each of three TOD (i.e. lights on, mid-day, dusk). In ramp pens, transitions with or without ramps were distinguished. Data were analysed using generalized linear mixed effect models with treatment, age, TOD and their interactions as fixed effects. At 3, 4, 5 and 8 woa more chicks were observed on the top tier in ramp compared to control pens (each woa: $p < 0.05$) with no difference observed at 11 and 14 woa. More birds used the top tier during the dusk phase and after lights off in ramp compared to control pens (both TOD: $p < 0.001$) with no differences after lights on and during midday. More transitions were observed in the ramp compared to the control group throughout the rearing phase and at all TOD (all comparisons: $p< 0.001$). Overall, birds in the ramp group performed more than 80% of transitions using ramps, even at 14 woa. Benefits of ramps for chicks include an easier and earlier access to resources that chicks in the control group do not have, which ultimately should lead to better welfare.

Resting behaviour of broilers reared with or without artificial brooders

Sara Forslind[1*], Carlos E. Hernandez[2], Anja B. Riber[3], Helena Wall[2], Harry J. Blokhuis[1]

[1] Department of Animal Environment and Health, Swedish University of Agricultural Sciences, SE-750 07 Uppsala, Sweden
[2] Department of Animal Nutrition and Management, Swedish University of Agricultural Sciences, SE-750 07 Uppsala, Sweden
[3] Department of Animal Science, Aarhus University, Blichers Allé 20, DK-8830 Tjele, Denmark
[*] Presenting author: sara.forslind@slu.se

Rest and sleep are important for the welfare of mammals and birds. A large part of the daily time budget of broiler chickens is taken up by resting behaviour and the quality of resting is important. However, in intensive broiler production systems, disruptions of resting behaviours are common. These disruptions of resting behaviour could be negative for the health and growth of the birds. This study investigated if artificial brooders that provide a delimited and darker resting place, away from active birds (e.g. near water and feed), reduce disruptions of resting behaviour compared to a control situation without artificial brooders. Six pens of each treatment were used in the same building, keeping 60 chickens (Ross 308) per pen with a stocking density at 20kg/m^2. Brooders were removed when the broilers were 21 days of age. The pens were video recorded and data on disturbances and duration of resting bouts as well as activity between resting bouts were collected on 20 and 34 days of age. Also, a spatial learning test was performed at 11 days of age. Statistical analyses were performed in R using an ANOVA test for duration data and a Chi-squared test for proportion data. The results showed that birds housed in pens with access to brooders have longer resting bouts (260.7 ± 5.2s vs. 132.8 ± 5.3s, $p < 0.001$) and are less likely to be disturbed during resting by other individuals (proportions 0.15 vs. 0.48, $p < 0.001$). The effect of the artificial brooders on both the duration of resting bouts and the proportion of disturbances remained after the removal of the brooders at 21 days of age. The duration of activity between resting bouts was shorter if the resting bout was ended by a disturbance (9.98 ± 1.0s vs. 61.0 ± 2.4s, $p < 0.001$). Birds reared with brooders were more likely to solve the spatial learning task (proportions 0.5 vs. 0.27, $p < 0.01$), but those succeeding were not faster at solving it. Broilers may be exposed to disrupted rest due to the asynchronous active/rest cycles in large flocks and the lack of a dedicated resting place separated from areas with high activity. However, additional changes to the housing conditions or management, will be needed to further prevent disturbances.

Mummys boys and girls? Effects of the rearing system on behaviour in an Open-Field-Novel- Object test in turkeys (*Meleagris gallopavo*)

Jenny Stracke[1*], Alica Krasny[2], Lea Ahrens[2], Nicole Kemper[2]

[1] *Farm Animal Ethology, Institute for Animal Science, Agricultural Faculty, University of Bonn, Bonn, Germany*
[2] *Institute for Animal Hygiene, Animal Welfare and Farm Animal Behaviour, University of Veterinary Medicine Hannover, Foundation, Hannover, Germany*
[*] *Presenting author: jenny.stracke@itw.uni-bonn.de*

In the present study, the influence of two rearing systems on the behaviour of turkey poults was tested in an Open Field Novel Object test (OFNO), which is frequently used as "fear test" in poultry. The hypothesis was that the behaviour would be influenced by the early post-natal period. The study was performed on an organic farm housing turkeys (Cröllwitzer x Hockenhull) under German organic standards. Animals were reared in two rearing systems (RS). In RS 1 animals were kept in small groups (~16m^2/animal; 30 animals/group) without the presence of an adult animal. In RS 2, animals were raised with the presence of an adult foster mother (~16m^2/animal; 15 animals/group). In three rearing periods, ten animals per group (60 animals in total) were tested in an OFNO. The test was conducted twice during the rearing phase (6th and 8th week of life (WoL)) observing the behaviour of chicks for ten minutes each. After five minutes, one of two novel objects (stick/can; objects differing between WoL) was presented.Behavioural parameters were analysed using linear mixed models. The RS was found to have an effect on the locomotion (walking: $F=18.7$; $p<0.001$; standing: $F=35.8$; $p<0.001$) and on the latency till the first step ($F=18.5$; $p<0.001$), with animals from RS 2 being more active and starting to move earlier. Furthermore, an effect on the frequency of changing position (quadrants) was found ($F=11.7$; $p<0.001$); here again, animals from RS 2 were more active. A significant effect of WoL was found for the latency till the first step ($F=37.0$; $p<0.001$), with animals showing shorter latencies when tested in week 8 compared to week 6. The interaction between WoL and RS also revealed a significant effect on this parameter ($F=5.7$; $p<0.05$), with animals from RS 1 showing longer latencies compared to animals from RS 2 when tested in week six; the difference was no longer present when animals were tested in week 8. To summarize the results, this study found the rearing phase to have an impact on activity behaviour in the OFNO. However, results also indicate that animals habituate to the test procedure, which stresses the question of repeatability of the test results. Still, as the behaviour of animals in the OFNO is assumed to reflect the subjective state at least in parts - a deeper understanding of these processes might contribute to improve rearing conditions of turkeys, and in consequence to enhance animal welfare.

Doubling feeder space can reduce competition for feed in pigs

Roberta Maria D'Alessio[1, 2*], Alison Hanlon[2], Keelin O'Driscoll[1]

[1]Pig Development Department, Animal & Grassland Research & Innovation Centre, Teagasc Moorepark, Fermoy, Co Cork, Ireland;
[2] UCD Veterinary Sciences Centre, University College Dublin Belfield, Dublin 4, Ireland;
[*] Presenting author: robertamaria.dalessio@teagasc.ie

Tail biting is one of the most challenging welfare problems in commercial pig production, and is generally controlled by routine tail docking, even though EU Council Directive (2008/120/EC) prohibits this. Competition for feed is considered a significant risk factor for tail biting. Very few studies describe the effect of increasing space at the feeder on feeding and aggressive behaviour in undocked pigs. This study sought to determine whether increasing space at the feeder would influence the number and duration of feeding bouts, and reduce the performance of aggressive behaviours. Undocked pigs (n =288) were weaned in their litter groups and randomly assigned to one of 12 pens with a double spaced feeder (DOUBLE; one feed space aligned with the front wall of the pen (OUTER), and one immediately adjacent (INNER)) or with a single-spaced feeder (SINGLE; OUTER only; n = 12 pigs/pen) until slaughter age. Duration of feeder occupancy, feed-space occupancy and the number of and duration of feeding bouts was recorded continuously from video recordings taken on four different occasions; twice while in the weaner stage (weeks 2 and 6 post weaning), and twice while in the finisher stage (weeks 9 and 16 post weaning; 1 camera/pen; 1 h per occasion). All instances of aggressive behaviour (head-knock, etc.) were recorded during every feeding bout. Data were analysed using SAS v9.4. Total feeder occupancy tended to be longer in DOUBLE (34:46 ± 06:00 min) than SINGLE (27:19 ± 05:41 min; $P = 0.06$). However, the occupancy of both feed spaces in DOUBLE was less than in SINGLE (DOUBLE OUTER = 11:43 ± 03:54 min; DOUBLE INNER = 19:32 ± 03:57 min; SINGLE = 30:38 ± 03:42 min; $P < 0.001$). In DOUBLE there was also a preference for INNER rather than OUTER feed spaces when it came to number of feeding bouts (46.6 ± 6.2 *v* 23.5 ± 5.6 bouts, respectively; $P < 0.001$). During feeding, pigs in DOUBLE performed fewer aggressive behaviours (15.0 ± 9.8) than SINGLE (52.8 ± 10.3; $P < 0.001$), and fewer displacements (0.9 ± 0.3) than in SINGLE (2.6 ± 0.4; $P < 0.001$). These data suggest that in pens of 12 pigs, doubling space at the feeder to two spaces allowed greater occupancy, even though there was less time spent within each space. Fewer aggressive and displacement behaviours indicate reduced competition for feed, and potentially less risk of tail biting.

Supplementation of amino acids at requirements for optimal growth largely counteracts the negative effects of low protein diets on tail biting in pigs, while extra enrichment is less effective

Ilaria Minussi[1,2,3,*], Walter J. J. Gerrits[2], Alfons J. M. Jansman[3], Rosemarijn Gerritsen[4], Johan J. Zonderland[5], William Lambert[6], J. Elizabeth Bolhuis[1]

[1] *Adaptation Physiology Group, Wageningen University, Wageningen, 6708 WD, the Netherlands*
[2] *Animal Nutrition Group, Wageningen University, Wageningen, 6708 WD, the Netherlands*
[3] *Wageningen UR, Livestock Research, Wageningen, 6708 WD, the Netherlands*
[4] *ForFarmers Nederland B.V., Lochem, 7241 CW, the Netherlands*
[5] *De Heus Animal Nutrition, Ede, 6717 VE, the Netherlands*
[6] *METEX NØØVISTAGO, 32 rue Guersant, 75017 Paris, France*
[*] *Presenting author: ilaria.minussi@wur.nl*

Dietary crude protein (CP) content is often lowered to reduce ammonia emissions, but may increases damaging behaviours in pigs. To investigate the potential of essential amino acid (EAA) supplementation to counterbalance the expected deleterious effects of low CP diets on tail biting, 576 undocked pigs (n=48 groups of 12, two batches) were observed from 10/11 (trial week 0) to 23/24 weeks of age on a commercial farm. Pens contained a chain, jute sack and tube with straw bricket. Pigs had ad libitum access to either a normal CP diet (NP; 175, 159, 143g/kg for starter, grower, finisher phase), a low CP diet (LP; -20% CP compared to NP), a LP diet with supplemented EAA (LP^+; EAA at the same level as NP diet), or a LP diet with additional pen enrichment ($LP\text{-}E^+$; wooden beam, rope, 350g of straw daily). Behaviour (6x10- min behaviour sampling/week), activity (12x10-min scan sampling/week), and tail damage (0- 5 score) were recorded in week 2 (starter phase), 4, 6 (grower phase), 8, 11, and 13 (finisher phase) of the trial. Fixed effects of treatment, phase and their interaction, and random effects of pen and batch were analysed with (generalized) mixed models. In case of tail biting outbreaks a stepwise 'safety protocol' was followed including extra enrichment and removal of biter and/or victim. Throughout all phases, LP and $LP\text{-}E^+$ were more active than NP and LP^+ pigs ($P \leq 0.001$). $LP\text{-}E^+$ showed most enrichment interaction, followed by LP, and then LP^+ and NP pigs ($P \leq 0.001$). Tail biting frequency was higher for LP compared to the other treatments in the starter phase ($P \leq 0.001$), and tended to be higher for LP than for NP and LP^+ in the finisher phase, with $LP\text{-}E^+$ in between ($P < 0.1$). Over all phases, LP pigs had the highest tail damage scores and NP the lowest ($P < 0.05$), with $LP\text{-}E^+$ in between LP^+ and LP, and LP^+ in between NP and LP-E+. Tail damage in $LP\text{-}E^+$ tended to increase after the starter phase ($P < 0.1$). The proportion of days the 'safety protocol' interventions were necessary was higher for LP and $LP\text{-}E^+$ than for NP and LP^+ pigs ($P < 0.01$), which may have led to an underestimation of the negative effects of the LP diet. In conclusion, supplementation of EAA at requirement for optimal growth appeared to largely counteract the negative effects of LP diet on tail biting across phases, while additional enrichment seemed to be effective only during the starter phase.

Cognitive ability affects pigs' choice of opponents in aggression after regrouping

Lucy Oldham[1*], Gareth Arnott[2], Mark Brimsa[1], Irene Camerlink[3], Andrea Doeschl- Wilson[4], Agnieszka Futro[1], Victoria Lee[1], Francoise Wemelsfelder[1], Simon P. Turner[1]

[1] Animal Behaviour & Welfare, Animal and Veterinary Sciences Department, Scotland's Rural College (SRUC), West Mains Rd, Edinburgh, EH9 3JG, UK.
[2] Institute for Global Food Security, School of Biological Sciences, Queen's University Belfast, Belfast, BT9 7BL, UK.
[3] Institute of Genetics and Animal Breeding, Polish Academy of Sciences, Ul. Postepu 36A, Jastrzebiec, 05-552 Magdalenka, Poland
[4] The Roslin Institute & R(D)SVS, University of Edinburgh, Easter Bush, Edinburgh, EH25 9RG, UK
[*] Presenting author: lucy.oldham@sruc.ac.uk

Individual variation in pigs' aggressive behaviour may reflect differences in decision-making ability. We tested the hypothesis that individuals which learn more quickly in a cognitive test prior to regrouping would be more selective in their fighting decisions and perform less aggression. Pigs (n = 116: 62 females, 54 males) completed a spatial discrimination task (SDT) at ~10 weeks of age. They were trained to associate one location with a food reward, and an opposite location with a punisher (no food and a fan). In the SDT, 93 pigs (48 females, 45 males) approached both the positive and negative location. Learning speed was assessed by the number of trials taken to reach 10 correct in 12 consecutive trials, out of a maximum 36 trials. At 14 weeks of age, litter pairs were regrouped into mixed-sex groups of 8-14 pigs unfamiliar to each other, resulting in re-establishment of dominance relationships. All 116 pigs were included in the regrouping treatment, to create equal group sizes within each batch. Behaviour was scored continuously from video to record all aggressive interactions and opponent's identity for an initial two hours post-regrouping. In the SDT, 85% pigs (n= 79: 43 females,36 males) reached the success criterion, in 15-36 trials (mean 24.7). During the first 2h interval of regrouping, each pig fought with on average 57% of unrelated females and 52% of unrelated males in the pen. Linear mixed model analysis found a positive correlation between learning speed in the SDT and the number of female opponents during regrouping (-0.073, s.e. 0.026 female opponents for every extra trial to reach criterion, t= -2.8, p= 0.005) but not the number of male opponents (t= -0.21, p= 0.8), nor the total number of opponents (t=-1.5, p=0.1). Further analysis, including additional measures of cognitive ability (percentage of trials correct) and regrouping aggression (the total duration and number of fights, fight outcomes, and lesion scores after regrouping) will be presented to give a more complete picture of the relationship between performance in cognitive tests and aggression after regrouping. These initial results suggest that cognitive ability does not reduce the overall number of opponents pigs fight in the acute period after regrouping. However, previous work suggests that female opponents are more likely to lose mixed sex contests, and therefore pigs that choose more female opponents may win more fights overall.

Improved gestation housing reduces sow oral stereotypical behaviour, and improves offspring health during the suckling period

Martyna Lagoda[1, 2*], Keelin O'Driscoll[1], Maria Costanza Galli[3], Joanna Marchewka[2], Laura Boyle[1]

[1] Pig Development Department, Animal & Grassland Research & Innovation Centre, Teagasc Moorepark, Fermoy, Co Cork, Ireland;
[2] Institute of Genetics and Animal Breeding of the Polish Academy of Sciences, Department of Animal Behaviour, ul. Postępu 36A, Jastrzębiec 05-552;
[3] Department of Animal Medicine, Production and Health, University of Padova, Viale dell'Università 16, 35020, Legnaro (PD), Italy
[*] Presenting author: lagodam@tcd.ie

Prenatal stress is the mechanism through which poor welfare experienced by pregnant sows has a detrimental effect on the health and resilience of their piglets. Hence, improving sow welfare during pregnancy is crucial to optimize the welfare, performance, health and associated antimicrobial use in the offspring. Stereotypical behaviour is an indicator of compromised sow welfare. Hence, this study aimed to investigate the effect of two gestation housing systems (improved; IM vs conventional; CON) on sow oral stereotypical behaviours (OSB) during pregnancy, and on scouring in their piglets during the suckling period. Sows (n=120, 3 replicates) were mixed into stable groups of 20 unfamiliar animals on d30 post-service (CON n=60; IM n=60) in group pens with free-access, full-length individual feeding/lying stalls. CON pens had fully-slatted, concrete floors, 2 blocks of wood and 2 chains suspended within the group area. IM pens had rubber mats, a length of manila rope in each feeding stall, and straw provided in 3 racks. Parity and sow back fat were equal between IM and CON pens, as was gestation house temperature. Direct observations of OSB (sham chewing, mouth stretching, palate grinding, sucking, tongue flicking, licking) were conducted 72hr post- mixing, in mid-pregnancy, and on d108 of pregnancy, using instantaneous scan sampling at 6min intervals for 3hrs (n=30 scans/day). OSB frequency (% observations) was then calculated on each day for each sow. Presence of scour in the farrowing crate was scored approximately every second day throughout lactation (n=10 scores; 0=normal faeces; to 3=severe diarrhoea) and treated post-scoring if necessary. Scores were summed to yield a total scour score (TSS) per sow throughout lactation. Generalized linear mixed models were used (SASv9.4; PROC MIXED; LSmean±SE) to investigate the effect of housing system on OSB frequency, and on TSS. OSB frequency was lower for IM sows in mid-pregnancy (IM: 2.6 ± 1.19; CON: 11.7 ± 1.18; $P<0.001$) and on d108 (IM: 4.4 ± 1.57; CON: 11.5 ± 1.54; $P=0.002$) compared to CON sows. TSS was lower for piglets born to IM sows (IM: 2.7 ± 0.31; CON: 4.3 ± 0.32; $P<0.001$) compared to CON sows. Lower OSB performance in IM pens confirms previous findings that housing gestating sows in improved systems is beneficial to welfare, with potential associated improvements to offspring health during the suckling period. Given the beneficial impact of roughage/fibre feeding on OSB in sows, it is likely that straw provision mediated this effect in the improved housing environment.

Reducing aggressive behaviour in rabbit does housed in groups

Ágnes Moravcsíková[1,2,*], Ondřej Krunt[3], Adam Kraus[3], Lukáš Zita[3], Luděk Bartoš[1,2]

[1] Department of Ethology and Companion Animal Science, Czech University of Life Sciences Prague, Czech Republic
[2] Department of Ethology, Institute of Animal Science Prague, Czech republic
[3] Department of Animal Science, Czech University of Life Sciences Prague, Czech Republic
[*] Presenting author: moravcsikova@af.czu.cz

There is an increasing interest in housing rabbit does in groups; however, a system that would prevent excessive aggression and be applicable on farms has not been implemented. The objective of this study was to investigate the effect of housing with the possibility of making burrows, and genotype on aggressive behaviours in group-housed breeding does. At 24 wk of age, 12 groups of 6 rabbit does (n=72) were randomly assigned to 4 treatments (2 housing systems and 2 genotypes). Housing systems consisted of concrete floor with deep litter (DEEP) or ground and deep litter with the ability to dig burrows (DIG). Genotypes consisted of Mecklenburg (MC) or Hyplus rabbits. 4 days after grouping, a male rabbit was added to each group and remained for 10 days. Each doe was observed for 30-min periods twice a day, at 10:00 and 22:00 hr for 5 days throughout the experiment (after the group formation, after the male was added, before kindling, 14 days after kindling, and 35 days after kindling). Aggressive behaviours between does (biting, boxing, chasing, carousel fights, attacking and threatening) were sampled in 1-min intervals following the one-zero sampling method. The number of injuries on does and kits as well as postnatal kit mortality was also recorded. Each rabbit was visually checked every day and treated if necessary. The effects of housing, and genotype were tested using multivariate Generalized Linear Mixed Models. We found that DIG does performed less aggressive behaviours towards other does compared to DEEP does (DIG = 0.35 ± 0.05, DEEP = 0.57 ± 0.05 lsmeans ± SE; F1,72=13.14, P=0.0005). Furthermore, aggressive interactions increased with body weight, among MC does appeared less often than Hyplus does (body weight nested within the genotype, $F_{2,72}$=25.12, P<0.0001). Reduced aggression was also reflected in a lower number of injuries in DIG does ($F_{1,57}$=1265.97, P<0.0001) and with an increasing body weight of the does, the number of skin injuries increased (body weight nested within the genotype, $F_{1,716}$=161.84, P<0.0001). This trend was more pronounced in Hyplus than in MC does. Housing treatment and genotype also had significant effect on the number of injured kits (housing $F_{1,57}$=1265.97, P<0.0001; genotype $F_{1,57}$=547.95, P<0.0001) and kit mortality (housing $F_{1,56}$=16.85, P=0.0001; genotype $F_{1,56}$= 56.9, P<0.0001). The results indicate that aggression among rabbits can be reduced when does dig burrows. Furthermore, we recommend using the original breed of rabbit (Mecklenburg) instead of commercially bred hybrid Hyplus rabbits.

Risk factors for stereotypic behaviour in captive ungulates

Kate Lewis[1*], Leanne Proops[1], Matthew O. Parker[2], Sebastian D. McBride[3]

[1] *Department of Psychology, University of Portsmouth, UK*
[2] *School of Pharmacy and Biomedical Science, University of Portsmouth, UK*
[3] *Institute of Biological, Environmental and Rural Sciences, Aberystwyth University, Wales, UK*
[*] *Presenting author: kate.lewis@port.ac.uk*

Stereotypic behaviours are repetitive behaviours induced by frustration, repeated attempts to cope, or central nervous system dysfunction, and are widely reported across a variety of captive species. Performance of stereotypies has significant implications for the management and welfare of these animals, including increased injuries and poor physical health, reduced production or sporting performance, decreased financial worth, and negative public attention. Captive ungulates are kept as production animals, in zoos, and for transport, sport and leisure. They can display a range of locomotor and oral stereotypic behaviours, including tongue- rolling, pacing and crib-biting. Although stereotypies in livestock and horses are well studied, stereotypy data for the majority of exotic ungulate species are sparse, and there are vast inter- species differences in their type, prevalence and frequency. We aimed to identify which aspects of ungulates' natural behavioural biology and current captive conditions predict stereotypy propensity. To do this, we conducted two systematic literature reviews to collect stereotypy prevalence data, and information regarding species' wild behavioural ecology. BIAZA-accredited institutions were also contacted to gain unpublished data regarding stereotypies. High quality stereotypy data were available for 38 species. We hypothesised that risk factors for stereotypy development would fall into three key categories: (1) those relating to natural foraging behaviour and current captive diet; (2) those relating to a species' natural social organisation and their captive social conditions; and (3) those relating to natural movement and ranging, and captive enclosure size. We ran a series of Bayesian models using R package *brms*, controlling for species' phylogenetic relatedness. As hypothesised, several measures relating to feeding behaviour influenced stereotypy: wild feeding strategy (browsers (CrIs [15.88, 56.95]) and mixed feeders (CrIs [10.27, 36.44]) showed higher prevalence than grazers), feeding captive animals in meals as opposed to *ad libitum* (CrIs [14.29, 37.25]), and feeding concentrates rather than forage (CrIs [27.02, 123.00] or mixed [CrIs 18.74, 103.55] diets. Regarding social behaviour, promiscuous species showed higher prevalence than polygynous species (CrIs [14.72, 56.65]), a factor rarely considered when exploring risk factors for poor welfare. No variables relating to natural ranging behaviour or captive enclosures were predictive of stereotypy. Results suggest that interventions to improve ungulate welfare should focus on feeding and social factors. Our models also provide a means for identifying which species may be more appropriate for captivity. This exploratory work paves the way towards a deeper understanding of how divergence from free ranging ecologies result in discrete stereotypies in captive animals.

Effect of access to pasture on hair cortisol and behaviour of sheep

Ricard Pares[1*], Pol Llonch[1], Xavier Manteca[1], Xavier Such[2]

[1] Department of Animal and Food Science, School of Veterinary Science, Universitat Autònoma de Barcelona, Bellaterra, Spain.
[2] Grup de Recerca en Remugants, Department of Animal and Food Science, School of Veterinary Science, Universitat Autònoma de Barcelona, Bellaterra, Spain.
[*] Presenting author: Ricard.Pares@uab.cat

Sheep flocks are usually managed in extensive or semi extensive systems. However, sheep are deprived from grazing at certain periods, in particular during gestation or post-lambing, or even during adverse climatic conditions. In order to improve welfare in sheep flocks, it could be interesting to analyse the effect of grazing restriction on sheep welfare. A study was performed to assess the effect of grazing restriction on sheep welfare. Forty pregnant Ripollesa breed were housed in an open barn for a period of 10 weeks, and two groups of twenty ewes were established: the control group grazed 5 hours daily during the morning, and the experimental group was kept indoors throughout the experimental period. Food supply was higher in the experimental group to maintain the same body condition in both groups. A hair sample from the left foreleg was obtained at the beginning of the study and at weeks 5 and 10 to analyse cortisol levels. Behaviour was video recorded two days per week in the following intervals: morning (6:00 to 6:15), afternoon (16:00 to 16:15) and evening (21:00 to 21:15) and using an ethogram that included the following behaviours: resting, rumination, aggressive behaviours (head butting and threatening) and abnormal behaviours (wool pulling). Overall, animals were observed for 15 hours over a 10-week period. Resting and rumination were analysed through scan and focal sampling respectively, whereas social and abnormal behaviours through continuous sampling. Cortisol levels in hair increased significantly during the experimental period. No differences were found between control and experimental group, but significant differences were observed between pregnant ewes carrying one or two lambs, being higher in pregnant ewes with two lambs ($p<0.01$). Wool pulling was not observed in the control group and in the experimental group it was observed on weeks 5, 6, 7, 8 and 10. Aggressive behaviours (head butting and threatening) were significantly more frequent in the experimental than in the control group ($p<0.05$). There were no differences in resting and rumination. An association of grazing restriction with wool pulling and increased aggression in ewes was found, and this effect cannot be offset by increasing feed intake. Hair cortisol was not affected by grazing restriction. In conclusion, observations provide useful information on the detrimental effect of grazing restriction on sheep welfare.

Effects of playpen access on stereotypic behaviour and aggression in conventionally housed female laboratory mice

Anna Ratuski*, I. Joanna Makowska, Dan Weary

UBC Animal Welfare Program, Faculty of Land and Food Systems, University of British Columbia, Vancouver, Canada
**Presenting author: aratuski@mail.ubc.ca*

Laboratory mice are typically housed in "shoebox" cages that limit the expression of natural behaviours such as climbing and burrowing. Mice living in shoebox cages show signs of poor welfare such as increased stereotypic and depressive behaviour. Temporary access to environments with increased space and complexity (playpens) can provide more behavioural opportunities and may improve laboratory animal welfare. Previous work by our group has shown that mice are motivated to access these environments, but it is still unknown how other aspects of welfare are impacted. In the current study, female C57BL/6J, BALB/cJ, and DBA/2J mice (n=21; 7 mice per strain) were housed in mixed-strain groups of three and given temporary access to a large playpen cage with their cage mates three times per week for 30 minutes at a time. Control mice (n=21; 7 mice per strain) were housed in the same conditions but remained in their home cages. Stereotypic behaviour was scored from videos using 0-1 sampling (15-s intervals for 15 min per h) during 6 h of the dark phase. Scoring began when mice were 37-38 days old and continued every two weeks until mice were 100-104 days old. There was an overall effect of treatment on the average number of stereotypic behaviours observed (means ± SE: 5.4 ± 0.6 for playpen mice, vs. 2.8 ± 0.5 for control mice; $F_{1,12} = 10.76$, $p<0.01$), driven by higher levels in the C57BL/6 and DBA/2J strains. We also scored aggression continuously from videos in the 30 minutes following cage changing (an acute stressor) on 3 occasions. There was no overall effect of playpen access on aggression, however there was an effect of genetic strain ($F_{2,24} = 18.33$, $p<0.0001$); C57BL/6 mice showed the highest average levels of aggression (7.9 ± 1.0 aggressive behaviours after cage changing, compared to 3.5 ± 0.5 for DBA/2J and 2.6 ± 0.4 for BALB/cJ mice). The reason for increased stereotypic behaviour in the playpen mice is not clear, but could be related to different emotional states or coping strategies. We conclude that providing playpen access at this frequency and duration is not a sufficient intervention to prevent the development of stereotypic behaviour or aggression.

Learning performance and active enrichment use in farm mink with different forms of abnormal behaviour

Jens Malmkvist[1*], Maria Díez-León[2], Janne Winther Christensen[1]

[1] *Department of Animal Science, Aarhus University, Denmark*
[2] *Royal Veterinary College, University of London, UK*
[*] *Presenting author: jens.malmkvist@anis.au.dk*

We tested the hypothesis that different forms of abnormal behaviour in farmed American mink (*Neovison vison*) are (1) associated with impaired learning, and (2) reduced during periodical access to additional environmental enrichment (running wheels). After screening 1151 individually housed adult mink females for presence of abnormal behaviour, we selected a total of 150 divided into six groups displaying fur-chewing (FURCHEW, n=21), stereotypic behaviour (SB) in the form of pacing (PACERS, n=33), stationary SB (STATSB, n=22), licking SB (ORALSB, n=17) or several forms combined (MIXED, n=22), or free from abnormal behaviour (CONTROL, n=35). Learning performance was assessed in a subset (n=90) of mink using a two-choice visual discrimination test with three progressive stages; 94% passed the 1st (acquisition), 70% the 2nd (recall) and 42% the 3rd (reversal) stage. Mink with mixed or pacing forms outperformed both control and mink with licking SB (stages passed: MIXED 2.3 ±0.2^{a}; PACERS: 2.1 ±0.2^{a}; CONTROL: 1.4 ±0.2^{b}; ORALSB 1.4 ±0.3^{b}, $F_{5,83}$=2.7, P=0.027), while others were not significantly different (STATSB: 1.9 ±0.2^{ab}, FURCHEW: 2.0 ±0.3^{ab}). Ten days of access to running wheels (RW), automatically recording revolutions per day (rpd), revealed that the groups differed in usage ($F_{5,131}$=10.0, P<0.001): CONTROL mink ran less (344 ±35^{a} rpd) than PACERS (1435 ±118^{bc} rpd), STATSB (1445 ±96^{c} rpd), and MIXED (1929 ±153^{c} rpd), but similarly to FURCHEW (485 ±56a rpd) and ORALSB (466 ±46^{ab} rpd) mink. All forms of SB, except licking, were significantly reduced (P<0.001) during RW access. Stationary SB returned to, but pacing and licking SB increased above (P<0.040), pre-RW-levels the weeks after the mink returned to standard cages without running wheel access. Our results do not confirm our hypothesis that abnormal behaviour was associated with impaired learning; rather, mink with locomotory forms of SB outperformed control mink (and mink with licking SB) for the number of stages passed in the learning test, suggesting that active response styles may be beneficial for performance in the task used. Further, mink with a SB involving locomotion and/or up-down movements used running wheels extensively, whereas control mink and mink with other forms of abnormal behaviour (licking or fur-chewing only) were more passive. We conclude that different forms of abnormal behaviour may be associated with different cognitive and motivational consequences. This is important knowledge for the prevention and treatment of these behaviours as well as for on- farm assessment of welfare, as some forms may reflect more serious welfare problems than others.

Toe-pecking – a serious but rarely studied welfare problem in laying hens

Sabine G. Gebhardt-Henrich[1*]; Sabine Mueller[2]; Lisa Zanini[3]; Michael J. Toscano[1]

[1] Center for Proper Housing: Poultry and Rabbits, Division of Animal Welfare, University of Bern, Switzerland
[2] Aviforum, Burgerweg 22, 3052 Zollikofen, Switzerland
[3] Gallosuisse, Burgerweg 22, 3052 Zollikofen, Switzerland
[*] Presenting author: sabine.gebhardt@vetsuisse.unibe.ch

In recent years, outbreaks of toe-pecking (TP) have been reported in laying hen flocks on Swiss farms leading to increased mortality. A literature search revealed a 35-fold lower number of scientific articles and a 50-fold lower number of citations about TP compared with feather-pecking. Therefore, the aim of our study was to assess the associations of TP with housing and management factors. An online survey among Swiss egg producers yielded 96 valid questionnaires on the outbreak of TP and housing and management factors with half of the producers reporting toe-pecking. Data from the survey were analyzed by χ^2 tests, Fisher's Exact test, and generalized mixed models. According to the survey, white flocks were more affected than brown flocks ($F_{1,76}$=4.97, P = 0.03, N = 54). Several factors regarding management and housing were associated with TP (e.g. metal slats: $F_{1,50}$ = 5.61, P = 0.02; direct sunlight: $F_{1,50}$=7.52, P = 0.008, high frequency lamps: odds ratio: 4.13 (1.11, 15.32)). Farms with problems with E.coli during the last 5 years were more likely to have an outbreak of toe-pecking ($F_{1,50}$=5.69, P=0.02). The type of housing (aviary/floor housing/access to a range) and laying rate were not associated with the occurrence of TP. According to the farmers, dimming the lights was the only effective procedure to reduce the problem (Fisher›s Exact Test: P <0.0001). In conclusion, TP seemed to be multi-factorial, could be reduced by a reduction of light, and affected mainly white hybrids.

Light & larvae as early-life interventions to prevent feather pecking in laying hens

Saskia Kliphuis[1*], Maëva WE Manet[1], Vivian C Goerlich[1], Rebecca E Nordquist[1], Frank AM Tuyttens[2,3], T Bas Rodenburg[1,4]

[1] Animals in Science and Society, Department of Population Health Sciences, Faculty of Veterinary Medicine, Utrecht University, Utrecht, Netherlands
[2] ILVO, Merelbeke, Belgium
[3] Faculty of Veterinary Medicine, Ghent University, Ghent, Belgium
[4] Department of Adaptation Physiology, Wageningen University & Research, Wageningen, Netherlands
[*] Presenting author: s.kliphuis@uu.nl

Severe feather pecking, the pulling out of feathers of conspecifics, is a maladaptive behaviour shown by laying hens, and causes significant welfare issues in commercial laying hen farming. Possible underlying causes are fearfulness and lack of foraging opportunities. As early life is a crucial stage for behavioural development, adapting the incubation and rearing environment to the birds› behavioural needs may prevent the occurrence of feather pecking. In a 2*2 factorial design study, we investigated the effect of a green light-dark cycle throughout incubation, resembling more natural incubation circumstances, and of foraging enrichment with live larvae during rearing on fearfulness and feather pecking. As green light during incubation was shown to reduce fearfulness in broilers, and enrichment with larvae could fulfill the birds' behavioural need to forage, we hypothesized that chickens receiving both light and larvae would be the least fearful and show the least feather pecking compared to no light and no larvae. Divided over two rounds of experiments, 1100 ISA Brown eggs were incubated either under 12:12h or 0:24h light-dark conditions. After hatch, 400 female chicks were housed in 44 pens (8 to 10 chicks per pen). During the entire rearing phase, half of the chicks received black soldier fly larvae in a food puzzle as enrichment. Treatments were not mixed within pens. To assess fear of humans, we carried out an approach test on pen level at 10 weeks of age. To assess feather pecking, we performed home pen observations at 5 weeks and scored feather damage at 16 weeks of age. Data were analyzed using means per pen. A Cox regression with factors light, larvae and interaction showed no effect of lighted incubation (HR=1.957, p=0.117) nor of larvae provisioning (HR=2.182, p=0.077) on latency to approach. No interactions were found between treatments. A GLM with light, larvae and round as fixed factors showed that feather damage was not affected by light (F=1.063, p=0.309) nor larvae (F=0.742, p=0.394). Treatments did not significantly affect the number of feather pecking bouts (Kruskal Wallis: H(3)=3.001, p=0.392). In conclusion, the present study showed little effect of light during incubation or larvae enrichment during rearing so far, but analysis of additional behaviour tests is still ongoing. This experiment was part of PPILOW (Poultry and PIg in Low-input and Organic production systems' Welfare, www.ppilow.eu). The PPILOW project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement N°816172.

Limit feeding of TMR increases intersucking in year-old dairy heifers

Blair C. Downey*, Harman B. Goeller, Cassandra B. Tucker

Center for Animal Welfare, Department of Animal Science, University of California, Davis, CA, USA
** Presenting author: bdowney@ucdavis.edu*

Intersucking, or licking or sucking another animal's teats or udder, is an abnormal repetitive behavior reported to occur with wide-varying prevalence (1-57% of individuals) in heifers and cows. This behavior can be affected by milk availability and opportunities to suckle in the milk-fed period, and its occurrence in later life is often hypothesized to be a continuation of this early life expression. Surveys have suggested this behavior could also be associated with time spent eating solid feed, but this has not been evaluated experimentally. We thus set out to describe whether intersucking occurred in year-old heifers who had been immediately separated from their dam and individually housed (spaced ~0.5m apart) during the milk-fed period, and thus never performed early-life (first 65 d) sucking of another animal. We also evaluated whether intersucking was affected by feed availability, and expected that it would increase when solid feed was limited compared to ad-libitum provision. We studied 42 pair-housed heifers (9 Jerseys, 33 Holsteins) at 13±1 mo (mean±SD). We used a switchback design with 3 periods where heifers were fed ad- libitum TMR (total mixed ration, grain+forage mix) in the 1st and 3rd periods (baseline 1 and 3), and exposed to limit feeding where TMR availability was reduced to 50% of ad-libitum intake in the 2nd (restriction). Each period lasted 2 days. Intersucking was scored continuously from video for all heifers from 08:00-20:00 for 1 day of each period (d2 in baseline 1 and restriction; d1 in baseline 3). We analyzed the time spent intersucking in each period using a Wilcoxon matched- pairs signed-rank test. Overall, 79% of the heifers performed intersucking in at least 1 of the 3 periods (range: 1-13 bouts/12 h totaling 1-127 s). Heifers spent more time intersucking during restriction (18±4 s/12 h, mean±SE) compared to baseline 1 and 3 (4±1 s/12 h; $P<0.006$). There was no difference between the baselines ($P=0.375$), and no difference across breeds in any period (Mann-Whitney test, $P>0.87$). To our knowledge, this is the first work documenting performance of intersucking in growing heifers that did not suckle conspecifics in early life. We found that intersucking is widespread in this age class, and that performance of this behavior is exacerbated by solid feed restriction, compared to ad libitum feeding.

Assessing captive African elephant welfare using self-directed behaviours and tail-hair cortisol

Jodie Brogan[1], Primrose Manning[2], Denise Hough[1], Maud Bonato[2, 3*]

[1] College of Medical, Veterinary and Life Sciences, University of Glasgow, Glasgow, United Kingdom
[2] African Elephant Research Unit, Knysna Elephant Park, Plettenberg Bay, South Africa
[3] Department of Animal Sciences, University of Stellenbosch, Matieland, South Africa
[*] Presenting author: research@knysnaelephantpark.co.za

Captive African elephants face numerous welfare issues through their use in the tourism industry. As these issues are often stress-related and linked to the number of tourists present around them, it is crucial to find reliable and practical ways to accurately measure the animal's behavioural and physiological responses to any potential stressors. We thus explored several trunk and tail related self-directed behaviours (SDBs), a subset of displacement activities validated as anxiety indicators, in a semi-captive population of 9 elephants maintained at the Knysna Elephant Park, South Africa. Additionally, we attempted to link this behaviour set with hair cortisol (hC) concentration, a novel and non-invasive measure of chronic stress in elephants. Each individual (7 females, 2 males; 13-31 years) was followed as focal animals for a period of 30 mins, twice daily from February 2020 to March 2021. SDBs were recorded as they occurred, together with the numbers of tourists present in the field. Tail-hair samples consisting of 5 strands of hair collected from each individual in March 2021 and frozen until processing. They were then sectioned, powdered, and incubated overnight to extract cortisol. A commercially available cortisol ELISA kit was used to interpolate cortisol concentrations for each elephant. The general linear mixed model procedure of R version 4.0.5 was used to determine the effect of hC on the expression of SDBs. The number of tourists present during the observation period was also included in the model to investigate whether this factor influenced the rate of SDBs observed. The average number of SDBs displayed per month by an individual was 59.69 ± 5.54, while the average hC concentration was 8.16pg/mg (± 1.48 pg/mg). hC had a significant inverse relationship with the expression of SDBs ($F_{1,7}$ = 7.29, P = 0.03), with lowest concentrations of cortisol occurring with highest frequencies of SDBs. Interestingly, whilst the number of tourists did not affect the expression of SDBs (P>0.05), higher hC concentrations were found with higher numbers of tourists (t = -2.75, df= 1, P = 0.04). These findings suggest that the expression of SDBs may act as an adaptive coping mechanism for individuals under anxiety. Further studies should investigate whether SDBs and hC levels differ between different management systems of African elephants (i.e. free-roaming vs. captive) to establish these measures as effective and non-invasive methods to assess elephants' welfare.

Exploring diurnal feeding patterns of individual growing-finishing pigs under healthy and undisturbed conditions

Jacinta D. Bus[1*], Iris J.M.M. Boumans[1], Jasper Engel[2], Ron Wehrens[2], Laura E. Webb[1], Eddie A.M. Bokkers[1]

[1] *Animal Production Systems group, Wageningen University & Research, the Netherlands*
[2] *Biometris, Wageningen University & Research, the Netherlands*
[*] *Presenting author: jacinta.bus@wur.nl*

In growing-finishing pigs, diurnal feed intake follows an alternans pattern, with an intake peak in the morning and a larger peak in the afternoon. Although this alternans pattern is reported at group level, for aggregated days, little is known about the diurnal feed intake of individual pigs from day to day. Therefore, we aimed to gain insight into the diurnal intake patterns of healthy individual pigs, exploring 1) which types of patterns exist and 2) whether individuals are consistent in their diurnal activity across days. Data was collected on 110 growing-finishing pigs (11 pigs/pen) using IVOG® electronic feeding stations (Hokofarm group), from arrival at the farm (average±stdev: 27.5±2.9kg) until slaughter (83d, 8d after 107±8.7kg). Sensor data was cleaned, aggregated at the hourly level and scaled at pig level by dividing hourly by daily intake. To study basal feeding patterns, putative deviating days (days surrounding health issues (1592d), after arrival (≈99*3d) and with farm visits (≈99*24d)) were removed from the dataset, leaving 4626 pig days (n=99 pigs) for analysis. Self- organising maps (dissimilarity based on weighted cross-correlation) combined with hierarchical clustering were used to visualise diurnal feeding patterns and their development in time. In addition, the weighted cross-correlation was used to quantify the consistency of individual pigs across days, creating graphs similar to autocorrelograms. Preliminary results identified a range of diurnal patterns, which could be summarised in 8 clusters. The clusters differed in the number, height, width and timing of intake peaks, and the most frequently occupied cluster reflected the alternans pattern (1113 days, 23.7%). Visualisations per month suggest younger pigs mainly feed throughout the day and night, while older pigs eat less frequently, in larger meals, during the day. Correlation coefficients at lag=1d were moderate to high for individual pigs (median: 0.61, range: 0.40-0.80), suggesting that pigs show similar diurnal patterns in adjacent days but some clearer than others. As the lag increased, autocorrelation coefficients slowly decreased (e.g. lag=28d, median: 0.58, range: 0.28-0.75), reflecting a slow change in diurnal patterns over time. To conclude, preliminary results suggest that although pigs show an alternans pattern on many days, a range of other diurnal intake patterns can occur. Individuals show similarity in diurnal patterns from day to day, some pigs stronger than others, and shift their patterns slowly with age. As pigs deviate their feeding behaviour in response to welfare challenges, improved understanding of individual basal patterns can aid in isolating welfare-indicative variation.

Daily activity of dairy goats in extensive husbandry systems

Monica Battini[1*], Manuela Renna[2], Luca Battaglini[3], Silvana Mattiello[1]

[1] Department of Agricultural and Environmental Sciences—Production, Landscape, Agroenergy, University of Milan (Italy)
[2] Department of Veterinary Sciences, University of Turin (Italy)
[3] Department of Agricultural, Forest and Food Sciences, University of Turin (Italy)
[*] Presenting author: monica.battini@unimi.it

Gathering information on animal activity rhythms is important for setting up effective data collection schemes for welfare assessment. However, information on daily biorhythms of farmed goats is scarce. Few studies have been conducted on feral goats, but it is known that farm routines can influence rhythms and duration of different activities, both in indoor and outdoor farming systems. This study aimed to identify daily activity rhythms of dairy goats in extensive farming conditions (i.e., alpine summer grazing) to suggest reliable data collection flows for welfare assessment protocols. Resting, grazing, moving, and standing behaviour of goats from fiveflocks (mean flock size: 109.4±75.0; min- max: 40-220 goats) were recorded by direct observations using a scan and instantaneous sampling method (30 min/scan). Goats were observed approximately for 8 hours/day from their release outdoors (between 8.15 and 11.00, depending on farm) after the morning milking to the gathering (between 17.00 and 19.00, depending on farm) before the evening milking. A one-way ANOVA was performed to compare the percentage of time allocated by the animals to the different activities among the flocks. A GLM was performed to identify differences depending on time of the day and flock. On average, goats spent 11.8±24.5% of time resting, 35.5±26.2% grazing, 31.5±27.2% moving and 14.5±15.5% standing, but only resting was significantly different among flocks ($p=0.001$). A significant effect of the interaction flock*time of the day was observed for grazing ($P=0.018$) and moving ($p=0.027$). However, this effect could be due to the different time of release outdoor of the goats, which depended on the farm routine. When a new GLM was applied considering the effect of the interaction between the flock and time elapsed from the release outdoor (T0 min), no statistical differences were found, and all flocks showed similar behavioural rhythms, with two peaks of resting behaviour (at T240 min and T390-420 min), and one peak of grazing behaviour (at T180-210 min), suggesting that daily activities of dairy goats are strongly dependent on farm routine. This suggests that, when planning the best time for behavioural observations, the time from routine operations, rather than the time of the day, should be considered. However, further research is needed to confirm these trends in different environmental and climatic conditions.

How do horses express their stress: the effect of coping styles on subtle behavioural indicators?

Anne-Laure Maigrot[1*], Marie Roig-Pons[1,2], Iris Bachmann[1], Sabrina Briefer Freymond[1]

[1] Agroscope - Swiss national stud farm (SNSF), Les longs Prés, 1580 Avenches, Switzerland;
[2] University of Bern, Vetsuisse faculty, VPHI – Animal Welfare Division, Langgastrasse 120, 3012 Bern, Switzerland
[*] Presenting author: anne-laure.maigrot@agroscope.admin.ch

Personality and its various sub-traits is the tendency to express similar behaviours across situations and time. It could be subdivided in many dimensions. One of which, called coping style, has an impact on the way the animal reacts to a stressful event. Indeed, across different species, two main behavioural tendencies have been highlighted: the most "proactive" individuals actively try to avoid the stressor and to fly away; the most "reactive" individuals do not show any clear behavioural response. We thus aim at highlighting accurate stress indicators to assess individual's location on the continuum between "proactive" and "reactive" coping. We placed 50 private horses in a secured arena and tested them with four personality tests validated for horses (stationary unknown human, unknown object, unknown surface crossing and sudden umbrella opening tests) and with three new tests (horses were successively confronted to a noisy approaching human, a ventilator making textile strips fly at different speed and an object moving around the arena). We recorded behavioural (head position, ears position, locomotion, postures and mimics) and physiological (heart rate variability; HRV) parameters. After selecting the behaviours performed by at least 50% of the horses, we performed a principal component analysis (PCA) to extract factors in which behaviours were highly correlated to each other. The first factor extracted from the PCA (explaining 30% of the variance) could be interpreted as the level of proactivity (a high score corresponds to more high speed gaits and less time immobile, head high and ears moving) and the second one (explaining 18% of the variance) as the level of arousal (a high score corresponds to a lower HRV, ears forwards, more attempts to avoid the objects and less attempts to touch it). The head position, the locomotor activity, the ears position and the HRV thus seem to be the most important indicators of stress for the most "reactive" individuals. In addition, we performed an ascending hierarchical classification to group our individuals. Three main groups were highlighted (i.e. "more reactive coping", "more proactive coping" and "extreme proactive coping"); 73% of the horses were classified similarly by the experimenter (subjective classification based on behavioural observations) analysing the behaviours (continuous sampling with The Observer XT; intra observer agreement ranged between 92% and 98%) from the videos. It thus seem that from our test we successfully could assess the individual's location on the continuum between "proactive" and "reactive" coping.

The Effects of Competition at the Feeder on Dominance in Dairy Cows

K. Sheng*, B. Foris, J. Krahn, D.M. Weary, M.A.G. Von Keyserlingk

University of British Columbia, Animal Welfare Program, 2357 Main Mall, Vancouver, BC, V6T 1Z4, Canada
** Presenting author: skysheng@mail.ubc.ca*

In dairy cattle groups, access to resources can be affected by dominance relationships. In loose housing systems, cows compete to access resources such as feed, and dominance relationships may be upset by frequent regroupings. Dominance relationships in dairy cattle are typically assessed using video focusing on, for example, agonistic interactions at the feed bunk during times of high competition (e.g., after fresh feed delivery). Little is known about how the level of competition in the groups affects dominance. We hypothesised that under conditions of high competition (here operationalized as the percentage of filled feed bins occupied at the same time by cows in the group; CD), competitive replacements at the feeder are more reflective of animals' motivation to access fresh feed rather than their position in the social hierarchy. We investigated how the dominance changes in relation to different levels of CD. We monitored cows kept in a dynamic group of 48 with access to 48 lying stalls, 30 electronic feed bins and 5 water bins. Regrouping events took place every 16 days on average, such that we followed 159 lactating Holstein dairy cows over the 10-month study period. We used a validated algorithm to detect competitive replacements at the feed bins, and used these to calculate an Elo rating for each cow (as a measure of social dominance). We also recorded the corresponding CD at the feed bins which varied from 3% to 100%. A linear model revealed that as CD increased by 1% (reflective of a more competitive feeding environment), the variation among cows in Elo rating decreased by 0.52 ($R^2 = 0.93$). We observed little difference between the dominance score of individual cows when CD was high, suggesting that the natural hierarchy of the group might not be the primary regulator of resource access during these times. A breakdown in dominance hierarchy (indicated by the compressed Elo ratings) may reflect elevated social stress as cow compete for access to feed.

Detecting Animal Contacts - A Deep Learning-Based Pig Detection and Tracking Approach

M. Wutke[1*], M. Gültas[2], A.O. Schmitt[1], I. Traulsen[3]

[1] Georg-August University Göttingen, Breeding Informatics - Department of Animal Sciences, Margarethe von Wrangell-Weg 7, 37075, Germany
[2] South Westphalia University of Applied Sciences, Statistics and Data Science, Faculty of Agriculture, Lübecker Ring 2, 59494 , Germany
[3] Georg-August University Göttingen, Livestock Systems, Department of Animal Sciences , Albrecht-Thaer-Weg 3, Albrecht-Thaer-Weg 3, Germany
[*] Presenting author: martin.wutke@uni-goettingen.de

The identification of social interactions is of fundamental importance for animal behavioral studies, addressing numerous problems like investigating the influence of social hierarchical structures or the drivers of agonistic behavioral disorders. In this work, we present a novel framework for the automated identification of social contacts in pigs. By applying a convolutional neural network (CNN) for the detection and localization of individual body parts, we are able to track the animals' movement trajectories over a period of time within a video. Based on the tracking and body part information, we identify social contacts in the form of head-head and head- tail contacts. Moreover, to enhance the applicability of our framework, we also used the individual animal IDs as well as the body part information to construct a network of social contacts as the final output, in which the intensity of the individual animal contacts is quantified and visualized. To evaluate our framework, we created two different test data sets to quantify the performance of our body part detection and tracking model. Consequently, by comparing the manually annotated body parts with the detected body parts from the CNN we achieved a Sensitivity, Precision, and F1-score of 94.2%, 95.4%, and 95.1% for the detection model. For the tracking model, we calculated the Multiple Object Tracking Accuracy (MOTA) and achieved a MOTA score of 94.4%. The findings of this study demonstrate the effectiveness of our keypoint-based tracking-by-detection strategy, which can be incorporate to address various problems like analysis of functional areas as part of an early warnings systems for the detection of agonistic behavior. Moreover, our approach is not limited to pig detection and tracking, but can be applied to various animals to improve animal monitoring systems.

Pain expression as an indicator of orthopedic disease in dairy cattle

M. Söderlind*, K. Ask, A. Granlund, A. Leclercq, E. Hernlund, P. Haubro Andersen, M. Rhodin

Swedish University of Agricultural Sciences, Department of Anatomy, physiology and biochemistry, Box 7011, 750 07 Uppsala, Sweden;
** Presenting author: maja.soderlind@slu.se*

Orthopedic disease causing pain and lameness is common in dairy cows and negatively affect animal welfare and economy. In other species, certain facial expressions associated with pain, "pain face" (PF) is well recognized. Although less studied, a cow pain face has been suggested. This study aimed to explore if a multimodal pain scale, which assessed position of ears, head and back, response to approach, PF and attention to surroundings (total score 0-10), could be used as an indicator of orthopedic disease and if knowledge of the lameness status biased the observer. PF was scored if an angular eye contour and/or increased facial muscle tension appeared during the observation period. An initial assessment (IA) of 28 lame loose-housed dairy cows was done, including video recording of the cows' body and face for pain evaluation by blinded observation (BO), pain evaluation by direct assessment (DA), lameness evaluation by objective (inertial sensors) and subjective methods, and determination of primary lesion by claw examination. When lameness was improved 1-5 months later, a follow up assessment (FA) was done similarly to the IA. Cows were included in further analysis (n=23) if they showed reduced asymmetry and a visually regressed primary lesion at FA. The data was tested for normal distribution (Shapiro Wilks test $p<0.05$) and nonparametric, descriptive and agreement statistics were applied. Pain scores from BO and DA were decreased at FA (median improvement BO: 3; DA: 2, $p<0.001$, Wilcoxon signed rank test), with an agreement of 0.604 at IA and 0.964 at FA (weighted kappa). A PF was present in a higher number of cows at IA compared to FA for both BO and DA ($p<0.05$, Wilcoxon signed rank test), with an agreement of 0.481 at IA and 1 at FA (weighted kappa). The results indicate that a multimodal pain scale, which include presence or not of PF, can be used to assess healing of orthopedic disease. The BO and DA showed moderate agreement at IA, and almost perfect agreement at FA, suggesting that observers' awareness of lameness status only influence the pain evaluation to a minor degree. Yet, more studies on pain expression in cattle are needed.

Poster N° 1

The effect on dogs of short-term exposure to unfamiliar visual, auditory, and olfactory stimuli (A pilot study)

Megumi Fukuzawa*, Sui Toyoizumi, Mizuki Ito, Osamu Kai

Department of Animal Science and Resources, Nihon University, College of Bioresource Sciences, Japan
**Presenting author: fukuzawa.megumi@nihon-u.ac.jp*

It has been reported that auditory, olfactory, and visual sensory stimuli are useful as enrichment tools for stress reduction in dogs in shelters. It is presumed that pet dogs are more likely to be exposed to these stimuli during their daily life, so the effect on them also needs to be considered. We observed the behaviour and changes in salivary cortisol concentration in dogs during short-term intensive exposure. Eight healthy dogs (8 - 86 months old, six females and two males) that did not show excessive response to unfamiliar stimuli were exposed to images of swaying trees, classical music, and aromatic essential oils. As the control, the dogs were shown the non-operating stimulus-providing equipment. Each stimulus was provided for four consecutive days, with a six-day interval between exposure to different stimuli. The experimental conditions consisted of 20-minute periods before, during, and after exposure, giving a total of 60 minutes of observation time. The postures and behaviours of the dogs were continuously video recorded. Saliva was collected three times: before the stimulus was provided, after the stimulus had been provided, and 20 minutes after the stimulus had been stopped. No consistent effects were observed on either saliva cortisol or posture, but some effects were observed for aromatic oils (self-grooming) and classical music (sighs) (Steel-Dwass, $p < 0.05$). The effect of saliva collection timing on cortisol concentration was observed for aromatic oils. The concentration 20 minutes after exposure to aromatic oils was ended (0.210 ± 0.043 μg/ dL) was significantly higher than that before exposure (0.163 ± 0.042 μg/ dL) (Steel-Dwass, $p < 0.05$). The time spent in the sternal posture was long under all conditions and observation periods, but an increase in sitting posture was observed with aromatic oils. It was speculated that the response to each stimulus was strongly influenced by the sensitivity of the individual, but that stress due to repeated short-term exposure was low.

Poster N° 2

What's the problem? Owner perceptions of problem behaviours in dogs aged 6, 12, and 18 months

Rachel Kinsman[1*], Rachel Casey[1], Ben Cooper[1], Kassandra Giragosian[1], Naomi Harvey[1], Sara Owczarczak-Garstecka[1], Lauren Samet[1], Séverine Tasker[2,3], Jane Murray[1]

[1] *Dogs Trust, London, United Kingdom.*
[2] *Bristol Veterinary School, Bristol, United Kingdom.*
[3] *Linnaeus Veterinary Limited, Shirley, United Kingdom.*
[*] *Presenting author: rachel.kinsman@dogstrust.org.uk*

The proportion and type of owner-perceived problem behaviours reported by dog owners participating in an ongoing longitudinal study of canine health and behaviour were explored. Prospective data were collected from self-administered surveys issued to each participant when their dog was aged 6, 12, and 18 months. A free-text box enabled owners to report any dog behaviours that they found to be a problem. At each timepoint, the four most common problem behaviours were categorised and summarised. For a subpopulation of dogs (for which data were available at all three timepoints), differences in the occurrence of these behaviours across the timepoints were assessed using binomial mixed-effects models, with individual identity as a random intercept. Post-hoc analysis used Tukey›s Honestly Significant Difference test for multiple comparisons. In the 6-, 12- and 18-month surveys respectively, 30.3% (659/2177), 41.0% (711/1735), and 32.7% (404/1237) of owners stated that their dog exhibited problematic behaviour(s). Barking, the most common behaviour across all three timepoints, was reported by 7.7% (168/2177), 13.1% (227/1735), 10.9% (135/1237) of owners in the 6-, 12- and 18-month surveys, respectively. Pulling on the lead was reported by 3.8% (83/2177), 6.2% (107/1735) and 3.9% (48/1237) of owners, jumping up at people by 3.7% (81/2177), 4.8% (83/1735), 4.2% (52/1237) of owners, and recall issues by 3.4% (73/2177), 5.7% (99/1735), and 4.4% (54/1237) of owners in the 6-, 12- and 18-month surveys, respectively. The post-hoc analysis on a subpopulation of 895 dogs showed a significant difference in the proportion of dogs displaying barking and pulling on the lead behaviour between 6 and 12 months ($p=0.001$ and $p=0.001$) and between 12 and 18 months ($p=0.002$ and $p=0.007$) but not between 6 and 18 months ($p=0.072$ and $p=0.257$). The prevalence of both these behaviours being highest at age 12 months. There was a significant difference in the proportion of dogs with recall issues aged between 6 and 12 months ($p=0.001$) and between 6 and 18 months ($p=0.002$), but not between 12 and 18 months ($p=0.217$). There were no statistically significant differences in the proportion of dogs that jumped up at people between the timepoints. Identifying the four most reported owner-perceived problem behaviours in dogs aged 6, 12 and 18 months can help inform recommendations for specific training strategies to target these problems. Future work will explore risk factors for owner-perceived problem behaviours, assess the efficacy of where owners sought help for these behaviours, and compare owner-perceived problem behaviours.

Poster N° 3

Is UK puppy-buying culture also suffering a long-COVID effect? Quantifying the COVID-19 Pandemic legacy upon UK puppy buying behaviours

Rowena MA Packer[1*], Claire L Brand[1], Zoe Belshaw[2], Fiona Dale[1,3], Camilla L Pegram[3], Kim B Stevens[3], Dan G O'Neill[3]

[1] Department of Clinical Science and Services, The Royal Veterinary College, Hawkshead Lane, North Mymms, Hatfield, Herts AL9 7TA, UK
[2] EviVet Evidence-Based Veterinary Consultancy, Nottingham NG2 5HU, UK
[3] Department of Pathobiology and Population Sciences, The Royal Veterinary College, Hawkshead Lane, North Mymms, Hatfield, Herts AL9 7TA, UK
[*] Presenting author: rpacker@rvc.ac.uk

The COVID-19 Pandemic precipitated dramatically increased interest in, and purchases of, puppies globally. Often fuelled by owners' desires to improve their mental health during this challenging period and facilitated by this rare opportunity to dedicate substantial time to their new dog during lockdowns, the 'Pandemic Puppy' phenomenon was characterised not only by increased puppy-purchasing, but also changes to prospective owners' pre-purchase and purchase behaviours. These changes likely reflected consequences of social distancing restrictions (e.g. fewer puppies being visited in-person prior to purchase, or collected from inside their breeders' home), increased competition for puppies (e.g. increased requirement for pre-purchase deposits and inflated purchase prices), and unscrupulous puppy breeders/importers supplying the market to meet demand (e.g. fewer puppies being sold with their mother present, but more sold with a Pets Passport). Whether these changes have returned to their pre-Pandemic 'baseline' is not yet known. Consequently, this study aimed to characterise UK puppy-buying behaviours in 2021 and compare them to early-Pandemic (2020) and pre-Pandemic (2019) puppy-buying behaviours. Owners of UK puppies bought aged <16 weeks between 23rd March 2021 (corresponding with the onset of the 1st UK COVID- lockdown in 2020) to 31st December 2021 (n=2084) were recruited into an online survey using snowball sampling via social media and veterinary, canine registration and animal welfare organisations. All owners consented to take part, and the project received ethical approval (RVC SSRERB: SR2020-0259). Statistical analyses compared 2021 pre-purchase and purchasing data with published data from the same calendar-period in 2019 (n=1150) and 2020 (n=4297). In 2021, the proportion of puppies sold with passports had significantly increased from 2020 (2019: 4.1%, 2020: 7.2%, 2021: 10.5%; $p<0.001$). Several key purchase behaviours had significantly improved between 2020 and 2021, but had not recovered to pre-pandemic levels; notably, collecting puppies from inside their breeders' property (2019: 84.8%, 2020: 51.0%, 2021: 66.9%, $p<0.001$), and puppies being seen with their littermates (2019: 84.9%, 2020: 72.1%, 2021: 81.5%; $p<0.001$). Pre-purchase deposits placed before viewing puppies had significantly reduced from 2020 levels and did not significantly differ from 2019 (2019: 8.9%, 2020: 17.3%, 2021: 10.7%; $p=0.14$); however, pre-purchase visits in-person had not yet recovered to 2019 levels (2019: 80.6%, 2020: 59.6%, 2021: 70.5%; $p<0.001$). Changes to many aspects of puppy-buying in the early phase of the COVID-19 Pandemic persisted into 2021 and likely necessitate greater public education initiatives to avoid becoming embedded into UK puppy-buying culture and threatening future canine behaviour and welfare.

Poster N° 4

Information quality and attitudes of cat owners in Croatia about cat keeping and health: preliminary results

Leon Pečarić[1], Mario Ostović[2*], Sven Menčik[3], Ivana Sabolek[2], Željko Pavičić[2], Kristina Matković[2], Željka Mesić[4]

[1] Tierarztpraxis Anger OG, Anger, Austria
[2] Department of Animal Hygiene, Behaviour and Welfare, Faculty of Veterinary Medicine, University of Zagreb, Zagreb, Croatia
[3] Department of Animal Breeding and Livestock Production, Faculty of Veterinary Medicine, University of Zagreb, Zagreb, Croatia
[4] Department of Marketing in Agriculture, Faculty of Agriculture, University of Zagreb, Zagreb, Croatia
[*] Presenting author: mostovic@vef.unizg.hr

Studies on pet-keeping arouse ever more interest considering the owner's quality of information and perception of the pet and pet ownership. The aim of this study was to assess the level of information and attitudes of cat owners in Croatia about keeping pet cats and their health. The study included a preliminary sample of first 300 cat owners that answered the questionnaire in 2021. The questionnaire was shared on Facebook groups for pet animals. The frequency of answers was determined by univariate analysis, while the relationship between respondent socio-demographic data and answers to the questions on cats and cat ownership was determined by the χ^2-test, with the significance level of $P<0.05$. Study results revealed that the questionnaire was predominantly answered by female, generally young individuals, students or employed, with university degree, living in urban setting, in a house in Zagreb and central Croatia, single living in households with up to five family members without children younger than 18 years. The respondents generally reported having one cat as its first owner. The cats were mostly female, domestic, adopted or found, older than 2 years. Most of the cats were kept indoors with outdoor access, were neutered, clean of parasites and vaccinated, but without a microchip. Most of the cats did not have a litter. Half of the respondents spent 25-50€ per month for their cat and almost the same proportion fed their cats exclusively with commercial feed. The majority of respondents received information on cat feeding, housing and hygiene from various sources, and information on cat health from veterinarians. Around 90% of the respondents were taking their cats to veterinarians and trusted them. Most of the respondents were informed about zoonoses but in a lower proportion than they were aware of the fact that cats could transmit diseases to other animals. The majority of respondents reported having no plants at home that could be harmful to cats. More than 80% of the respondents considered that welfare of pet cats should be better protected. Considering the socio- demographic parameters investigated, the place of living (urban/rural) most frequently showed significant relationship with the respondent level of information and attitudes about cat keeping and health. The results of this preliminary study suggest that cat owners in Croatia are well informed about cat keeping and health having rational attitudes about cat ownership.

Poster N° 5

Attitude towards animals by pet and non-pet owners in some selected veterinary clinics/hospitals of northern Nigeria

Mohammad Bashir Aliyu[1*], Sadiq Adamu Hassan[2], Fatima Lawal Yusuf[1], Mohammed Sanusi Yusuf[1], Daniel Obinna Esonu[1], Abubakar Sadiq Usman[1]

[1] Department of Veterinary Public Health and Preventive Medicine, Faculty of Veterinary Medicine, Ahmadu Bello University, Zaria, Nigeria
[2] Kundila Veterinary Hospital, Ministry of Agriculture and Natural Resources, Kano, Nigeria
[*] Presenting author: mailaliyu@gmail.com

Differing attitudes and beliefs regarding human-animal interaction have been a topic of interest. The value of human attachment to animals in terms of research, companionship, and conservation varies. This study aims to determine attitudes toward animals by pet and non-pet owners in selected states of Northern Nigeria. A total of 300 clients over 18years old were recruited randomly from six veterinary hospitals and clinics. A standard Attitudes Toward Animals (ATA) questionnaire by Turner, D.C. (I.E.A.P./I.E.T., CH-8810 Horgen, Switzerland) with 29 control statements was used to obtain information on various control fields related to animal cognition and feelings (5 items), nature conservation(4items), animal welfare(7items), and pet care (8 items). The last item was on time needed to care for pets. Using Spearman rank correlation, demographic factors were compared with the average mean of control fields responses, while mean care time for pets was compared using the Wilcoxon test. Virtually all the pet owners 145 (98%) had a pet as a child, while 98 (64.5%) of non-pet owners, never had a pet as a child. Out of the 88 respondents that disagreed and strongly disagreed with the statement (if an animal is suffering and cannot be cured, it should be killed painlessly), 72 (82%) had a college/university level of education. Respondents from both religions in the present study disagreed 34 (11.3%) and strongly disagreed 23 (7.7%) with the statement "eating dogs or cats is unacceptable" while 41 (13.7%) neither agreed nor disagreed with the statement. There was a significant (p=0.023) positive correlation (r=0.132) between age and animal welfare but had a weak negative correlation with animal cognition (r=-0.124) which was statistically significant (p=0.032). The religion of Christianity and Islam indicated a significant (p=0.025) positive correlation to pet care (r=0.129). Pet owners registered a mean time of 73.95mins (SD 53.316) and 77.47mins (SD 59.001) as the time needed to take care of a cat pet and dog respectively, while non-pet owners needed a mean time of 62.28mins (SD 51.820) to care for cat and 55.44mins (48.344) to care for a dog. Religion and age influence attitudes towards animals but plays a significant role in pet ownership. The findings indicate a need for the improvement of awareness among adults on attitudes towards animals. Veterinarians should enlighten clients on animal welfare. Thus, animal welfare should be a core part of the veterinary training curriculum in Nigeria.

Poster N° 6

Factors associated with children´s attitudes towards the humane treatment of animals

Javiera Calderón-Amor[1*], Camila Palma[2], Carmen Gallo[3]

[1] Universidad Austral de Chile, Doctorado en Ciencias Veterinarias, Valdivia 50900000, Chile.
[2] Vinculación con el Medio, Universidad Austral de Chile, Valdivia, Chile.
[3] Instituto de Ciencia Animal, Facultad de Ciencias Veterinarias, OIE Collaborating Centre for Animal Welfare and Livestock Production Systems—Chile, Universidad Austral de Chile, Valdivia, Chile
[*] Presenting autor: j.calderon.amor@gmail.com

The development of attitudes begins at an early age and has repercussions throughout life. For instance, cruelty to animals during childhood is a predictor of violence towards other people during adulthood. This study aimed to describe factors associated with children's attitudes towards the humane treatment of animals. We administered 4 questionnaires to 286 children in 3rd and 4th grade (8-9 years old) from 4 schools. **1)Intermediate Attitude Scale (IAS**): measures attitudes toward the humane treatment of animals and contains 23 items related to the care and treatment of pets, farm, and wild animals. Children can strongly agree, agree, disagree, or strongly disagree on a Likert-type scale. **2)Bryant Index of Empathy for Children and Adolescents (BIE)**: measures empathic tendencies. **3)Dog facial recognition**: measures the ability to recognize dog facial expressions. Using photographs of a dog showing signs of either fear, anger, happiness, or surprise, the children had to identify what the dog was feeling. **4) Demographics:** gender, pet ownership. The BIE statements were reduced into three factors using principal component analysis. The first factor "Understanding feelings" (e.g., Kids who have no friends probably don't want any), the second factor "Feelings of sadness" (e.g., I get upset when I see a kid being hurt), and the third factor "Tearful reactions" (e.g., Sometimes I cry when I watch TV) were used as explanatory variables. A linear mixed regression model was built to find associations between the total IAS score and the explanatory variables: school (private/public), grade (3^{rd}/4^{th}), gender (girl/boy), pet ownership (yes/no), accuracy of dog´s facial recognition (accurate/inaccurate), and the three factors of BIE (continuous). According to the responses, 55.6% attended private schools, 54.3% were boys, and 87.2% kept a pet. The final multivariable regression model showed that children from 4^{th} grade were associated with higher IAS scores compared to 3^{rd}-grade children (P=0.007), children who were accurate in recognizing the dog›s happy facial expression were associated with higher IAS scores compared to children who failed to recognize the expression (p=0.002), children with higher empathy scores in the "Understanding feelings" (p=0.02) and "Feelings of sadness" (p<.0001) factors were associated with higher IAS scores. Gender, school, and pet ownership had no association with IAS. Our results support the idea that attitudes towards the humane treatment of animals are related to empathy. These findings highlight the importance of designing school programs that develop empathy and positive attitudes to increase children›s sensitivity towards people and other living beings.

Poster N° 7

Psychopathy, Infant Features and Pet Attachment

Sam Jack[1*] , Carroll Grace[2]

[1] *Animal Behaviour Centre, School of Psychology, Queen's University Belfast,*
[2] *Animal Behaviour Centre, School of Psychology, Queen's University Belfast,*
[*] *Presenting author: sjack01@qub.co.uk*

Psychopathy is regarded as a collection of personality traits, which may include manipulative behaviour, callousness, and a lack of empathy. Psychopaths may struggle to form close emotional bonds, which could result in being unable to develop strong attachments to pets. Without secure emotional ties, individuals may view animals within the home as possessions and develop negative attitudes towards them. This could eventually lead to abandonment or animal abuse, especially as individuals who possess psychopathic traits have been found to abuse animals at a higher rate than those without. In contrast, possession of infant features in the animal may strengthen the human-animal bond. Infant features or baby schema are specific facial elements that are synonymous with infancy, which play a role in the development of attachment bonds between infants and caregivers. Furthermore, there is a link between strength of pet attachment and preference for infant features. The aim of this study was to determine if infant features in animals affects the strength of attachment, and to establish if this is mediated by sub-clinical psychopathy. Male participants were selected from a pre-existing dataset (N=1000), a subset of those in the upper (n=250, 'high psychopathy' (HP)) and lower (n=250, 'low psychopathy' (LP)) quartiles of the Levenson Self-Report Psychopathy Scale were invited to participate in this study. A total of 88 participants (HP; n=41, LP=45) completed an online pet attachment survey (Lexington Attachment to Pets Scale) and uploaded images of their pets. The faces of each pet were measured for baby schema using a previously identified method in cats. These images were rated using a Likert scale (from 1-not cute at all to 5-extremely cute) by a panel of animal welfare experts (n=20) to create subjective cuteness scores. An independent-samples t-test found there was no difference in attachment scores between individuals who possessed high and low psychopathic traits (p=.344). Spearman's rho Correlation found there was no association between attachment scores and cuteness scores, rs =-.019, p=.909. In conclusion, possession of psychopathic traits appears to have no influence on pet attachment, irrespective of baby schema. Ethical approval was obtained from the Queens University Belfast and all participants gave informed consent.

Poster N° 8

The impact of the Covid-19 pandemic on animal adoptions and relinquishment: the perspective of shelter staff

Grace A. Carroll[1*], Alice Torjussen[2], Catherine Reeve[1]

[1] School of Psychology, Animal Behaviour Centre, Queens University Belfast, Belfast, BT9 5BN, UK
[2] Department of Engineering and Design, Animal-Computer Interaction Lab, University of Sussex, Falmer, BN2 9RH, UK
[*] Presenting author: g.carroll@qub.ac.uk

The Covid-19 pandemic brought with it loss of household incomes, restricted veterinary services and an inability of animal shelters and rescues to operate as normal. Staff from 30 shelter and animal rescue organisations from the UK, Ireland, Germany, Portugal and Australia completed a questionnaire on the impact of the pandemic on the organisation, staff and animal adoptions and relinquishment. This research utilised a OneWelfare approach by considering the welfare of animals, staff and their working environment. Descriptive thematic analysis was used to identify recurrent themes within the data. We used a deductive approach where codes and themes were developed from the data content. As the study is qualitative in nature, no statistical analyses were completed. Analysis was done across questions, rather than for each question individually, to identify patterns running throughout the dataset. Three overarching themes were evident across all shelters: (i) impact on animals, (ii) impact on staff identity, and (iii) impact on organisational processes. There were a number of subthemes identified. For example, animals were affected both positively (e.g. less stress from fewer visitors) and negatively (e.g. relinquishment due to fears of animals carrying Covid-19) by the pandemic. Shelters and workers feel underappreciated by the government and the public. There is a perception that shelters, and their staff, were not treated the same as other charities or animal centres during the pandemic. Covid-19 lockdowns gave shelter staff an opportunity to allow procedural changes to be made and staff had more time to pick the most suitable owner for their animals. However, there was a decrease in staff mental health and fewer volunteers were available. In the future, collaboration across the sector will ease the strain put upon shelters and their staff during a crisis. For example, volunteers and resources should be shared across organisations, and the implementation of rule changes should be permitted, such as allowing a larger amount of people to foster animals short-term. In addition, further support will need to be in the form of government aid and financial support, and the cooperation of other services such as veterinary clinics. It should be noted that responses were obtained from a relatively small sample of shelters, with the majority of responses coming from the UK, which may limit the generalizability of the findings. However, the persistence of the three overarching themes across the dataset suggests that common issues were experienced across the sample of shelters.

Poster N° 9

Belief in "Animal Mind": a survey of Italian ornamental bird owners and breeders

Elizabeth Ann Walsh[1*], Filippo Morrone[2], Dinato Beatrice[3], Lieve Lucia Meers[4], Donatella Gelli[5], Simona Rosaria Normando[3],

[1] Cork Pet Behaviour Centre, Cork, Ireland,
[2] Associazione Pescarese Ornicoltori, Pescara, Italy
[3] Department of Comparative Biomedicine and Food Science, University of Padua, Legnaro (PD), Italy.
[4] BIAAT Foundation, Genk, Belgium
[5] University of Padua, Department of Animal Medicine, Production and Health, Italy
[*] Presenting author: walshelizabeth05@gmail.com

Varying views regarding belief in animal mind (BAM) can be controversial. People's beliefs may be influenced by their experience of animals. This study investigated perception of BAM in 3 categories of person in respect to owning/breeding ornamental birds. An online survey, part of a larger survey investigating behaviour in captive birds, was conducted, targeting ornamental bird owners/breeders, through breed clubs, societies, social media, and word of mouth. Questions investigated demographic information and BAM (validated standard tool), using a 1-7 point, likert scale, regarding 4 taxa, mammals (MA), birds (BI), Reptiles (RE) and insects (IN). The BAM sum was created, by coding the third question within the same taxa, directly; remaining questions were reverse coded (i.e., 8-score); the resulting four numbers were added together. A Generalized Linear Mixed model was used (with a normal distribution) (Generalized Estimation Equations), with the following subject effects in the Model: respondent type, gender, age, geographic location of respondent, geographic location of respondent aged 8-15 years, if respondent was a hunter, respondent education. Taxa was a Within-Subject Effect, and respondent was used as subject. Twenty-three variables are included in this abstract. N=269 (92/breeders, 72/non-owners, 105/owners), aged 18-84/years, 110/F, 159/M. Alpha was set at 0.01. There were significant differences between respondent categories ($P<0.001$), gender ($P=0.009$), geographical location aged 8-15/yrs ($P<0.001$), respondent category*taxa ($p<0.001$), taxa category $P<0.001$, and education level had a tendency towards significance ($P=0.02$). Breeders (mean 19.46) had a lower BAM than owners (22.75) and non-owners (24.89) had the highest BAM. Females (20.19) had the lowest BAM; having lived in a rural area aged 8-15/yrs (17.73) influenced a lower BAM; with city dwellers having the highest BAM (23.08). All respondents agreed on BAM rating for BI, non-owners, owners, breeders (23.84, 22.52, 21.86), however non-owners and owners (22.87, 20.39) agreed on RE and differed from breeders (15.65). Breeders scored IN lowest (12.90), owners scored in between (19.67), and non-owners scored the highest (22.75). With regard to MA, breeders (21.70) differed from non-owners (24.16), but owners (22.60) did not differ from breeders. Increased education level (21.61), tended to influence BAM positively, compared to BAM associated with lower levels of education (19.56). Non-owners rated all taxa higher than other respondents for BAM. This may be due to many influences/factors. 61 non-owners, 58 breeders and 64 owners owned a cat/dog, (mammal species), which may have influenced their perceptions of sentience and BAM. Influencing factors may be complex.

Poster N° 10

Behavioral changes in pets, as reported by the owners, before and during the lockdown in China

Sara Platto[1*], Agathe Serres[2], Simona R C Normando[3], Wang Yanqing[4] , Dennis C. Turner[5]

[1] Department of Biotechnology, College of Life Sciences, Jianghan University, Hubei, Wuhan, P.R.China
[2] Institute of Deep Sea Science and Engineering, Chinese Academy of Sciences, 28 Luhuitou Road, Jiyang district, Sanya, P.R. China
[3] Department of Comparative Biomedicine and Food Science, University of the Studies of Padova, Padova, Italy
[4] China Conservation and Green Development Foundation, Beijing, P.R.China
[5] Institute for applied Ethology and Animal Psychology, I.E.A.P./I.E.T., Horgen/ZH,
[*] Presenting author: stenella369@hotmail.com

Two years after the first lockdown in China (January 23, 2020), cities around the country are still experiencing different levels of restrictions depending on the number of COVID--19 cases, a situation that might also impact the welfare of pets. The current study aimed to assess the behavioral changes in dogs and cats before (BL) and during the lockdown (DL) in China. The survey was uploaded to an online platform (Wèn Juàn X ī ng), which allowed creation of a weblink or QR code that was sent to the public around China through the main Chinese social media platforms (WeChat, Weibo). Pet-owners could access to the questionnaire from July 1st, 2020 to June 30th, 2021. A total of 261 completed questionnaires were collected. The pet-owners in China reported that behavioral problems (BP) and stress-related behaviors (SRB) were more frequent in dogs (BP: 36.6%; SRB: 31.7%) and cats (BP: 37.1%; SRB: 49.3%) before than during the lockdown (dogs. BP: 27.2%, SRB: 26.2%; cats. BP: 34%, SRB: 33.6%), while anxiety-related behaviors (ARB) only increased in dogs during the lockdown (BL: 35%; DL: 36.3%). A reduced frequency of daily walks was reported (72.6%), with more dogs never being walked (27.4%) during than before the lockdown (daily walks: 92.3%; dogs never walked: 7.7%%), which was also found positively associated with BP. Owners also reported that dogs slept more during the day (47%), and cats had erratic nocturnal patterns and irregular day-time sleep (11.8%) more often during than before the lockdown (dogs: 44.6%; cats: 9.5%), which were positively related to SRB and ARB in dogs, and BP in cats. The pet feeding habits did not show significant changes before compared to during the lockdown. Nevertheless, the presence of voracious feeding habits in dogs and cats was positively associated with BP. Changes in litter brand were more frequent before (62.2%) than during the lockdown (43.3%), and were positively related to SRB in cats. The frequency of litter scooping or refills did not significantly change before compared to during the lockdown, but their reduced occurrence was positively associated with BP and SRB in cats. In addition, cats› aggressive behaviors towards family members were positively related to the presence of SRB and ARB in the felines, and with the increase of the number of people in the household. This survey represents the first assessment of behavioral changes in pets before and during the lockdown in China. Its findings highlight the importance of developing support tools during moments of crisis for the owners, in order to avoid conflicts with their pets that can lead to the abandonment of the animals.

Poster N° 11

Impact of Covid-19 safety protocols on the wellbeing of dogs involved in canine-assisted interventions - comparison between Flanders (Belgium), Italy and Spain

Lieve Meers[1*], Maya Sturlese[2], Carolina Duarte-Gan[3], Elizabeth Walsh[4], Laura Contalbrigo[5], William Samuels[6], Vicky Stevens[1], Stephan Laufer[1], Simona Normando[2]

[1] *BIAAT Foundation, Genk, Belgium*
[2] *Department of Comparative Biomedicine and Food Science, University of Padua, Padua, Italy*
[3] *Department of Psychology, University of Jaén, Jaén, Spain*
[4] *Cork Pet Behaviour Centre, Cork, Ireland*
[5] *National Reference Centre for Animal Assisted Interventions, IZSVe, Padua, Italy*
[6] *School of Nursing, Hunter College, New York, USA*
[*] *Presenting author: info@biaat.be*

Since the Covid-19 pandemic started (November 2019), new institutional safety protocols were developed. This study investigated the impact of Covid-19 protocols on the welfare of dogs involved in canine-assisted interventions. Between 01/12/2020 and 18/11/21, an email survey was sent to therapists who were currently conducting canine-assisted interventions (CAI) in Flanders, Spain, and Italy. Respondents were asked to share their unstructured observations on how mandatory Covid-19 safety protocols influenced their dogs' behaviour. Questions were translated and back-translated for consistency. Freeman-Halton extended Fisher's exact tests were used. Forty-five therapists (15 Flemish; 14 Spanish, 16 Italian), completed the survey. Reports included 89 dogs (30♂, 42♀, 17 unknown) of which 36% were mixed-breeds, 12.4% were Labradors, 3.4% were Terriers, 18% were Golden Retrievers, and 30.3% were other breeds. Their age ranged between 2-13 years (6.5 mean). Twenty-one (46.7%) respondents reported that the CAI areas were disinfected between sessions, with differences among countries ($p<0.001$). Thirteen (28.9%) dogs reacted by sniffing or sneezing after smelling disinfected areas. Two dogs vomited and gagged, and three dogs urinated over disinfected areas. Twenty-two (48.9%) protocols advised social distancing between participants and animals, with differences among countries ($p<0.001$). When restrained, 17.8% dogs exhibited self-calming behaviors; 57.8% respondents reported that wearing a face mask was obligatory at sessions, and 24.4% dogs responded with flight responses to masks. When practitioners disposed of their used masks in open bins, 5 dogs tried to retrieve them from the bin to play, 2 Labradors tried to eat them, 6 respondents felt that it was harder to communicate with their dogs when wearing a mask, and 2 dogs tried to take the mask off. Eight (17.8%) practitioners used the dogs' temperature as a health indicator. All of their dogs exhibited defensive behaviors (e.g., tucking their tails, escape attempts, biting). Eight facilities asked that dogs be washed before sessions. One dog responded to this by running away, 1 dog emitted howling/squealing, 4 showed signs of discomfort, and 1 developed dermatitis. These results suggest that the dogs often appeared to react with stress/confusion to the changes in CAI practices they were familiar with. We propose, integrated human/animal health and welfare, protocols and assessments, in recognition of their inter-relatedness, and mutual importance for welfare, to provide a robust «One welfare» framework in animal-assisted interventions.

Poster N° 12

Research program about the development of future guide dogs for blind people: How can we optimise the breeding programme, from weaning to the end of training?

Fanny Menuge[1*], Míriam Marcet-Rius[1], Camille Chabaud[2], Eva Teruel[3], Galice Kalonji[1], Cécile Bienboire-Frosini[2], Tiago Mendonça[4], Alessandro Cozzi[5], Patrick Pageat[5]

[1] Animal Behaviour and Welfare Department, Research Institute in Semiochemistry and Applied Ethology (IRSEA), Quartier Salignan, 84400 Apt, France
[2] Molecular Biology and Chemical Communication Department, IRSEA, Quartier Salignan, 84400 Apt, France
[3] Data Management and Statistics Service, IRSEA, Quartier Salignan, 84400 Apt, France
[4] Centre for Clinical Ethology and Animal Welfare (CECBA), Quartier Salignan, 84400 Apt, France
[5] Research and Education Board, IRSEA, Quartier Salignan, 84400 Apt, France
[*] Presenting author: f.menuge@group-irsea.com

Nowadays, 40% of failure rate is observed among potential guide dogs. The context in which they grow up can have an impact on their emotional balance and success. Our project included several studies, in collaboration with the Frederic Gaillanne foundation (France), which is raising Labradors, Labernois and St-Pierre. The aim was to evaluate through physiological and behavioural parameters whether the development context of these dogs could influence their welfare and performance. Guide dogs are usually homed in foster families and stay there for about a year. The process of habituation, managed by these foster families, is a crucial part of fear prevention, which is the first cause of downgrading. To assess the impact of this period on the development of fears, 11 five-month-old potential guide dogs underwent an emotional reactivity test developed by the foundation, scoring the responses to three categories of stimuli—sound and visual, body sensitivity, unknown person. Also, foster families completed a questionnaire concerning puppies' habituation. Results showed that dogs secreted more cortisol during the test when habituation work has been done less frequently ($r = 0.48$). Besides, 16 dogs participated in the Strange Situation Test: descriptive data revealed that dogs that have developed a secure attachment—dogs showing proximity seeking, exploration, no avoidance, and active search but no distress at separation—with their foster family have more chance to succeed as guide dogs than anxious or avoidant dogs. When the education period starts, different organizations are established depending on the school. Either they stay at school 7 days a week (1), or they return to their foster family every weekend (2) or every evening (3). By comparing options 1 (N=9) and 2 (N=9) on dogs' welfare and performance, we demonstrated that the dogs were well accustomed to life in the school kennel, with physiologic data in line with normal rates in both groups. Also, dogs staying at school expressed less stress behaviour at rest (GLMM; DF=1; $F = 10.11$; $p=0.0018$), and a visual analogue scale completed by the dog trainer showed that they were more focused during training sessions (GLMM; DF=1; $F=5.42$; $p=0.0326$). The project provides guidance on how to train more emotionally balanced dogs, which would allow more people to benefit from the help of a guide dog. This could be done by establishing a more suitable development context and strengthening the follow-up in foster families. This could improve dogs' welfare and increase their success probability.

Poster N° 13

Behaviour and health of horses used in e quine-assisted intervention is associated with workload and husbandry conditions

Susanne Waiblinger*, Sarah Gosch, Stephanie Lürzel, Ines Windschnurer

Institute of Animal Welfare Science, Department for Farm Animals and Veterinary Public Health, University of Veterinary Medicine, Vienna, Veterinärplatz 1, 1210 Vienna, Austria
** Presenting author: Susanne.Waiblinger@vetmeduni.ac.at*

Equine-assisted interventions (EAI) gain popularity, but studies on the welfare of the horses related to their living and working conditions are still scarce. By use of a survey, we aimed to investigate the associations between horses' health or behavioural problems and potential in- fluencing factors (housing, management, training practices, workload of the horses) in institu- tions offering different EAI.A questionnaire was sent out via e-mail to 783 institutions offering EAI; 133 responses out of 136 could be analysed. The study participants were located in Austria (24%), Germany (57%) and Switzerland (19%). Besides descriptive analyses, linear and logistic regression models were calculated. Horses' breed and type of EAI were not considered in the models; institutions fre- quently offered diverse EAI-types. The most frequent health problems reported were tensions in the neck and back (reported by 58% of respondents) and problems of the locomotor system (52% responses). Few respondents reported behavioural problems; the problems most often reported were biting of the trainer/ther- apist (17% of respondents) and anxious behaviour in different situations (12%). Weaving and rearing were not reported by any of the respondents. With respect to workload, horses were used on average in one to four EAI sessions per day, with the average duration lasting 10-120 minutes. In 29% of the institutions, horses were used on 5-7 days per week, and 21, 22, and 25% of respondents used horses on average on 2, 3 and 4 days per week, respectively. The percentage of horses with problems of the locomotor system was higher with a longer average duration of the EAI session ($p=0.026$) and lower when horses were provided with more weeks without EAI sessions per year ('holiday weeks', $p=0.013$). The lower the number of clients per horse was per day, the higher the number of horses without any health problem was ($p=0.029$). A higher number of holiday weeks was also beneficial for a lower percentage of respiratory tract diseases ($p=0.049$), as was access to pasture during summer ($p=0.026$). Biting the trainer/therapist occurred more often if food was used as a reward during training ($p=0.042$). A lower workload, represented by a larger number of holiday weeks, shorter duration of a single therapy unit and a lower number of clients, as well as access to pasture, was associated with improved health. Furthermore, training methods used need to be chosen carefully and applie d knowledgeably in order to avoid problematic behaviours such as biting.

Poster N° 14

Assessment of the welfare of working horses and mules in Colombia

Marlyn H. Romero*, Jorge Alberto Sanchez

Department of Animal Health, Faculty of Agrarian and Animal Sciences, University of Caldas, Manizales, 170004, Colombia.
** Presenting author: marlyn.romero@ucaldas.edu.co*

The welfare of working equids in developing countries is sometimes threatened due to the limited resources and/or knowledge of their owners. In terms of animal welfare level, it appears that mules are at higher risk than horses to have health and behavioral problems. The objective of this study is to evaluate the welfare of horses and mules using a validated protocol that assesses animal-based indicators. Protocol included health (physical observations of mucous membranes, lesions at commissures of lips, body lesions, ectoparasites, heat stress, body condition score, lesions of skin and/or deeper tissues, hoof horn quality and shape, sole shape and structure, gait, between others) and behavioral (animal's attitude, chin contact and response to observer approach) parameters. A total of 160 horses and 40 mules from three municipalities in the Colombian coffee-growing region were evaluated by means of the direct observation of health and behavioral parameters. Descriptive analysis of the variables expressed in proportions was performed to evaluate the differences between horses and mule parameters. Interactions between the different measurements were examined using the Chi-squared test and ANOVA test. Spearman correlations were used to relate the measurements. Horses and mules demonstrated friendly behavior in front of the evaluators (78.13% and 61.54%, respectively); apathetic or severely depressed behavior was low (10.7% Vs 17.5%) ($P>0.05$). Eighty percent of the mules and 54.4% of the horses exhibited a healthy body condition score ($P<0.05$), with a body condition score (BCS) of 3 or more on a scale of 1 to 5 (1, very thin; 5, very fat). Less than 15% of the animals had eye problems, limb deformities and gait abnormalities. Injuries to the head, withers, spine, ribs/flank, hindquarters, and hind legs were observed in a range between 12.5% and 30.43% of the animals, with higher frequency in horses ($P<0.05$). Weak correlations (R2 coefficient<0.5), although statistically significant, were observed between low body condition and the presence of skin and deeper tissue lesions, systemic health abnormalities and limb problems ($P<0.05$). The low proportion of health and behavioral problems found in the study suggests that owners are concerned about the welfare of their working animals. However, the presence of skin and deep tissue lesions, especially in horses, suggests that they are subjected to high workloads, being essential to train owners in aspects related to the importance of providing their equids with adequate rest periods to recover from work and working hours in keeping with their health conditions.

Poster N° 15

The protective effect of social support: can humans reassure pigs during stressful challenges by using social learning?

Daniela Luna[1*], Javiera Calderón-Amor[2], Catalina González[1], Christopher Byrd[3], Rocío Palomo[1], Elizabeth Huenul[4], Jaime Figueroa[4]

[1] Universidad de Chile, Facultad de Ciencias Veterinarias y Pecuarias, Santiago 8820000, Chile,
[2] Universidad Austral de Chile, Doctorado en Ciencias Veterinarias, Valdivia 50900000, Chile,
[3] North Dakota State University, Department of Animal Sciences, Fargo ND 58108-6050, USA,
[4] Universidad de O'Higgins, Instituto de Ciencias Agroalimentarias, Animales y Ambientales- ICA3, San Fernando 3070000, Chile.
Presenting author: dlunavet@gmail.com

Farm animals can socially learn to trust a person after observing that person handling a familiar conspecific gently, even if they had never positively interacted with the person themselves. The purpose of this study was to evaluate whether pigs are reassured by the human during a stressful challenge, having previously acquired a positive perception of the human by witnessing the gentle handling of a high or low socially ranked conspecific. Additionally, the effectiveness of reducing pigs' stress response based on the degree of human familiarity was examined. Seventy-five pigs (21 days old, 5.6±0.2 kg) housed in 15 nursery pens (5 pigs/pen) were randomly assigned to one of three treatment groups (5 pens/treatment): Dominant Demonstrator Group (DDG), Subordinate Demonstrator Group (SDG), and Control Group (CG). Pigs from DDG and SDG observed a high and low socially ranked conspecific ("demonstrator"), respectively, while the demonstrator received gentle handling consisting of stroking for 10 minutes and a sucrose solution, twice a day for 5 weeks. The CG received minimal human contact required for feeding, cleaning, and health examination. Following the treatment period, the behavior of animals was evaluated in response to a familiar (handlers involved in treatments) and a nonfamiliar person (unknown human) in a social support test, consisting of physical restraint in a cage for 4 minutes while the person provided stroking, followed by the release of the animal in the test pen for 1 minute. Data were analyzed using a mixed linear model and Tukey-test as a post-hoc test in R Software. Both DDG (22.1±3.9 vs 11±3.9, P=0.009) and SDG pigs (32±3.9 vs 20.8±3.9, P=0.005) showed a greater frequency of reactions reflecting restlessness when tested with an unfamiliar human compared to familiar, whereas CG pigs presented no differences (26.4±3.6 vs 30.3±3.6, P=0.10). Moreover, when tested with their familiar human, DDG (49.1±4.4%, P<0.0001) and SDG pigs (41.6±4.4%, P=0.001) remained calm for longer compared to CG (16.3±4.1%). When pigs were released from the cage by their familiar human, SDG (6.9±3.8s, P=0.0006) and DDG pigs (8.2±3.8s, P=0.003) contacted the human sooner compared to CG (32.9±3.5s). Also, they spent more time investigating the human (SDG:44.5±4.6%, P=0.0007; DDG:50.7±4.6%, P<0.0001) in comparison to CG (14.3±4.2%). No differences in behavioral reactions based on the demonstrator›s social rank were observed. In conclusion, the positive perception of humans acquired by pigs through social learning persists in highly aversive situations and can lead to positive reassurance by familiar humans during stressful events.

Poster N° 16

Effect of human-animal interaction on tear staining and body temperature of piglets

Dayane Lemos Teixeira, Giovanni Marcone, Marc Bagaria, Berta Baulida, Emma Fàbrega*

Animal Welfare Program, IRTA, Veïnat de Sies s/n, 17121 Monells, Girona, Spain
** Presenting author: emma.fabrega@irta.cat*

Human-animal interaction (HAI) has effects on the behaviour, physiology and affective state of animals. Therefore, variation in the HAI may result in changes in the metabolic activity and the blood circulation, which might affect animal skin temperature. Negative HAI can cause animal stress, which could be assessed by tear staining in piglets' face. This study aimed to evaluate the effect of HAI on tear staining and skin temperature of piglets. Sixty female piglets weaned at 21 days old were divided in 12 groups (5 pigs/pen) and assigned to three treatments, which consisted of a caretaker entering into the pens and interacting with the piglets for 5 min/day, 3 days/week, during 6 weeks. For 'positive HAI', the caretaker spoke calmly to the piglets, gently scratched and stroked them; for 'neutral HAI', the caretaker remained still; for 'negative HAI', the caretaker shook and mashed paper bags. On week 2, the face of all piglets was wiped clean. On week 5, piglets were caught and restrained and digital images were taken from left and right sides of their face and tear staining area was scored (0-5 scoring scale). With piglets still caught and restrained, digital thermography images were also taken from the tail, ear and snout of piglets, 10 min before (n=58) and 10 min after (n=52) the HAI and the highest temperature of the selected area was recorded. Data were analysed in Proc Glimmix of SAS; models included treatment and side of the face or time as fixed effect and group as experimental unit. There was no effect of treatment and side of the face on tear staining area (1.6±0.95; $p>0.05$). Ear (38.5±0.26°C) and snout (31.5±0.66°C) temperature were not affected by treatment or time ($p>0.05$). Tail maximum temperature was lower on neutral HAI (37.0±0.17°C) than on positive (38.0±0.17°C) and negative HAI (37.5±0.17°C; $p<0.001$). The findings suggest that the HAI treatments did not increase the stress level to the point to cause changes in tear staining, ear and snout skin temperature, or these parameters are not sensitive enough to detect stress caused by HAI. Further studies investigating their association would be beneficial. The effect of HAI on the base of the tail' skin temperature could be related to tail lesion or to tail movement, which is an indicator of positive affective states. However, tail movement is not an indicator of negative emotions, therefore further investigation would also be required for more explicit conclusions.

Poster N° 17

A systematic review of studies of chicken welfare at catching and risk of bias

Heleen van de Weerd*, Jon E.L. Day

Cerebrus Associates Ltd., The White House, 2 Meadrow, Godalming, Surrey, GU7 3HN, UK
** Presenting author: heleen@cerebrus.org*

We conducted a systematic review (Cochrane, 2021) of the welfare impacts of various catching methods for laying hens and broiler chickens. Catching can cause injuries and influence dead-on- arrival (DOA) at the slaughterhouse. While studies report a seemingly low range of DOA (0.1% to 0.6%, Cockram et al. 2018), this does represent millions of birds annually. Papers were screened against clear inclusion and exclusion criteria. Twenty-two papers met the criteria and were included, grouped around 3 themes. Each paper was assessed for the risk of possible bias in six domains (no randomization, no blinding of assessors or data analysts, not reporting missing data, selective reporting, or other types of bias) and three levels (low risk; some concerns; high risk), as well as an overall bias judgement. Eight papers compared manual catching and handling of broilers, with a range of techniques (one or two birds upright, one- or two-leg catching). Only three studies evaluated manual broiler handling methods and found that inverted handling caused more stress than upright handling (corticosteroid measurements and fear tests in non-commercial settings). There were insufficient studies to determine the welfare implications of upright and inverted catching. Nine studies evaluated mechanical vs manual broiler catching methods. Mechanical catching was associated with a higher risk of DOA than manual catching (in 6 studies that included DOA). However, DOA is an inaccurate indicator to distinguish between the effects of catching method, as several underlying factors confound the levels measured. With regards to catching method and injuries, there was no clear trend in outcomes. Broilers that were manually caught and inverted had higher levels of fear compared to those caught by machines, due to reduced human-animal contact with machine catching. Only five studies included hen depopulation and handling of laying hens. There was some evidence that inverting hens induced higher levels of fear compared to not inverting. The limited information on cage depopulation suggested that one-leg removal could lead to more broken bones than two-leg removal. All studies had some concerns for possible bias and 50% of the studies had an overall high risk of bias judgment. Results need to be interpreted with an awareness of possible weaknesses and uncertainties, and conclusions drawn with caution. Further research -of good quality- is needed, with huge potential to improve poultry welfare.

Poster N° 18

Gaze following in ungulates: domesticated and non-domesticated species follow the gaze of both humans and conspecifics in an experimental context

Alina Schaffer[1,*], Alvaro L. Caicoya[2,3], Montserrat Colell[2,3], Ruben Holland[4], Conrad Ensenyat[5], Federica Amici[1,6]

[1] Behavioral Ecology Research Group, Institute of Biology, University of Leipzig, Leipzig, Germany
[2] Department of Clinical Psychology and Psychobiology, Faculty of Psychology, University of Barcelona, Barcelona, Spain
[3] Institute of Neurosciences, University of Barcelona, Barcelona, Spain
[4] Zoo Leipzig, Leipzig, Germany
[5] Barcelona Zoo, Barcelona, Spain
[6] Research Group «Primate Behavioural Ecology», Department of Human Behavior, Ecology and Culture, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany
[*]Presenting author: alina.schaffer@uni-leipzig.de

Gaze following is the ability to use others' gaze to obtain information about the environment (e.g., food location, predators, social interactions). As such, it may be highly adaptive in a variety of socio-ecological contexts, and thus be widespread across animal taxa. To date, gaze following has been mostly studied in primates, and partially in birds, but little is known on the gaze following abilities of other taxa and, especially, on the evolutionary pressures that led to their emergence. In this study, we aimed to compare species in their ability to follow the gaze of conspecifics and allospecifics and, in particular, the effect of domestication on these skills. We used an experimental approach to test gaze following skills in a still under-studied taxon, ungulates. Across 28 individuals from four species (i.e., domestic: 17 goats and 3 lamas, and non-domestic: 4 guanacos and 4 mouflons), we assessed individual ability to spontaneously follow the gaze of both conspecifics (Conspecific task) and human experimenters (Human task) in different conditions. The study subjects looked in the model's (i.e., gazer, cue giver) direction more in the Experimental than in the Control condition in both tasks, although this difference was stronger in the Conspecific task (Conspecific task: $p < 0.001$; Human task: $p = 0.016$). Moreover, while all species overall followed the model's gaze more in the Experimental than in the Control condition, goats ($p < 0.001$), lamas ($p = 0.002$) and mouflons ($p < 0.001$) did it significantly so, but not guanacos ($p = 0.638$). Despite the relative low number of study subjects, our study provides the first experimental evidence of gaze following skills in non-domesticated ungulates, and contributes to understanding how gaze following skills are distributed in another taxon – an essential endeavor to identify the evolutionary pressures leading to the emergence of gaze following skills across taxa. Furthermore, following the gaze of conspecifics as well as humans suggests it is an aspect of higher cognition, and therefore, this knowledge presupposes that we regard animals as living beings with their own complex emotions and communication and take this into account accordingly when keeping and dealing with them.

Poster N° 19

It makes a brave cow: how frequency of outdoor access improves the reactivity and human-animal relationship of dairy cattle

Jasmine E. Muszik[1*], Marjorie Cellier[1], Nadège Aigueperse[2], Elsa Vasseur[1]

[1] *Department of Animal Science, McGill University, Sainte-Anne-de-Bellevue, Quebec H9X 3V9, Canada*
[2] *Université Clermont Auvergne, INRAE, VetAgro Sup, UMR Herbivores, F-63122 Saint Genès- Champanelle, France*
[*] *Presenting author: jasmine.muszik@mail.mcgill.ca*

Movement restricted cattle are often denied the opportunity for daily mental and physical stimulation. Previous research has also established the physical and psychological benefits of allowing cattle to go outside. Increasing access to exercise may enhance welfare by enriching the lives of these animals and decreasing their reactivity. Thus, the aim of this study was to investigate to what extent the frequency of outdoor access impacts cattle reactivity in particular to humans. 36 Holstein cows from a tie-stall were divided into two treatments: a 3-exits and a 1- exit group that were allowed access to the outdoors three days of the week (n=18), and once a week (n=18), respectively. During outing day(s), the treatment cows, which were blocked into groups of three, were led to an outdoor area that was divided into six paddocks (each 117 m2 (9 m x 13 m)). Blocks were rotated weekly between paddocks for five consecutive weeks. Animals were allowed outside for a duration of 1 hour. Cows were individually tested two weeks before, one day after, and eight weeks following the trial, for reactivity using a Human Approach Test which had four stages: 1. standing still, 2&3. taking one step closer in each stage, and 4. reaching out towards animal. Reactivity at each stage was recorded live using a score range of -3 to 3 (with increasingly positive scores indicating decreasing fear). Scores were analyzed with a mixed model with a Bonferroni adjustment, for each stage of the test. The treatment, period, and the interaction between treatment and period, were considered the fixed effects while the cow nested into block was the random effect. There was no significant difference in reactivity score between the treatments. Both treatments had relatively neutral scores before and right after the trial. Both treatments had higher scores during the follow-up period starting from stage 2 onward for 1-exit and stage 3 onward for 3-exits, with a significant increase in score for stages 3 and 4 (min. increase = 0.48; P = 0.03; max increase = 0.51; P = 0.02). This demonstrates decreased fear of humans for both treatments, regardless of outing frequency, suggesting long-term effects of leading cows outdoors on human reactivity due to cows positively associating human approach with going outside. However, further reactivity tests, such as the sudden test, should also be utilized to understand if outing affects reactivity in a general way and not just human relationship.

Poster N° 20

Exploring ridden horse behaviour and rider satisfaction: a pathway for improving horse welfare and rider safety?

Karen Luke[1*], Amanda Warren-Smith[2], Bradley Smith[1], Tina McAdie[1]

[1] School of Health, Medical and Applied Sciences, Central Queensland University
[2] NSW Department of Primary Industries, Orange
[*] Presenting author: karen.luke@cqumail.com

Horse riding is growing in popularity, yet it is a dangerous activity and concerns for horse welfare abound. Evidence is emerging that horse welfare and human safety are related, suggesting that improvements in horse welfare will likely lead to improved human safety. A challenge for improving animal welfare, is motivating human behaviour change to deliver better outcomes for animals. This study examined the relationships between horse behaviour, rider satisfaction and rider safety. It was hypothesised that horses with better welfare would exhibit less hyperreactive behaviour and have more satisfied riders. A convenience sample of 427 riders were surveyed anonymously using primarily Likert scale questions, to assess their horse's welfare, their ridden accidents and injuries and level of satisfaction. Underpinned by the 2020 Five Domains Model, ridden horse welfare was assessed using a range of validated indicators including husbandry practices, such as confinement, isolation and access to forage, and horse behaviour such as aggression and bucking. Riders of multiple horses were randomly asked to respond to the survey for their favourite or least favourite horse. Spearman's rank correlations and Mann Whitney U tests were used due to non-normal data. Rider satisfaction was positively correlated with horse welfare ($r = 0.29$, $p < 0.01$), riders' perceived control of the horse ($r = 0.52$, $p < 0.001$) and riders' perceived obedience of the horse ($r = 0.30$, $p < 0.001$). Further, rider satisfaction was negatively correlated with hyperreactive horse behaviour ($r = -0.22$, $p < 0.01$) and rider accidents and injuries ($r = -0.16$, $p = 0.001$). Sub-group analysis revealed favourite horses (as defined by their riders) had significantly more satisfied riders ($p = 0.002$) and significantly better welfare ($p = 0.003$) than least favourite horses. Riders perceived their least favourite horses as harder to control ($p = 0.02$) and less obedient ($p = 0.05$) compared to riders of favourite horses. Indicating that horses with better welfare have more satisfied riders. Further, rider perception of control is strongly related to rider satisfaction. Unsurprisingly, riders were less satisfied with horses that displayed more frequent hyperreactive behaviour (a signal of poor welfare). Horse riding in the developed world is primarily a leisure or sport activity, so satisfaction is likely important. Demonstrating that riders are more satisfied riding horses that have better welfare may provide intrinsic motivation for riders to explore ways of improving horse welfare, which in turn, may increase their enjoyment of riding.

Poster N° 21

ManyGoats - an initiative to promote open and reproducible research on goat behaviour and welfare

Federica Amici[1,2], Okan Atay[3], Mario Balaro[4], Monica Battini[5], Desiree Brucks[6], Joao HC Costa[7], Ruan Daros[8], Shai David[9], Özdal Gökdal[3], Edna Hillmann[10], Nina M. Keil[11], Whitney Knauer[12], Uta König von Borste[l6*], Lorena Lacuesta[13], Serge-Yan Landau1[4], Rebecca K. Meagher[15], Carly Moody[16], Christian Nawroth[17], Heather Neave[18], Tjasa Pangerl[19], Fernando Sanchez-Davila[20], Janko Skok[19], Jenny Stracke[21], Jordan Tonooka[15], Rodolfo Ungerfeld[13], Beth Ventura[22], Arantxa Villagrá[23], Susanne Waiblinger[24], Tolulope J. Williams[25], Gosia Zobel[26]

[1] Life Sciences, Institute for Biology, Human Biology and Primate Cognition, Leipzig University, Germany
[2] Max Planck Institute for Evolutionary Anthropology, Department of Human Behavior, Ecology and Culture, Leipzig, Germany
[3] Department of Animal and Plant Production, Çine Vocational School, Aydın Adnan Menderes
University, Çine-Aydın, Türkiye
[4] Department of Pathology and Clinical Veterinary, Universidade Federal Fluminense, Niterói, Brazil
[5] Department of Agricultural and Environmental Sciences, University of Milan, Milan, Italy
[6] Animal Husbandry, Behaviour, and Welfare Group, Institute of Animal Breeding and Genetics, University of Giessen, Germany
[7] Department of Animal and Food Sciences, University of Kentucky, Lexington, USA 8 Graduate Program in Animal Science, School of Medicine and Life Sciences, Pontifícia Universidade Católica do Paraná, Curitiba, Brazil
[9] Head of Welfare, Nutrition and Research, Zoological Center Ramat Gan, Israel. 10 Albrecht Daniel Thaer-Institute, Faculty of Life Sciences, Humboldt-Universität zu Berlin, Germany
[11] Centre of proper housing of ruminants and pigs, Swiss Food Safety and Veterinary Office, Agroscope, Ettenhausen, Switzerland
[12] Department of Veterinary Population Medicine, College of Veterinary Medicine, University of Minnesota, St. Paul, Minnesota, USA
[13] Departamento de Biociencias-Unidad Académica de Fisiología. Facultad de Veterinaria, Universidad de la República, Uruguay
[14] Emeritus, Department of Natural Resources, Agricultural Research Organization, Rishon LeZion, Israel
[15] Department of Animal Science and Aquaculture, Dalhousie University, Truro, NS, Canada
[16] Department of Animal Science, UC Davis, Davis, USA
[17] Institute of Behavioural Physiology, Research Institute for Farm Animal Biology, Dummerstorf, Germany
[18] Department of Animal Science, Aarhus University, Tjele, Denmark
[19] Faculty of Agriculture and Life Sciences, University of Maribor, Maribor, Slovenia
[20] Universidad Autonoma de Nuevo Leon, Facultad de Agronomia, Laboratorio de Reproducción Animal, General Escobedo N.L., México
[21] Farm Animal Ethology, Institute of Animal Science, University of Bonn, Germany
[22] School of Life Sciences, University of Lincoln, United Kingdom
[23] Centro de Tecnología Animal, Instituto Valenciano de Investigaciones Agrarias, España

[24] *Institute of Animal Welfare Science, University of Veterinary Medicine, Vienna, Austria*
[25] *Department of Animal Physiology, Federal University of Agriculture, Abeokuta Nigeria*
[26] *Animal Behaviour and Welfare Team, AgResearch Ltd., New Zealand*
The members of the ManyGoats initiative are listed alphabetically.
[*] *Presenting author: uta.koenig@agrar.uni-giessen.de*

Most studies on goat behaviour have been conducted on groups of animals characterised by specific individual factors and living conditions. Due to the contextual idiosyncrasies of individual testing sites, the results of individual studies could only be valid for the particular group of animals and thus may not always be reproducible. However, robust results are necessary to ensure that outcomes are broadly relevant; this is vital if such results are intended to contribute to improved husbandry and management conditions, and ultimately better animal welfare. Multi-site approaches can offer a resource-efficient opportunity to tackle this problem and increase the external validity of scientific results. For this reason, we established the ManyGoats initiative; our aim is to increase the generalisability of findings in research on goat behaviour and cognition by implementing identical experimental protocols and simultaneously testing animals across different facilities around the world. The initiative will also aim at improving training and knowledge transfer in goat behaviour research and will adhere to Open Science principles, making our work transparent, inclusive and readily accessible. To date, the ManyGoats initiative consists of more than 30 researchers across five continents, with expertise in goat behaviour, animal welfare, veterinary medicine, statistical modelling and animal ethics, but more researchers/labs are invited to join the network. In our first proof-of-concept study ('*ManyGoats1*'), we will focus on goats› behavioural responses to different human attentional states during an Avoidance Distance test. To increase heterogeneity in our sample and identify the factors that contribute to behavioural variation, we will test a diverse range of subjects (i.e. all sexes, different ages, breeds, uses including dairy, meat, fibre and companionship) in different living conditions (e.g. lab, farm, zoo settings). Currently, we are developing the ManyGoats1 test protocol and anticipate starting data collection from September 2022.

Poster N° 22

Flight distance in cows with limited resources

Sergio Acuña Ballesteros*, Fidel de Souza Pretto, João Pedro Donadio da Silva Pereira, Kevin Bernardes de Oliveira, Priscila Deotti Signor, Luiz Carlos Pinheiro Machado Filho

Applied Ethology Laboratory, Federal University of Santa Catarina, Brazil.
** Presenting author: s.a.ballesteros@posgrad.ufsc.br*

Cows, like other animals, have an invisible zone around them where they feel safe, called the "flight zone", whether such distance is crossed by an animal of another species like an experimenter, it can cause discomfort and to flee. Flight distance might be increased by stress generated in the cows because of impossibility of accessing resources suchlike water or shade. This distance is measured to determine the reactivity with respect to the approach of the human being. The objective of this work was to identify the difference between the flight distance of Bradford and Jersey cows in a Voisin rational grazing system (VRG), subjected to different availability of water and shade. Sixteen Jersey and 16 Bradford cows, were divided into 4 groups, with 4 Bradford and 4 Jersey within them. It was carried out at the Federal University of Santa Catarina Experimental Farm of Ressacada by 4 period of 5 days each one. The groups were subjected to 4 treatments using a statistical Latin Square design: T1-Shade presence and water ad libitum; T2- Shade presence and cows drank water two times per day for 30 minutes (12:00 am and 5:30 pm); T3- Without shade presence and water ad libitum; T4- Without shade presence and cows drank water two times per day for 30 minutes (12:00 am and 5:30 pm). Flight distances (meters between the experimenters and cows) were measured by two observers (familiar and neutral) before and after each experimental period, approaching slowly by foot (1 step/second) till the cow expressed any withdrawal reaction. The statistical parametric ANOVA were in R Studio with 95% confidence. There was not difference (P>0,05) in flight distance of cows among the different treatments. Flight distance was not different (P>0,05) between the two measurements either a difference in flight distance (P=1,323E10) between the familiar (1.21m) and unfamiliar (1.88m) person was found. Difference in flight distance between groups (P=0,02) was found when tested with the familiar person, and a tendency (P=0,08) when tested with the neutral person. The cows in this experiment that were subjected to restriction of water and without shade, did not increase the flight distance with a familiar or neutral person, however they were more apathetic towards the neutral person, showing a higher flight distance than the familiar person. Availability of shade and/or water did not affect flight distance in cows tested with familiar or unfamiliar person.

Poster N° 23

Owners' perceptions of the welfare of their diseased goats in Nyala, Sudan

Saber Adam[1], Abdelkareem Ahmed[1,2,3*]

[1] Department of One Health, Medical and Cancer Research Institute, Nyala, Sudan
[2] Department of Physiology and Biochemistry, Faculty of Veterinary Science, University of Nyala, Nyala, Sudan; Botswana University of Agriculture and Natural Resources, Private Bag 0027, Gaborone, Botswana.
[3] Biomedical Research Institute, Darfur University College, Nyala, Sudan
[*] Presenting Author: kareemo151@gmail.com

The livestock sector plays a vital role in the economy and welfare of the whole Sudanese population. Goats have constituted a large part of the livestock population and are deeply entrenched in almost every Sudanese culture, which has an important contribution to food security by producing milk and meat. Despite their contributions, to the livelihood of the Sudanese. However, the welfare of these goats is still far behind. Yet, there is no record of the welfare of diseased goats in Nyala. Here we assessed the conception of the owners of their diseased goats' welfare. We assessed indirect interviews with owners and included information on age and educational level and goat information including food type, daily feed intake, daily water consumption, fold cleaning, symptoms general appearance, and separation after disease. One hundred owners were interviewed when they brought their goats to the hospital. Results showed that 47% of owners were young ranging from 21 to 40 years old while 53 % were old ranging from 41 to 60 years old. Low-educated owners (63 %) provided their goats' medication without prescription (37%), no change in animal food (86%), or provided low-quality food (77 %) and fed their animals twice per day (68 %). In addition, low- educated owners provided their goats with straw (60%) together with little animal house cleaning (54 %) Moreover, low-educated owners did not separate their goats from the herd (84 %) when compared with better-educated owners (16 %). On the other hand, the better-educated owners (37%) were found to give more care to their goats by providing better welfare by treatment with prescription (63 %), changing animal food (14 %), providing high-quality food (23 %), free access to food (32%), cleaning goats house regularly (54 %). We concluded that goats in Nyala city suffer due to insufficient welfare reflected in the feeding system, medical care, house cleaning, and separation of diseased goats from healthy goats which was obviously associated with educational levels. Thus, veterinary services, extension, and owner awareness are needed to improve owners' perception of their diseased goats' welfare.

Poster N° 24

Assessment of human beliefs, value and practice towards animal welfare in 21st century, Sub- Saharan Africa

Oluwafemi Babatunde Daodu[1,2*], Michael Akagbe[2]

[1] Department of Veterinary Microbiology, Faculty of Veterinary Microbiology, University of Ilorin, Ilorin, Kwara State, Nigeria.
[2] United Missionary Church of Africa Theological College, Ilorin, Kwara State, Nigeria
[*] Presenting author: daodu.ob@unilorin.edu.ng

Human welfare has extensively been investigated in various strata of life and globally. However, despite the growing concerns for animal welfare in the world, the investigation of the human perspective to animal welfare is yet underdeveloped in Sub-Saharan Africa. This study assessed human beliefs, values and practice in relation to animal welfare in 21st century, Nigeria, Sub- Saharan Africa. A pre-tested structured questionnaire was administered using a created Google form that was distributed through different social media platforms. A total of 503 participants were recruited from thirty states of the country and the Federal capital territory, Abuja, covering about 28 major ethnic/tribes of the country. This study revealed several misconceptions which foster habits and behaviors that endanger animals in Nigeria, putting them at disadvantaged positions in society. Among companion animals, cat received the highest entry under the category of 'unwanted' where 95.2% of the respondents do not want them and 38.9% consider them evil. Also, respondent's perception of cat being evil was significantly higher than same for dog ($p<0.0001$). Among wild animals, Snakes are perceived as most evil while others such as Bats, Vultures and Snakes included are considered the most irritating when seen. These perceptions have resulted in actions such as torture or killing of such animals as some respondents believe the presence of these aforementioned animals in human dwelling symbolizes evil. Several respondents (64%) believe that animals do not have feelings like humans and therefore cannot experience or express emotions (pain). Furthermore, 22.8% of our respondents agree to their tendency of transferring intense emotions such as anger to animals in cases of misbehaviors while a few others (11.2%) conceded to beating animals in a bid to show their superiority. While few participants (36%) approved trophy hunting, many (90.1%) believed that animal killing has reduced wildlife population and might have led to extinction of some animal species. Most respondents (>79.7%) opined that animal health issues are poorly handled in Nigeria, of which evidences are seen in the manner with which many animal handlers maltreat animals through beating, poor feeding, poor housing, non-bathing and lock ups. Additionally, 84.5% of respondents advocated for appropriate punishment to be meted out to anyone who abuse animals' health standard. This study indicated the need for re- orientation and sensitization of the general populace in Nigeria, by religious/educational institutions and the government parastatals, of the dangers of these misconceptions towards animals and the society at large.

Poster N° 25

The effect of early pain experience on pain sensitivity later in life

Zimbábwe Osório-Santos[1,2*], Thomas Ede[1], Maria José Hötzel[2], Daniel M. Weary[1], Marina A. G. von Keyserlingk[1]

[1] Animal Welfare Program, University of British Columbia, Canada
[2] Laboratório de Etologia Aplicada e Bem-Estar Animal, Universidade Federal de Santa Catarina, Brazil
[*] Presenting author: zimbabweosorio@gmail.com

In humans, early painful experiences can increase pain sensitivity later in life, but little is known regarding this phenomenon in cattle. This study aimed to assess if the removal of one horn bud early in life affects the pain sensitivity responses after the removal of the second horn bud four weeks later. Twenty female and six male Holstein calves were pseudo-randomly assigned to control or treatment conditions. At 9.5±1.9 days old all calves were given multimodal pain control (xylazine, lidocaine corneal nerve block, and meloxicam). Treatment calves then had one horn bud removed using caustic paste; control calves were sham disbudded. Four weeks later all calves had their contralateral horn bud disbudded using a hot-iron, multimodal pain control was provided again. Mechanical nociceptive threshold (MNT) changes were assessed using an algometer applied adjacent to both horn buds and on the rump at a constant pressure of 1 kg-force/s, beginning 3 days before the first disbudding and ending 30 days after the second disbudding. Data were root squared transformed and analyzed using mixed models. Wounds were photographed weekly and later scored. The MNT assessed 5 hours after caustic paste application (i.e., the first disbudding) decreased compared to baseline (mean of the last two measures before each disbudding) in the treatment calves (1.27±0.07 to 0.85±0.11, $p<0.001$) but not in the control calves. No MNT changes were found in the other regions. Treatment calves showed reduced pain thresholds compared to control calves during the 4 weeks that followed (1.20±0.07 control vs 0.99 ±0.04 treatment, $p=0.02$). Following the second disbudding, both groups showed a marked drop in MNT 5 hours after hot-iron disbudding on the contralateral bud compared to the baseline (1.19±0.04 to 0.68±0.04, $p<0.0001$), with no evidence of treatment differences. For treatment calves, rump MNT increased 5 hours after hot-iron disbudding (from 1.37±0.06 to 1.66±0.07, $p <0.001$); no difference was detected on the previously disbudded side. Only 2 caustic paste wounds were healed over the experimental time, and 7/11 still exhibited necrotic tissue attached to the scalp. Thirty days after hot-iron disbudding none of the wounds were healed; however, 9/11 and 5/11 wounds reached the granulation stage in the control and treatment groups respectively. These results indicate that caustic paste wounds remained sensitive and all the calves experienced pain sensitivity after hot- iron disbudding; high sensitivity following this second disbudding may have caused a ceiling effect, limiting our ability to detect treatment differences.

Poster N° 26

Consumers' awareness of piglet castration and attitudes towards alternatives to surgical castration: results from North Macedonia

Dimitar Nakov[1*], Metodija Trajchev[1], Branislav Stanković[2], Marko Cincović[3], Slavča Hristov[2]

[1] Ss. Cyril and Methodius University, Faculty of Agricultural Sciences and Food, Skopje, Republic of North Macedonia
[2] University of Belgrade, Faculty of Agriculture, Department of Animal Science, Zemun-Belgrade, Serbia
[3] University of Novi Sad, Faculty of Agriculture, Department of Veterinary Medicine, Novi Sad, Serbia
[*] Presenting author: nakovd@fznh.ukim.edu.mk

One of the most challenging welfare problem in pig production is surgical castration of male piglets without the use of anesthesia and analgesia. Farmers in North Macedonia are traditionally castrated their male piglets surgically unanesthetized in the first week of life, mainly to avoid the unpleasant boar taint of pork and to reduce male-specific behaviour, and this procedure is still common in most Western Balkans countries. Alternatives for avoidance of surgical castration in pig production are raising entire males or immunocastration. In order to provide an overview of consumer perception towards surgical castration and their alternatives, an exploratory survey was carried out involving 130 randomly selected consumers from April to June 2021 via an online questionnaire. The recruitment of the consumers was done through an existing network of professional and family acquaintances in an extended way, by further dissemination of the questionnaire through their networks. The questionnaire was development in COST IPEMA network and included statements related to consumption of pork meat, purchasing habits, awareness of piglet surgical castration and knowledge toward alternatives of castration. Respondents were asked to fill in socio-demographic information and their professional or personal connection to animal production. The most of the respondents were situated in urban area, therefore the results couldn't be generalized for rural people. Overall, 72% of the respondents were confident that the meat they eat is safe. The most of the respondents (75%) had a positive attitude towards the use of vaccines in pig production. The majority of the respondents (62%) indicate that they did not know how male piglets are mainly produced. Overall, 45% of the respondents indicated to be aware of versus 55% unaware of the practice of piglet castration. Surgical castration without pain relief (47.3%) and rearing entire males (53.5%) showed the lowest acceptability. Within the alternatives castration with anaesthesia was broadly accepted by the respondents. Most respondents indicated that the lowest price is not crucial in decision to buy pork but good taste is primary. Three clusters could be defined based on the respondents' agreement to the different statement for each of the alternatives to surgical castration. However, after being informed, the majority wanted unanesthetized castration to be banned. In that context, a moderate to very high acceptability can be expected from the alternatives, if performed according to the best practices.

Poster N° 27

Effects of group size on the social experience of dairy cows

Joseph Krahn*, Borbala Foris, Kehan Sheng, Daniel M. Weary, Marina A. G. von Keyserlingk

Animal Welfare Program, Faculty of Land and Food Systems, The University of British Columbia, 2357 Main Mall, Vancouver, BC, V6T 1Z6, Canada
** Presenting author: jkrahn@student.ubc.ca*

Intensively-housed dairy cows are typically kept in groups based on stage of lactation and regularly engage in agonistic interactions over resources such as fresh feed. Receiving agonistic interactions can disrupt individual feeding behaviour and may negatively affect the animal's physical and psychological health. There is a well-established relationship between increased stocking density and the frequency of agonistic interactions in group-housed cattle. However, little is known about how group size per se affects the frequency of these behaviours. We investigated if housing cows in smaller groups, while maintaining a constant stocking density, reduces the number of agonistic interactions. We followed 2 replicates of 50 cows through 2 group-size treatments. In treatment 1, cows were kept in one group of 50. In treatment 2, these same cows were divided into 5 groups of 10, maintaining the same stocking density. We used a validated algorithm to determine replacements (i.e., agonistic interactions that result in one cow leaving the feed or water bin and another taking her place). We used these replacements to calculate individual Elo-ratings (a type of dominance score) for each cow and used this to categorize cows into 5 dominance categories. To ensure a consistent Elo-rating distribution between treatments, 2 cows from each dominance category were randomly assigned to each small group in treatment 2. We used the last 3 days in each treatment for analysis. A Student's t-test was used to compare the average daily number of replacements received in the two treatment conditions. We found that cows received more replacements in larger groups ($t_{1,9}$= 5.51, p= 0.0004); the average daily number of replacements received per cow was 11.9 ± 0.6 (Mean ± SE) in Treatment 1 vs. 8.4 ± 0.5 (Mean ± SE) in Treatment 2. We also noted that the effect of treatment was not consistent in the two replicates; differences in the average daily number of replacements received per cow in Treatment 1 vs. Treatment 2 were greater in Replicate 2 (5.2 ± 0.6; Mean ± SE) than in Replicate 1 (2.1 ± 0.6; Mean ± SE). We speculate that the stronger effect of treatment in the second replicate was due to higher ambient temperatures during treatment 2 of this replicate. Our findings suggest that at a constant stocking density, reducing the number of social partners can reduce the frequency of agonistic behaviours. Housing cows in smaller groups may be a practical method of reducing social stress.

Poster N° 28

Can an oral probiotic affect the performance and feeding behavior of crossbred Holstein x Angus calves?

Gustavo Mazon*, Mackenzie Berry, Joao H.C. Costa

University of Kentucky, Lexington, Kentucky, USA
**Presenting author: gustavomazoncalves@gmail.com*

Megasphaera elsdenii probiotics can aid cows in risk of subacute ruminal acidosis. Thus, we aimed to evaluate the effects of a probiotic capsule (Megasphaera elsdenii NCIMB 41125; Lactipro FLX Calf, MS Biotec) on the performance and feeding behavior of calves. This study was conducted at the University of Kentucky between August 2020 and April 2021. Thirty-one Holstein x Angus calves (45.3±7.1 kg; 8.2±2.0 days old) were enrolled in a 76-day randomized trial in two blocks. Calves were assigned one of three treatments: placebo (ME0), probiotic administration on day 15 (ME15), or on days 15 and 39 (ME15+39). Calves were individually housed with unlimited access to water and calf starter. Calves were fed 7L of milk replacer daily divided in two meals until day 41. On day 42, milk was reduced in half (3.5L/day) and then calves were weaned on day 56. Calf starter intake was calculated by disappearance. Cameras (Moultrie M-40i) recorded the calf starter and water buckets in 1-minute intervals on days 13, 32, 53, and 67. Behaviors were classified as: eating, drinking, or oral behaviors. Eating and drinking behaviors were defined as the calf having its muzzle inside the calf starter or water bucket. Oral behaviors were classified as the calf licking the pen walls or buckets. The effects of the probiotic were determined using mixed linear models. The model included treatment, enrollment weight, enrollment age, immune status, if the calf was ever treated with antibiotics, study period, and a treatment by period interaction. Study period was specified as a repeated measure and calf as subject, using a compound-symmetry structure. Block was a random factor. Calves receiving the probiotic had greater daily calf starter dry matter intake (ME0=1.17±0.13, ME15=1.62±0.13, ME15+39=1.68±0.11 kg/d; P=0.01). There was a significant treatment by period interaction for calf starter intake where calves receiving the probiotic had greater intakes during the weaning (P=0.01) and post-weaning (P<0.01) periods. Calves receiving the probiotic spent more time drinking water (ME0=2.46±1.20, ME15=6.32±1.19, ME15+39=6.73±1.08 min/d; P=0.03). However, time spent eating (ME0=38.09± 4.75, ME15=37.51±4.68, ME15+39=40.86±4.45 min/d; P=0.75) or performing oral behaviors (ME0=32.96±4.53, ME15=31.74±4.75, ME15+39=21.31±3.82 min/d; P=0.14) did not differ between treatments. No treatment by period interactions was seen for eating (P>0.45). However, we observed a significant treatment by period interaction for drinking (P=0.03). Overall, the probiotic increased calf starter intake and the time the animals spent drinking water but had no effect on the time spent eating or performing oral behaviors.

Poster N° 29

Effect of enrichment on change of behaviour and cortisol level in Hanwoo (Korean native cattle)

Jung-hwan Jeon*, Ki-hyun Kim, Ju-lan Chun

National Institute of Animal Science, Rural Development Administration, Wanju, 55365, Republic of Korea
**Presenting author: jeon75@korea.kr*

Recently, animal welfare has aroused sentiments and the installed of enrichment is basic in the livestock industry. The objective of this study was to determine the influence of enrichment (cow brush) on change of behaviour and cortisol level in Hanwoo (Korean native cattle). In this study, Ten Korean native cattle were randomly divided into two groups (n=5 each) and allocated to either practice pen (5×10m) or with enrichment (cow brush). Their ages were between 45~67 months. The behaviours of cattle were recorded using 12 CCD cameras and digital video recorder from 17 April to 30 June in 2020. We monitored for 24 h per day at 2, 4, 6 and 8 weeks. The behaviours were scanned every 2 min to obtain an instantaneous method. The blood samples were collected at 2, 4, 6 and 8 weeks in the morning (09:00~09:30). Serum was obtained by centrifugation from blood in the serum vacutainer tube. The cortisol was determined using a commercially available ELISA Kit. The proportion of scratching with head was 46%, the proportion of scratching with body was 38%, the proportion of scratching with neck was 14% and with rear was 2% in Korean native cattle. Aggression behavior was no difference between treatment and control group ($P > 0.05$). A cortisol level in treatment group decreased from 1st week (about 32.4 ng/mL) and reached its lowest level on 8th week (about 9.8 ng/mL) ($p < 0.05$). In 8th week, cortisol level in treatment group was lower than cortisol level (about 30.3 ng/mL) in control group ($p < 0.05$). We observed that cow brush might help satisfy the behaviour and keep clean, as well as probably reducing cortisol level. These results suggest that the cow brush is expected to be suitable as enrichment for Hanwoo in Korea. However, further study on the assessment of enrichment for Hanwoo would be useful.

Poster N° 30

Effect of alternative farrowing pens with temporary crating on the performance of lactating sows and their litters

Si Nae Cheon[1*], Jung Hwan Jeon[2]

[1] *Department of Animal Science, Gyeongsang National University, Korea*
[2] *Animal welfare research team, National Institute of Animal Science, Korea*
[*] *Presenting author: wns2546@naver.com*

This study was performed to development the alternative farrowing pen (AFP) and to investigate performance and behavior of lactating sows and their litter. A total of 64 multiparous sows were randomly divided into two groups and were allocated to farrowing crates (FCs) and AFPs on day 7 prepartum from the expected farrowing day. The AFPs contained a crate and support bars that could be folded to provide the sows with extra space on day 5 postpartum. Some piglets were cross-fostered immediately after parturition so pens or crates would contain no fewer than nine and no more than twelve piglets. Behavior was recorded by charge-coupled device cameras and digital video recorders, and the data were scanned every 2 min to obtain an instantaneous behavioral sample. Farrowing systems did not affect feed intake, back-fat thickness, litter size and piglet weight at birth and weaning ($p > 0.05$). In addition, there were no differences in the number of crushed piglets between the two farrowing systems ($p > 0.05$). However, the weaning-to-estrus interval was shorter in the sows of the AFPs than in thous of the FCs ($p < 0.05$). The sows spent most of their time lying down during the lactating period, at about 80% lateral recumbency and 10–15% ventral recumbency. The only significant differences were in the feeding and drinking behavior between sows in the two farrowing systems ($p < 0.05$). The FC sows displayed more feeding and drinking behavior than the AFP sows, especially in the late lactating period ($p < 0.05$). Piglets in the FCs tended to spend more time walking than piglets in the AFPs ($p < 0.05$), whereas there were no differences in suckling and lying behavior between piglets in the two farrowing systems ($p > 0.05$). It is concluded that the AFPs with temporary crating until day 4 postpartum did not negatively affect performance and crushed piglet compared with the FCs. It also may improve animal welfare by allowing sows to move and turn around during the lactating period. Further research is needed to find suitable housing designs to enhance productivity and animal welfare.

Poster N° 31

The impact of cross-fostering on teat order in fostered piglets and residents

Lara Pajžlar, Janko Skok, Dejan Škorjanc, Maja Prevolnik Povše*

University of Maribor, Faculty of Agriculture and Life Sciences, Department of Animal Science, Pivola 10, 2311 Hoče, Slovenia
** Presenting author: maja.prevolnik@um.si*

Cross-fostering (C-F) brings changes in the social environment of suckling piglets and inevitably affects the suckling process. Two aspects of suckling behaviour are of crucial importance: suckling activity itself and suckling order. While some studies have been conducted on suckling activity after C-F, there is a lack of information on the effects of C-F on the suckling order that piglets establish during lactation. This preliminary study therefore investigated whether piglets maintain their suckling position when C-F and thus changes in the social structure of the group are implemented. A total of 226 piglets from 22 litters of different sizes (median=11, range 6-13) and ages (median=4 d, range 2- 8) participated in the experimental C-F. Two litters were assigned to the single repetition (11 repetitions in total), and four piglets from each of these litters (two lightest and two heaviest) were mutually exchanged. The suckling position (teat pair and suckling area; i.e. anterior: the first two teat pairs, middle: teat pairs three to five; and posterior: teat pairs six and more) was recorded in one suckling session before, which we chose as the (closest) reference point for comparison (pre- CS; CS stands for cross-suckling) and two after C-F (CS1 and CS2). According to the results, resident piglets generally suckled successfully after C-F (> 95%) and mostly stayed on the same suckling area despite C-F (75.4% in CS1 and 68.8% in CS2 compared to pre- CS). On the other hand, significantly fewer fostered piglets (58% and 75%; $p < 0.05$) managed to suckle successfully during CS1 and CS2, respectively, and changed suckling area to a large extent after C-F. Of the piglets that were able to suckle successfully, about half suckled in the same suckling area as before C-F. Overall (in relation to all three suckling sessions), 65% of the residents did not change their position, while 27% did. In the case of fostered piglets, it was only 53% of piglets with all three successful sucklings, of which two- thirds changed their suckling position at least once. In conclusion, C-F appeared to disrupt teat order, with greater effects in the fostered piglets. However, changes in the suckling position of the residents should not be neglected. The extent of the changes is likely to depend on the degree of overlap in the piglets› preferred suckling position. We suggest that this should also be taken into account when implementing C-F.

Poster N° 32

Effect of different light intensities on the activity patterns of growing-finishing pigs

Alice Scaillierez[1*], Sofie van Nieuwamerongen - de Koning[1], Iris Boumans[1], Rik van der Tol[2], Eddie Bokkers[1]

[1] Animal Production Systems group, Wageningen University and Research, the Netherlands
[2] Farm Technology Group, Wageningen University and Research, the Netherlands
[*] Presenting author: alice.scaillierez@wur.nl

Light is known to be an important environmental factor regulating the secretion of melatonin. This hormone is synthetised in absence of light to trigger the circadian sleep/wake cycle and therefore the diurnal patterns of activity. EU welfare regulation imposes a minimal threshold for light intensity in pig barns of 40 lux. However, knowledge about pigs' behavioural response to light intensity is limited and so far, literature shows mainly studies of light intensities up to 600 lux. The objectives of this study were to assess if light intensity impacts pigs' activity and how pigs adapt their activity patterns over time. Four artificial light treatments were tested in two batches of growing-finishing pigs (2x16 pens with 7 pigs each). Light intensity at pig eye level was low (46 lux), medium (203 lux) or high (988 lux) with a homogeneous light distribution within each pen. A fourth treatment consisted of a spatial gradient of intensity ranging from 72 lux in the front part of the pen to 331 lux in the back. The photoperiod (11L:13D) and light spectrum provided by customizable LED-based luminaires were similar amongst treatments. Video data were collected on the sixth and tenth week of the growing-finishing phase. Active behaviour was observed through scan sampling every 20 minutes for 24 hours and pigs were considered active when they were moving, interacting with their environment or with pen mates either in standing, sitting or lying position. For each scan and each pen, a group activity score in percentage was obtained by dividing the amount of pigs active over the amount of animals present in each pen. Differences in group activity per light treatment were tested using the Kruskal-Wallis test. Preliminary results based on batch 1 demonstrate that group activity did not differ between intensity treatments ($p=0.59$). In accordance with literature, pigs became less active over time with a group activity of 23.4% in week 6 compared to 19.0% active pigs in week 10 ($p<0.001$). Graphical representation of activity patterns show a clear diurnal rhythm with most activity occurring during light period. It seems that pigs exposed to low light intensity were active earlier compared to higher intensities, however more data and further analysis are needed to confirm this. In conclusion, preliminary results show that pigs' active behaviour decreases with time, but light intensity does not clearly affect group activity. Also, pigs exposed to dim light seem active earlier in the morning.

Poster N° 33

Effects of light intensity on space use and pen fouling in growing-finishing pigs

Sofie van Nieuwamerongen - de Koning[1*], Alice Scaillierez[1], Iris Boumans[1],
Rik van der Tol[2], Eddie Bokkers[1]

[1] Animal Production Systems group, Wageningen University and Research, the Netherlands
[2] Farm Technology Group, Wageningen University and Research, the Netherlands
[*] Presenting author: sofie.vannieuwamerongen-dekoning@wur.nl

Correct use of functional areas intended for resting, defecating and urinating limits environmental emissions and supports pig health and welfare. The role of light intensity in guiding pigs to properly use functional areas has been underconsidered so far, although there are indications that pigs prefer to rest in dimmer areas and defecate in brighter areas. We investigated how space use and pen fouling are affected by four different light treatments, consisting of a low, medium and high light intensity with a homogeneous distribution across the pen (averaging 46, 203 and 988 lux, respectively) and a spatial gradient with an intensity ranging from 72 lux in the feeding area to 331 lux in the dunging area. We studied 2 batches of commercial growing-finishing pigs that were subjected to the four light treatments applied in four separate rooms (n=8 pens per room per batch, with 7 pigs per pen). Pen fouling and space use were recorded on a weekly basis during 12 weeks. Preliminary results of the first batch were analysed with mixed models including light intensity and week of observation. Repeated observations on the same pens were taken into account by including a repeated effect of sampling hour and observation week. Results indicate that fouling with faeces and urine of the resting and feeding area increased with age ($p<0.0001$) but no effect of light intensity was present. On average, the percentage of floor area covered in faeces and wets spots was 5.6±0.2% and 37.2±1.0% respectively (mean±SEM). Concerning space use, a 24-hour period was analysed in both week 6 and 10 of the finishing phase, using instantaneous scan sampling with 1h-intervals. Preliminary results indicate that light intensity did not affect the occurrence of lying in the dunging and feeding area, but lying in the dunging area significantly increased from week 6 to week 10 (24.0±0.01 vs. 27.9±0.01% of pigs per pen per sampling hour, $p<0.001$). This may be caused by avoidance of increasingly fouled pen areas or changed preferences towards a cooler microclimate within the pen, as the upper critical limit for heat stress lowers with increasing body weight. The average percentage of pigs lying in the resting area was higher ($p<0.05$) for the medium intensity (39.1±0.01%) than for the low intensity (27.2±0.01%) and spatial gradient (27.8±0.01%). This points towards improved space use under light conditions of medium intensity, however this can only be verified after including data from batch 2.

Poster N° 34

How to increase pig and pen cleanliness and reduce ammonia concentration on fattening pig farms

Marko Ocepek*, Inger Lise Andersen

Norwegian University of Life Sciences, Faculty of Biosciences, Dept. of Animal & Aquacultural Sciences, 1432 Ås, Norway
**Presenting author: marko.ocepek@nmbu.no*

Inappropriate eliminating on resting area has a negative effect on the environment, the cleanliness of pigs and pens and can impair farm productivity. There are several environmental and ambient factors that can affect pig eliminative behaviour and, thus, to systematically study these factors on farm is of great importance. The objective of this field- study was to investigate the effects pen design (pen partitions (open (slatted) or closed (solid)), and space pr pig (m2)), type of rooting material (chopped or long straw, silage, hey, newspaper, or wood shavings (class 1 = not provided; class 2= provided)), amount of litter in the resting area (class: 1-5), ambient temperature (Mean±SE: 17.9○C; range: 11-30.3°C), and air velocity (Mean±SE: 0.11 m/s; range: 0.0-0.42 m/s) on cleanliness of the pen (class 1:>40% of the floor covered with manure; class 2: between 10≥40 % of the floor covered with manure; class 3: less than 10% of the floor soiled; Mean±SE: 1.5±0.0; range: 1-3) and the pigs (less than 10% of the body surface soiled; Mean±SE: 69.4±1.4%; range: 0-100%) and ammonia concentration (Mean±SE: 4.1±0.5 ppm; range: 3-74 ppm). The present survey was conducted in accordance with the legal requirements for keeping fattening pigs in Norway. Data was collected from 87 pig farms (n=5769 pigs; n=643 pens) across Norway and analysed using mixed (ammonia concentration) or generalized linear (pen and pig cleanliness) model in SAS. The cleanliness of the pigs was higher when pen partitions in the eliminative area were open compared to closed (Mean ± SE: 72.9±1.4 vs 19.6±5.2; P=0.007, respectively). The pig cleanliness increased with increasing space per pig in the resting area (P<0.001), with decreasing temperature (P<0.001), and lowering of air velocity (P=0.003). Other factors that increased cleanliness was using straw as rooting material (P=0.028) and increasing amount of litter in the resting area (P=0.002). Pen was cleaner when pen partitions were open compared to closed (Mean ± SE: 2.1±0.1 vs 1.4±0.0; P=0.010, respectively) and with increased space pr pig in the eliminative area (P<0.027), using straw (P=0.002) or silage (P=0.003) as rooting material, and with increasing amount of litter (P=0.002). Ammonia concentration was reduced with increasing floor space in the eliminative area (P<0.001), decreased floor space in resting area (P<0.010), and increasing amount of litter (P=0.006). Our results pinpoints which factors that are affecting pig and pen cleanliness and ammonia concentration, and these factors should be taken into consideration when designing future pig facilities.

Poster N° 35

Particle and protein sorting in mixed rations by sheep and goats within two hours after feeding

Roxanne Berthel[1*], Frigga Dohme-Meier[2], Nina Keil[1]

[1] Centre for proper housing of ruminants and pigs, Federal Food Safety and Veterinary Office, Agroscope, Ettenhausen, Switzerland
[2] Agroscope, Ruminant Research Group , Posieux, Switzerland
[*] Presenting author: Roxanne.berthel@agroscope.admin.ch

In indoor feeding, feed sorting behaviour of small ruminants leads to decreasing feed quality of the provided ration over time. This study analysed the extent of feed sorting of dairy sheep and goats in mixed rations (MRs) of varying cutting length within 2h after feed delivery. Three different MR were tested consecutively and each was compared in two cutting-length-variants of long (6-8 cm) and short (3-4 cm). The first MR consisted of 1st- and 2nd-cut grass-hay (HH; dry matter ratio 50:50), the second of grass-silage and grass-hay (GH; 50:50), and the third of corn-silage, grass-silage and alfalfa-hay (MG; 40:55:5). Experimental animals were 24 sheep and 24 goats, non-lactating, tested in pairs and habituated to each MR for 14 days, alternating the two variants daily. Thereafter they received each variant for five days, with every second pair receiving the variants in reversed order. Feed samples of rations and 2h-leftovers were taken on days four and five. With the fractions retained on each level of a particle separator, a mean particle size (mPS) of each sample was calculated. Samples were additionally dried (24h, 60°C) and analysed for crude protein content (CP). Two linear-mixed–effect-models per MR estimated the interactive effects of time (ration vs. leftovers), species and variant on 1) the mPS and 2) the CP. We expected an increase in mPS and a decrease in CP, and a higher degree of feed sorting in long variants and for goats compared to short variants and sheep. Across all MRs, contrary to the expectations, animals sorted for larger particles in the long variants, but as expected short variants were sorted less (interaction variant:time HH: $p<0.001$; GH: $p<0.001$; MG: $p<0.001$). Sorting for particle length did not differ between species (HH: $p=0.22$; GH: $p=0.12$; MG: $p=0.14$). The sorting for CP was on a similar level between variants of HH, but for GH and MG stronger in the long than the short variant (interaction variant:time HH: $p=0.1$; GH: $p<0.01$; MG: $p<0.01$). Sheep sorted for CP in all MR, whereas goats sorted for CP only in MG (interaction species:time HH: $p<0.01$; GH: $p<0.001$; MG: $p=0.28$). These results show that sheep as well as goats change the quality of MRs within only two hours after feed delivery even if feed components are short cut. If a herd cannot feed simultaneously, individuals that have to feed later will eat poorer quality feed with implications for their welfare.

Poster N° 36

Feeding behaviour of sheep and goats on mixed rations varying in cutting lengths

Roxanne Berthel[1], Frigga Dohme-Meier[2], Nina Keil[1*]

[1] *Centre for proper housing of ruminants and pigs, Federal Food Safety and Veterinary Office, Agroscope, Ettenhausen, Switzerland*
[2] *Agroscope, Ruminant Research Group , Posieux, Switzerland*
[*] *Presenting author: nina.keil@agroscope.admin.ch*

To reduce feed sorting in indoor feeding of ruminants, homogenous mixed rations (MR) are produced by short cut components. Too short fibrous feed particles can impair functioning of the rumen, which has negative welfare implications. This study compared feeding and rumination of dairy sheep and goats fed with long and short cut variants of three different forage based MR each. Three different MR were tested consecutively. The first MR consisted of 1st and 2nd cut hay (HH; dry matter ratio 50:50), the second of grass-silage and hay (GH; 50:50), and the third of maize silage, grass-silage and alfalfa hay (MG; dry matter ratio 40:55:5). Each MR was offered in two variants, where hay and/or grass-silage, were either cut long (6-8cm) or short (3-4cm). Experimental animals were 24 non-lactating dairy sheep and goats each, fed in pairs. All animals were habituated to both variants of a MR before the experiment by alternating between the variants daily for 14 days. Animals received each variant for five days, with every second pair receiving the two variants in reversed order. Feeding and rumination behaviour was monitored for two 24-hour periods on day four and five by automatically recording jaw movements. Three linear-mixed-effects-models per MR estimated the interactive effects of species and the variant on 1) daily duration of feeding (F), 2) rumination (R) and 3) bites per bolus (BpB). On average sheep and goats, respectively, fed 5.1(±1,4 standard difference)h/day and 5.0(±0.9)h/day, ruminated 7.2(±1.7)h/day and 5.2(±1.2) h/day, and had 69.7(±10.5)BpB and 63.8(±9.0)BpB. Across all MR, no relevant species nor variant effect on F was evident (variant HH/GH/MG: $p=0.54/0.77/0.11$; species HH/GH/MG: $p=0.05/0.13/0.06$). R was higher in sheep than goats (HH/GH/MG: +1.9/2.5/1.7h/day, all $p<0.01$) with no effect of the variant detectable (HH/GH/MG: $p=0.89/p=0.62/p=0.49$). Sheep used more BpB than goats in GH (+8.2BpB, $p=0.01$) and MG (+11.4BpB, $p<0.001$) but not in HH ($p=0.50$). For HH and GH, differences in BpB between variants were not detectable (HH/GH: $p=0.48/0.61$). In MG however, both species used less BpB for the long than for the short variant (–3.1BpB, $p<0.01$). The values assessed are in the range reported from the literature and support earlier findings, that sheep ruminate longer than goats, but have a similar number of bites per bolus. A negative effect of the short compared to the long variants was not supported, so that a cutting length of 3-4cm should still allow for species-specific feeding behaviour with the forages used.

Poster N° 37

Assessment of feeding, drinking and nest box usage of laying hens in response to routine vaccination

Azadeh Jalali[1*], Klara J. Grethen[2], Laura Candelotto[3], Yamenah Gomez[4], Michael Toscano[5]

[1] Farm Veterinary Medical Service
[2] ZTHZ, Division of Animal Welfare, VPH Institute, University of Bern, Burgerweg 22, 3052 Zollikofen, Switzerland.
[3] ZTHZ, Division of Animal Welfare, VPH Institute, University of Bern, Burgerweg 22, 3052, Zollikofen, Switzerland
[4] Center for Proper Housing: Poultry and Rabbits (ZTHZ), Division of Animal Welfare, VPH Institute, University of Bern, Burgerweg 22, 3052 Zollikofen, Switzerland
[5] Center for Proper Housing: Poultry and Rabbits, Division of Animal Welfare, University of Bern
**Presenting author: Jalaliazade@gmail.com*

Vaccinations are a standard procedure for commercial laying hens where responses could be used as a phenotype for health resilience. The current study observed feeding, drinking, and nestbox usage of individual birds in response to a standard vaccination with the expectation that these behaviors would decrease in the period after vaccination. Two pens, each containing 225 Dekalb White laying hens were used within a commercial barn adapted for research. Within each pen, 18 birds were individually identified by coloured backpacks assigned 2 weeks after population. At 38 weeks of age, the birds received a standard vaccine (IB 4/91) via the drinking water following a two-hour period (0800 – 1000) when the water is turned off to ensure vaccine uptake. Video recordings were made on the pre-, post-, and vaccination days from three cameras placed overhead that gave a comprehensive view except inside and underneath the aviary itself, i.e., approximately 25% of the feeder and drinkers were not visible. From the recordings, time observed feeding, drinking, and in the nestbox was quantified for all focal hens during daylight hours (15 hours/day). Recordings for each day was used to calculate total durations and number of bouts separately for the day light periods before (0200-0759), during (0800-0959), and after (1000-1700) to control for the water deprivation immediately before vaccination. Data was analysed using mixed models and Tukey›s test for post-hoc comparisons. For nestbox usage, only the period before water deprivation was analysed on account of peak egg-laying period. Total duration of nestbox usage the day after vaccination tended to be less than the pre-vaccination day ($p = 0.071$) with all other periods similar across times and days ($p > 0.2$). There was no difference in the average number of nesting bouts ($p > 0.2$). The decrease in total nestbox duration could be explained by a general malaise over birds. Although not evaluated, care staff have reported a small reduction in egg laying the day after vaccinations suggesting lingering effects of vaccination. We found no change in feeding and drinking behavior despite our expectations. Although the vaccine was live attenuated, administration through the water supply is considered less physiologically demanding and could explain the lack of impact. Given the observation of group-level responses observed in the current work, future research should more directly examine the individualized variation in responses to different vaccines and at different ages.

Poster N° 38

Perch use and leg health measures of slow-growing broiler chickens provided with perches and outdoor access

Hanh Han Quang*, Xuan Nguyen Thi, Ton Vu Dinh

Faculty of Animal Science, Vietnam National University of Agriculture,Vietnam
** Presenting author: hqhanh@vnua.edu.vn*

Provision of perches and outdoor access for slow-growing broiler chickens is increasingly popular in Vietnam, but its effects on bird welfare are insufficiently evaluated. A total of 300 local crossbred chickens at five weeks of age was equally assigned to four housing systems: Indoor with perches (IP), indoor without perches (INP), outdoor with perches (OP), and outdoor without perches (ONP) with three replicates. A bamboo platform perch with a dimension of 3m x 0.8m x 0.15m in length x width x height was installed in the corner of the room in IP and OP treatments. In outdoor access treatments (OP and ONP), chickens were able to free access to the yard from 6 am to 6 pm every day during 6-13 weeks of age. Two trained assessors directly observed perch use by chickens in the daytime (8-9 am and 4-5 pm) and night-time (8-9 pm) during 30 minutes for each time point at 10 minute intervals after a 5-minute settling period. Gait score, footpad dermatitis, and hock burn were assessed and scored according to Welfare Quality assessment protocol for poultry (2009). Data were analyzed by General Linear Model using Minitab 16.0 software, and the Tukey test was used to compare the means among treatments. The percentage of birds perching was 20.9-25.6% on average from 6-13 weeks of age and not different between treatments ($P>0.05$) and between ages ($P>0.05$) during the daytime. Perch use significantly increased with age from 0.6-1.4% on average during 6-9 weeks of age to 34.0-38.1% on average during 10-13 weeks of age ($P<0.001$) in both IP and OP treatments during night-time. The mean scores of foot fat dermatitis in IP and OP treatments were lower than those in treatments without perches (INP and ONP) ($P=0.041$). However, mean scores of hock burn in treatments with perches (IP and OP) were higher than those in non-perch treatments (INP and ONP) ($P=0.019$). The gait score was not different among treatments ($P>0.05$). The provision of perch and outdoor access benefits the foot fat dermatitis but the hock burn dermatitis is affected.

Poster N° 39

Present scenario of poultry slaughter welfare at traditional and commercial farming in Bangladesh

Jalal Sarder*, Hemayatul Islam, Rashida Khatun, Abdulla Bhuyan, Afia Khatun, Reazul Islam, Ishrat Moni, Jashim Uddin

Faculty of Veterinary and Animal Sciences, University of Rajshahi, Rajshahi-6205, Bangladesh
** Presenting author: jalalnusa@yahoo.com*

Poultry farming is a rapidly growing agricultural sector in Bangladesh due to the huge demand for eggs and meat among middle-class people. The purpose of this study was to assess the welfare of poultry, housed and reared in traditional and commercial poultry farms in Bangladesh. A total of 100 poultry farms were selected for this study, including 60 traditional and 40 commercials (20 broiler and 20 layers), from 4 villages of Paba Upazila of Rajshahi division of Bangladesh. Farm visits and questionnaires were completed between January to March of 2022. Questioners included but were not limited to the number of poultry on a farm, the type of poultry housed in a room, and its density, farmhouse length, width, and height. The data were composed and compiled, and the windows SPSS program was used to obtain results. The average floor spaces of traditional chicken and duck farmhouses were 8.0±2.57 sq. ft and 11.5±3.54 sq. ft, respectively. In the case of mixed farming, the floor space of the house was 8.64 ±3.47 sq. ft. The floor spaces of commercial houses of layer and broiler were 225±25.5 sq. ft and 125.0±30.0 sq. ft, respectively. But in the cage layer systems, the floor spaces of houses were 432.0±28.0 sq. ft. The flock size of traditional chicken and duck were (number) 10.1±5.31, 3.0±3.29, whereas mixed flock size was 13.6±10.2. On the other hand, the floor space (sq. ft.) of the commercial broiler and layer (floor) were 300±50 and 1250±60, at the same time the cage flock was required 288±12 (sq. ft.) floor space. The end of the calculation observed that the average floor space of each traditional chicken and duck was 0.8±0.2, 3.8±0.25 sq. ft. Similarly, observed the commercial floor size of each broiler and layer were 0.75±0.30 sq. ft and 0.98±0.42 sq. ft, respectively. The survey observed that the floor space of the commercial cage was too limited, and it was 0.58±0.18 sq. ft/ birds. Ideally, floor space/ per poultry should be much more than our projected results. Due to less space than required (poor welfare), poultry in Bangladesh is more likely to feel stress, cannibalism, feather pecking, and sometimes even death.

Poster N° 40

Camera-based automatic cow identification using deep neural networks

Alexander Ulrichsen[1*], Brian Lee[2], Paul Murray[1], Stephen Marshall[1], Mark Rutter[3]

[1] *University of Strathclyde, Glasgow, Scotland*
[2] *Peacock Technology Ltd, Stirling, Scotland,*
[3] *Harper Adams University, Newport, UK.*
[*] *Presenting author: alexander.ulrichsen.2015@uni.strath.ac.uk*

Cow identification is a key phase in automated processing of cow video footage for behavioural analysis and tracking. Previous cow identification research has achieved up to 97.01% accuracy on 45 cows and 94.7% on datasets containing up to 200 cows. Recently, 99.3% cow identification accuracy has been achieved on a dataset consisting of 537 cows by training a Convolutional Neural Network using similarity learning. This type of training produces embedding vectors rather than class probabilities which are commonly used in a standard network. Another key element of similarity learning is the triplet loss function, which aims to maximise the embedding distances between challenging opposing classes while minimising embedding distances between the same classes. These traits, allow for the model to be trained more directly - producing more robust features – while also eliminating the need for re-training when new cows are introduced to the herd for identification. This is a desirable trait in a herd monitoring system where cows can change frequently. Research presented in this paper examines the performance of the aforementioned network on an entirely new dataset containing cows that were not utilized in training. The new dataset also exhibits higher visual variation than the initial dataset used for training the existing model. Our results show that the model can achieve accuracy comparable with other cow identification methods on a dataset containing entirely different cows from those used during training. This is important since the other work we refer to all achieve results by training and evaluating on datasets containing the same cows, which is obviously less challenging. We demonstrate the robustness of the features learned from training the model more directly using similarity learning over the standard classification network training approach and show the model is highly generalizable to new cows. We also examine the performance difference after the model has been finetuned on the new data for comparison between a general model and model specially tailored to the new dataset using similarity learning. Preliminary results show this novel approach has an accuracy of 96.2% with limited reference embedding samples for the classifier, and this can likely be improved with more samples. This demonstrates the potential of this approach for identification on any heard without the need to be specifically trained on the given cows.

Poster N° 41

The impact of ambient temperature on the drinking behaviour of dairy cows measured with ruminal sensors

Miroslav Kjosevski*, Vlatko Ilieski, Aleksandar Janevski, Aleksandar Dodovski

Faculty of veterinary medicine – Skopje, Macedonia
**Presenting author: miro@fvm.ukim.edu.mk*

The drinking behaviour in dairy cows might be affected by multiple factors such as feed, farm management, water flow and other factors. The ambient temperature in different seasons could significantly affect the amount of water needs and the drinking behaviour of cattle. Ruminal sensors, when applied as boluses that measure reticuloruminal temperature (RRT) in dairy cows might record water drinking at the moment when there is a sudden drop of RRT. The objective of this study was to detect potential differences in drinking behaviour between September and January based on the RRT in dairy cows. The study was conducted in one tie-stall farm with 50 dairy cows fed with silage and hey. SmaXtec bolus sensors were applied in the rumenoreticulum on six cows and continuous measurements of RRT were recorded for 30 days in September and January with a login interval of 10 minutes. Additionally, the air temperature and humidity were continually recorded in the stall for the same periods. Sudden drop of the RRT of 1^0C was an indication for water drinking. Two or more consequent drops of RRT were considered as one drinking bout. The comparisons between the average numbers of drinking bouts per day between the two seasons were made by Wilcoxon Signed-Rank Test. The ambient temperature in the September was 20.8±3.4^{0}C (from 11.8 to 28.7^{0}C) and the temperature humidity index (THI) was 66.5±4.2, while in January these parameters were 8.8±2.9^{0}C (from -0.4 to 17.2^{0}C) and THI = 49.6±4.3. The average number of drinking bouts per day/cow in September was 4.9±1.1 while in January was 6.35±1.2, which was not significantly different ($W=-15$, $p>0.05$). However, the seasonal comparison between the number of RRT drops, presented as an average drops per day, of all animals was significantly higher in January (16.4±3.3) than in September (9.6±3.5), $W= -21$, $p<0.05$. The results from this study indicate that there are no significant differences in the drinking frequency between the observed ambient temperatures, even though high in-stall air temperatures were present in September. However, this finding does not necessarily apply to the amount of drank water. The detected differences in the number of drops of RRT highlight the need for a more careful interpretation of the data from ruminal boluses.

Poster N° 42

Heat stress effects in dairy calf behavior: Association between elevated temperature-humidity index (THI) and behavior in dairy calves during the preweaning period

Emily M. Rice[1*], Melissa C. Cantor[1,2], Joao H.C. Costa[1]

[1] University of Kentucky, Department of Animal Sciences, Lexington, KY, USA,
[2] University of Guelph, Department of Population Medicine, Guelph, ON, Canada;
[*]Presenting author: emilyrice@uky.edu

This retrospective study investigated the association of heat stress with feeding behavior and activity levels of dairy calves. Holstein dairy calves (n=96) were offered up to 10 L/d milk replacer with an automated feeder (CF1000, Forster-Technik, Germany) for 50 days. Feeders recorded milk and starter intake and drinking speed. Daily activity behaviors (lying bouts, step count, activity index) were collected using a commercial pedometer (IceQube, IceRobotics, Scotland) attached to the hind leg. Daily average air temperature and relative humidity, measured by data loggers (HOBO Pendant, Onset, USA), were used to generate a daily temperature-humidity index. Heat stress was defined at THI ≥ 70 (NOAA, 1976). Data were collected from June 2018 to September 2019 excluding winter months (Dec-Feb). Average THI was 74.63 ± 2.42 and average air temperature was 25.05 ± 1.71°C. Repeated measures mixed linear regression models assessed the association of season and heat stress with milk intake, drinking speed, lying bouts, step count, and activity index. Models were created using passive immunity status as a covariate, fixed effects of feeder week and disease status, and calf as the subject. We observed that (56/96) calves experienced at least one heat stress bout. All behaviors were associated with season ($P \leq 0.01$). Using Bonferroni-adjustments for multiple comparisons, heat stress × week interactions were significant for all variables ($P \leq 0.01$). Milk intake was only different on week 1 ($P = 0.001$), where heat stressed calves drank less milk (5.08 ± 0.15 L/day) than non-heat stressed calves (5.95 ± 0.15 L/day). Drinking speed was different on weeks 5-7 with heat stressed calves having slower drinking speeds than non-heat stressed calves ($P \leq 0.001$). Daily lying bouts were different on weeks 1-4, with heat stressed calves having greater lying bouts when compared to non-heat stressed calves ($P \leq 0.01$). Differences for step count and activity index were observed in week 2 ($P < 0.001$), with heat stressed calves having higher step counts (462.71 ± 26.78 steps/day; $P = 0.001$) and higher activity index (2389.88 ± 159.95; $P < 0.01$) compared to non-heat stressed calves (338.84 ± 23.26 steps/day; activity index 1713.63 ± 143.64). Changes in activity levels during heat stress suggest that affected calves increase restless behaviors in comparison to non-heat stressed calves. The observed differences in feeding behaviors and activity levels within early life indicate that young calves express more behavioral variability while experiencing heat stress.

Poster N° 43

A study concept: Developing models from an optimised number of sensors used for the welfare assessment of dairy cows

Ena Dobrikj*, Miroslav Kjosevski

Animal Welfare Center, Faculty of Veterinary Medicine, Ss. Cyril and Methodius University, North Macedonia
** Presenting author: ena.dobrik@hotmail.com*

There is an enormous variety of sensors and different PLF technologies than can be applied for monitoring and welfare assessment of animals on farms. Protocols that are developed and used for the welfare assessment of animals are usually time consuming. Having numerous sensors and technologies of different varieties on the farm would probably lead to the most accurate results, however this would be financially unviable and an inefficient use of the sensors. Therefore, we propose a study concept that aims to create models with an optimised number of sensors and technologies that will assess the welfare of dairy cows based on the widely acceptable welfare criteria in the Welfare Quality® protocol. This concept will be carried out in five stages. The first stage – *Sensors*, will identify all applicable sensors that can be used to measure the welfare criteria in the Welfare Quality® protocol. This stage will be achieved by reviewing studies where the sensors have been applied, as well as selecting sensors that are able to measure welfare criteria on farms and/or principals defined in the Welfare Quality® protocol. The second stage – *Versatility*, will identify the most versatile sensors; meaning, they can be used to measure most of the welfare criteria in the protocol. After ending up with a list of sensors from stage two, the third stage, - *Ranking*, will rank these sensors based on their applicability (type of rearing system), accuracy, readability, reliability and price. The fourth stage - *Models*, will be to create models from the sensors, based on their versatility and ranking. These models will represent a combination of sensors with different levels of versatility and ranking and the end goal would be to measure most of the welfare criteria in the Welfare Quality® protocol. This would result in developing a few models that contain a set of sensors that can be applied for continuous real-time measurement of animal welfare. In the final *Testing* stage, the most promising developed models will be validated on dairy farms by comparing their findings with the findings from the standardised measures defined in the Welfare Quality® protocol. The models that result from this research can be applied on commercial farms for a more optimised continuous real-time monitoring of animal welfare of dairy cows.

Poster N° 44

Signs of bovine respiratory disease: A review of literature evaluating clinical illness scoring

Aiden Juge*, Courtney Daigle

Department of Animal Science, Texas A&M University, College Station, Texas, USA
**Presenting author: aidenjuge@tamu.edu*

The standard method for detection of Bovine Respiratory Disease (BRD) in beef and dairy cattle is visual observation of clinical illness signs. However, the signs used vary, and identification of illness may or may not be based on a formal scoring system. Sixteen studies of the effectiveness of clinical signs for BRD detection were identified via Google Scholar and Web of Science searches and citation tracing. Eleven studies examined beef cattle in feedlot settings and five examined dairy calves. Across all studies, nineteen metrics of illness were evaluated for relevance in identifying individuals with BRD. Of these, the most frequently described illness signs were behavioral depression or lethargy (n=13) and nasal discharge (n=12). While 81% of studies included "behavioral depression" as a clinical indicator of illness, only one study in beef cattle provided an operational definition for identifying "depressed" behavior. There were differences in metrics used between beef and dairy cattle. Only two of five studies in dairy calves included behavioral depression or lethargy, while all studies in beef cattle did. Temperature (n=9) was evaluated in more beef studies than dairy studies. Slow movement (n=5), rumen fill (n=4), lack of appetite (n=4), social isolation (n=2), excess saliva (n=2), inflamed lymph nodes (n=2), conjunctivitis, (n=2), hematological signs (n=2), dirty nostrils (n=1), and diarrhea (n=1), were only evaluated in studies of beef cattle. Cough (n=10), drooping ears/lowered head (n=6), lung auscultation (n=5), and heart rate (n=2) were included in a greater proportion of dairy studies than beef studies. Ocular discharge (n=11) and fast or labored breathing (n=11) were evaluated in similar proportions of beef and dairy studies. Eleven studies, six in beef cattle and five in dairy cattle, included a scoring system that provided decision criteria for identifying sick animals. Of those eleven systems, one score for beef cattle and two scores for dairy cattle included only clinical signs that could be observed without the need for animal handling. While dairy cattle are handled regularly, most beef cattle are not, so a clinical illness scoring system that would be suitable for routine use in beef cattle cannot include signs such as temperature, heart rate, or induced cough. The lack of a data-backed, reliable clinical illness scale appropriate for differentiating between sick and healthy beef cattle limits the extent to which existing clinical illness scoring systems are suitable for detecting BRD in all types of cattle.

Poster N° 45

Can we reliably detect livestock respiratory disease through precision farming? a systematic review

Luís Fernando C. Garrido*, Sabrina T. M. Sato, Leandro B. Costa, Ruan R. Daros

Graduate Program in Animal Science, School of Life Sciences, Pontificia Universidade Católica do Paraná, Curitiba, PR, 80215-901, Brazil
**Presenting author: garridolfc@gmail.com*

Respiratory diseases negatively impact livestock animals' welfare and productivity. Precision Livestock Farming (PLF) technologies were developed to aid in respiratory disease detection though only a few studies critically evaluated the performance and applicability of such PLFs. The aim of this systematic review is to assess if PLF technologies can monitor respiratory diseases. Data regarding species, type of sensor, performance measures, study's condition (laboratory or field), and the gold standard were collected from articles in the Web of Science, Scopus, and IEEE databases. Only studies reporting PLF technology development or validation were included in the review. The possibility of field application was assessed for technologies developed and validated under field conditions, using a reliable gold standard that achieved high performance (sensitivity > 90% and specificity or precision > 90%) for respiratory disease monitoring. Using the PRISMA guidelines, 24 studies (swine [14/24], poultry [6/24] and bovine [4/24]) were included. No studies were found for small ruminants. Most PLF relies on sound (22/24) followed by image (1/24) and accelerometer data (1/24). Both field (12/24) and laboratory (11/24) study conditions were found; one did not specify the study condition. The gold standards varied according to the methodology and species (blood analysis [1/24], clinical assessment [2/24], a combination of clinical assessment and blood analysis [1/24], audio labeling [14/24]; audio and visual labeling [3/24], PCR [2/24] and not mentioned [1/24]). We identified 6 studies with high PLF technology performance (poultry [1/6], bovine [1/6] and swine [4/6]). Half of these studies [3/6] presented issues with gold standard selection for validating the technology; the studies only manually labeled sounds of clinically relevant behaviors (e.g., cough, snore) from audio files as the gold standard, which may lead to sound misclassification compared to live observations. Two pig studies of the same research group presented high PLF technology performance for respiratory disease detection, though these studies used a small sample size (36 animals). A bovine study under field conditions achieved high performance using an infrared temperature technology validated with a specific respiratory disease diagnosis method as gold standard. Overall, relying on PLF technologies for automatic respiratory diseases detection in livestock species should be taken with caution as most studies were ineligible for field application. Many technologies only assessed a single clinical sign and lacked broader sickness behaviors evaluation. Some studies performed well indicating that in the future it may be possible to reliably detect respiratory disease with the aid of PLF.

Poster N° 46

A pilot study of the use of acceleration data loggers for automatic behavior monitoring of layer hens

Barbara Bagiova[1,2,*], Miroslav Hlasnik[3], Katarina Bodova[3], Katarina Pichova[2], Lubor Kostal[2]

[1] Department of Animal Physiology and Ethology, Comenius University Bratislava, Slovakia
[2] Institute of Animal Biochemistry and Genetics, Centre of Biosciences SAS
[3]Department of Applied Mathematics and Statistics, Comenius University Bratislava, Slovakia
[*] Presenting author: Barbara.bagiova@savba.sk

Hens are by far the most frequently kept terrestrial animals on farms in the whole world. Advancing technological progress, advances in sensing technologies and machine learning, bring a great opportunity for the monitoring of animal-based welfare measures in on-farm conditions to improve the quality of animal lives. Automated recording of distinct movement patterns of farm animals provides a possibility to supervise continuously a very important animal welfare indicator – behaviour. This pilot study aimed to further explore the potential use of accelerometric data for automated analysis of certain behaviours in chickens. Our study included 40 Dominant Leghorn laying hens housed by ten in deep-litter pens using wood shavings as litter and equipped with a perch, nest box, feeder, and nipple drinkers. Hens were continuously video-recorded by a camera from above for 24 hours. Three-axis accelerometers (AX3, Axivity Ltd, UK) were used to record the direction and magnitude of the hens' body acceleration. Sensors were affixed using elastic tubing as a "backpack" to the chicken harness (Amazon.com, USA), holding a sensor in a defined position to the body axes. Sensor data were collected at a rate of 100 Hz. For the detection of behaviours, we used the library of functions developed in MATLAB to identify chicken behaviours pecking, preening, and dustbathing by Abdoli et al. (2020). These algorithms are based on their own annotations of behaviours. However, we also annotated the above-mentioned behaviours from twenty 10 min video samples using the ELAN software (https://archive.mpi.nl/tla/elan). We tested the hypothesis that the frequencies of chicken behaviours (pecking, preening and dustbathing), as identified using the Abdoli et al. (2020) dictionary, and the frequencies of these behaviours, as identified using the same approach based on our own annotation data, would be comparable. The data from the preliminary analyses suggest that the dictionary of behaviours based on our annotation and that of Abdoli et al. (2020) are not consistent. Although the authors of the algorithm talk about "weakly labelled" data as a basis of the dictionary creation, it seems that the degree of annotation weakness is crucial and that it probably differed between our annotations. Our findings indicate that although the combined use of on-body sensors and machine learning represents a viable way of automated monitoring of chicken behaviour, there is further work needed to improve the precision of the algorithm to distinguish specific behaviours.

Poster N° 47

Vocalizations emitted by goats: are there any differences between bleats depending on the contexts of emission?

Stefania Celozzi[1*], Giorgio Presti[2], Mael Vittorio Vena[2], Stavros Ntalampiras[2], Luca Andrea Ludovico[2], Tyfenn Ogel[1], Monica Battini[1], Silvana Mattiello[1]

[1] Department of Agricultural and Environmental Sciences- Production, Landscape, Agroenergy. University of Milan, Via G. Celoria 2, 20133, Milano, Italy
[2] Department of Computer Science "Giovanni degli Antoni, University of Milan, Via G. Celoria 18, 20135, Milano, Italy
[*] Presenting author: stefania.celozzi@unimi.it

The project VOCAPRA aims to implement an early-warning IT tool for improving animal welfare by continuously and non-invasively monitoring vocalizations in goat herds. On the basis of specific acoustic features of vocalizations emitted by the animals, the tool will send notifications to the farmer about goats' emotional state triggered by specific emission contexts. Acoustic sensors and cameras were installed in four goat farms (305 goats overall) for continuous recording of spontaneous vocalizations and behaviour. Each vocalization was associated to a specific context of emission (feeding distribution, daily routine, extraordinary farm maintenance/cleaning, intraspecific bleating, mother-kid separation, goats' handling, exit to pasture, calling the farmer, presence of unknown persons). The acoustic features (pitch, P (logarithmic scale); envelope, E (decibel); spectral centroid, C (logarithmic scale); roughness, R (exponent values); duration, T (seconds)) of more than 2000 vocalizations were extracted. For each feature, except for T, the mean value (m), the variability (i), the average trend (d_m) and the variability of the trend (d_i) were calculated. A principal component (PC) analysis on these variable revealed that 12 over 16 PCs explain 95% of total variance and that some variables (P_i, Cd_m, R_i, Rd_m and Rd_i) carry almost no information on the first two PCs. For these preliminary analysis, differences among contexts on the remaining features were compared by ANOVA merging vocalisations from the four farms. Post-hoc pairwise comparisons were carried out for features that resulted significantly different. The variables that presented the highest variation among contexts were P_m, C_m and R_m. Differences were found between feed distribution and daily routine operations (R_m=4.20±1.70 vs 3.20±2.17; P_m=60.87±9.43 vs 64.44±7.86; C_m=92.97±2.65 vs 95.81±3.01, respectively; $p<0.05$). Bleats emitted during mother-kid separation had higher R_m and lower P_m and C_m than those emitted during daily routine operations (R_m=4.22±1.42 vs 3.20±2.17; P_m=59.58±7.99 vs 64.44±7.86; C_m=93.37 ± 1.77 vs 95.81±3.01, respectively; $p<0.05$). Intraspecific bleating presented significantly higher P_m and lower C_m and R_m than vocalisations emitted during daily routine operations (P_m=69.66±8.23 vs 64.44±7.86; C_m=93.09±2.29 vs 95.81±3.01; R_m=2.48±1.25 vs 3.20±2.17, respectively; $p<0.05$). Finally, significant differences were observed for C_m in response to the presence of known (farmer) or unknown persons (94.61±2.50 vs 90.91±3.04, respectively; $p<0.05$). Although further research is required on a larger sample, taking into account also the farm effect, our preliminary results suggest that it is possible to develop an IT tool for automatic classification of goats' vocalisations emitted in different emotional contexts based on different acoustic features.

Poster N° 48

Anti-predatory movement pattern of sheep on Norwegian rangeland pastures based on data from GPS collars

Nina Salvesen[1*], Svein-Olaf Hvasshovd[1], Lise Grøva[2], Inger Hansen[2], Erling Meisingset[2], Jennifer Stien[3]

[1] The Norwegian University of Science and Technology
[2] The Norwegian Institute of Bioeconomy Research
[3] The Norwegian Institute for Nature Research
[*] Presenting author: ninsalves@gmail.com

Detecting atypical behaviour in sheep on rangeland grazing pastures is in demand to ensure welfare and sustainability in both Norwegian and worldwide pastoral systems. The access to high density data from numerous GPS collars facilitates the possibility to collect behavioural information at both individual and herd level. Knowledge of typical behaviour patterns and deviations from these has the potential to provide a tool to detect atypical behaviour in real time; i.e. caused by predatory attacks or disease. Target values for digital behavioural markers in sheep due to predatory presence is a relatively new type of research with little documentation, thus the work presented is quite new in the field. This study investigates the movement patterns of free ranging sheep in terms of diurnal and seasonal behaviour traits. The potential for this data to detect deviating behaviour in sheep on rangeland pastures in Norway was explored using statistics, unsupervised machine learning, and ethological theory. Data from 391 sheep of six breeds in three different grazing areas from 2012-2016 and 2018-2020 is included in the analysis. The machine learning models K-means and DBSCAN were employed to classify patterns of sheep behaviour logged by GPS collars, which hourly relayed their UTM position throughout the grazing season. Variables included in the analysis were time of day, activity levels, altitude, trajectory angle, season, breed, number of lambs, temperature, and age of sheep. Diurnal behavioural traits could be identified, and the model categorized their day into four characteristic activity periods. Threshold values were calculated from the mean of the behavioural outliers detected by the model, which when triggered might indicate predatory presence to the herd. The threshold values were found to be the sheep moving faster than 824 *m/h*, with a variability of 168 *m/h*, or migrating above the 72.6th percentile of the local topography in altitude, with a variability of 153 *m*. Atypical behaviour were more present at temperatures above 20 °C. The threshold values may be used as trigger conditions in future collar alerting technology, and thus give more specialized herd welfare warnings to the farmer.

Poster N° 49

What was that noise? Horse behavior and facial expression after a sudden noise

Angélica M. Palomino*, Laize Guedes do Carmo, Laís C. Werner, Pedro Vicente Michelotto Jr, Ruan R. Daros

Graduate Program in Animal Science, School of Medicine and Life Sciences, Pontifícia Universidade Católica do Paraná, Curitiba, PR, 80215-901, Brazil
** Presenting author: angelicapalomino30@gmail.com*

Brief, unpredictable sound stimuli arouse attention and may result in escape attempts in equines. The aim of this study was to assess if a sound stimulus is associated with pain and discomfort in horses through behavioral change and facial expression. Thirteen mares from the university›s experimental herd underwent a 5-day study (animal care committee (#01741-2020): adaptation phase (days 1-3), test phase (day 4) and post-test phase (day 5). During the adaptation phase, the animals were individually brought from the holding area to the horse chute; after 60 seconds the mare was offered a food reward (16 small pieces of carrot and apple). The animals had 1 min to eat and remained 1-min longer in the chute before being led back to the holding area. In the test phase, 1-min after the horse arrived at the chute, a sound stimulus (114.6 ± 1.46 Hz) was applied by dropping a metal piece on the ground. The animal could not see the experimenter making the noise; no food was offered at this stage. On day 5, the same baseline protocol was applied. Time from the holding area to the chute and back was annotated. At the chute, all mares were recorded using two cameras. Behavioral data (escape attempts, tail movement, pawing, kicking and tail movement) were collected on all days. The mare›s facial expression was assessed using the horse grimace scale (HGS) only on day 4, using 1-min video clips immediately before and after the noise stimulus. Comparisons before and after noise were made using generalized linear mixed models in R. Mares had higher HGS (1.8±0.4 points; $p<0.01$), more escape attempts (0.8±0.2; $p<0.01$), more tail movement (10%; $p<0.01$) and tended to return faster (3±1.8 seconds; $p=0.10$) to the holding area after the noise stimulus. Other behaviors did not change 24 h after the noise event. There was a tendency for increased escape attempts on day 5. Our results indicate that the sound stimulus caused discomfort to the mares after the test but did not cause lasting aversion in the animals. The evaluation of HGS in this type of study highlights the usefulness of this tool for assessing other than painful states in horses. However, caution should be taken when assessing HGS without previous knowledge of the context. Proper management of environmental noise has the potential to reduce the discomfort of animals and, consequently, improve the welfare of horses.

Poster N° 50

Using an automated infrared thermography system to detect changes in dairy cow eye temperature after an event presumed to cause stress (hoof trimming)

Jennifer E Weller[1*], Anna Henry[2], Stephanie Buijs[1]

[1] *Animal Welfare Unit - Livestock Production Sciences Branch, Sustainable Agri-Food Sciences Division, Agri-Food and Biosciences Institute, Hillsborough, Co. Down, United Kingdom*
[2] *Faculty of Life and Health Sciences – School of Biomedical Sciences, Ulster University, Coleraine, Co. Londonderry, United Kingdom*
[*] *Presenting author: jennifer.weller@afbini.gov.uk*

Previous research suggests that IRT can be used in dairy cows to detect stress induced during procedures such as herding, or disbudding, by reporting increases in eye temperature. However, IRT studies typically rely on handheld equipment that requires manual positioning and activation, making it unsuitable for routine use on commercial farms. This pilot study explored the use of a stationary IRT-system (Agricam©) that automatically obtains images of both eyes of each cow after milking. This moment was chosen as it allows processing of cows as they return to their house, meaning image capture did not require any additional handling. This increases potential for future routine implementation on commercial farms. However, it also means that only stressors with an effect persisting until the next milking can be detected. Thirty-eight research cows were subjected to one of two routine hoof trimming events which were considered to be stressful (even though conducted by a professional trimmer). None of these cows had been reported lame within the past 3 months. Trimming events were expected to lead to a higher eye temperature the next time the cow passed the IRT-system (at PM milking, 1-7 hours after trimming), compared to the individual's baseline value (i.e., average of values collected at the two PM milkings prior to trimming). To determine how long the effect would remain measurable, further temperatures were collected after the following 3 milkings (AM and PM next day, and the AM following that) and compared to their respective two-day AM or PM baseline. Eye centre temperature, maximum Caruncula Lacrimalis temperature and maximum posterior border temperature was extracted for each eye at each timepoint. Eye temperatures at the first time point after trimming did not significantly differ from baseline values (all $p>0.05$). However, at AM the day after trimming, right eye temperatures were significantly cooler than baseline (Caruncula: 25.6°C±2.5SD vs. 27.3°C±1.4SD, border: 25.3°C±2.5SD vs. 27.0°C±1.4SD, centre: 24.3°C±2.5SD vs. 26.0°C±1.4SD; all $p<0.01$). Additionally, both eyes were significantly cooler than baseline at the last two time points (all $p<0.02$). Absence of an effect during the first post-trimming measurement suggests that either hoof trimming did not result in a persistent stress response, or that IRT was insufficiently sensitive to detect this response. However, decreased temperatures were detected later after trimming (possibly reflecting stress alleviation due to improved hoof conformation, although this needs further confirmation). This still supports the potential of IRT-systems to detect changes in dairy cows welfare.

Poster N° 51

Infrared thermography to measure behavioural responses of emotion and productivity in dairy cows

Jashim Uddin[1*], Clive J.C. Phillips[2], David M. McNeill[3]

[1] Department of Veterinary and Animal Sciences, University of Rajshahi, Rajshahi 6205, Bangladesh.
[2] Curtin University Sustainability Policy Institute, Kent St., Bentley, Perth, WA 6102, Australia.
[3] School of Environmental and Rural Science, University of New England, Armidale, NSW 2351, Australia.
[*] Presenting author: jashimvet2008@ru.ac.bd. ORCID ID; 0000-0003-2552-6482

In dairy cattle, feelings of negative emotions by potential threats such as approaching an unfamiliar object, person, or more dominant herd mate, may lead to the development of infrared thermographic perturbations. We investigated infrared thermography of lactating dairy cow's external body surfaces, in particular eyes and coronary band of forelimbs, in a series of studies to examine the association with rectal temperature and other behaviours (considered indicative of emotions), such as flight speed and crush score. In each experiment, animals were considered stressed by unfamiliar persons, manual insertion of rectal thermometer, close proximity when capturing thermal images. The first experiment evaluated lateralised behaviours, milk productivity and infrared temperature (IRT) of external body surfaces of 31 extreme left (less anxious, 15) and right (more anxious, 16) lateralised cows. Maximum IRT of body surfaces were more relevant to stress behaviours than that of average and/or minimum IRT. There were positive associations between IRT of eyes and coronary band with anxious behaviours (assumed from right lateralised passage in a lane test). In experiment 2, 50 cows were used to further evaluate the relationship between body temperature (IRT + Rectal) and behaviour, including flight speed and crush score. There were associations between IRT and behavioural indicators: limb IRT was related to walking speed, and the ratio of IRT of eyes to limbs was positively associated with a vertical, rather than horizontal, tail position, indicating arousal. IRT measures had higher adjusted R2 (eyes 86 %; limbs 78 %) than rectal temperature (63 %) in the regression models. A repeated design showed that IRT of both eyes was repeatable, as were the laterality index, flight speed and waiting time in the milking parlour yard prior to milking ($P \leq 0.001$), but not the rectal temperature. Differences in the DIM, milk yield, milk fat content and somatic cell count of cows could confound investigations into the relationship between IRT and behaviours. It is concluded that IRT of eyes and coronary band of forelimbs of lactating dairy cows could, by association, have the potential to predict their behavioural responses related to emotions and consequent milk productivity better than rectal temperature.

Poster N° 52

Associations between feeding behaviors and management practices in automatically fed group-housed preweaned dairy calves in the Upper Midwest USA

Rielle K. Perttu*, Marcia I. Endres

University of Minnesota, St. Paul, MN 55108
** Presenting author: pertt009@umn.edu*

Automated milk feeders (AMF) are becoming more common on dairy operations in the United States. These systems allow producers to feed calves on an individual basis while being housed in groups. When a calf visits the feeding station, the AMF records feeding behaviors such as drinking speed (mL/min), rewarded and unrewarded visits (number/day), and consumption percentage (% of total allotment consumed/day). Some studies suggest that behavioral patterns developed before weaning may persist into adulthood, potentially influencing health and welfare. Research has shown that management factors are associated with changes in calf behavior. However, those studies had small sample sizes and were not conducted on farms with AMFs. Therefore, the objective of this study was to investigate the associations between feeding behaviors and management practices in automatically fed group-housed preweaned dairy calves. Study personnel visited 25 farms (including a total 2,413 calves) on a bimonthly basis over an 18-mo period to collect AMF software feeding behavior data and various management factors of interest. The housing factors of interest included in the final models were light intensity at the feeder (**LIF**) and bedding depth (**BDP**). The calf-care factors included amount of milk at peak (**MAP**), age of calves at weaning (**WEA**), and number of calves housed in the group (**NUM**). In addition, the average fat percent in milk (**AOF**) collected on a quarterly basis at each farm was included. To assess the relationships between feeding behaviors and management factors, linear regressions using Pearson's correlation were fit with feeding behaviors as the response variables and management factors as the predictors. The LIF was positively associated with drinking speed (P = 0.02) and the BDP was negatively associated with unrewarded visits and consumption percentage (P = 0.002 and 0.03, respectively). The NUM was negatively associated with unrewarded visits (P = 0.01). The MAP was positively associated with rewarded visits and negatively associated with unrewarded visits and consumption percentage (P = 0.0003; 0.003; 0.00001, respectively). The WEA was positively associated with rewarded visits and negatively associated with consumption percentage (P = 0.03 and 0.01, respectively). The AOF was positively associated with rewarded visits (P = 0.03). Our results suggest that housing and management practices might influence preweaned dairy calf feeding behaviors. For example, frequency of meals and a competitive environment may have implications for long-term health of dairy calves. Producers can modify their practices to help improve welfare of dairy calves on automated feeding systems.

Poster N° 53

Validation of behavioural sampling techniques for 20-25 kg pigs during 23-hour transport

Cecilie Kobek-Kjeldager[1*], Line D. Jensen[1], Leslie Foldager[1,2], Marianne Kaiser[1], Karen Thodberg[1], Mette S. Herskin[1]

[1] Dept. of Animal Science, Aarhus University, Blichers Allé 20, 8830 Tjele, Denmark
[2] Bioinformatics Research Centre, Aarhus University, Universitetsbyen 81, 8000 Aarhus C
[*] Presenting author: cecilie.kobek-kjeldager@anis.au.dk

Yearly, approx. 33m pigs are transported between EU member states. Pigs up to ~30 kg make up the vast majority (~70%). Animal transport is debated due to welfare concerns, but the scientific attention is still limited, especially when considering behaviour. In a project investigating the effect of deck heights (60 v 80 cm and 70 v 90 cm) during long-distance transport of 20–25 kg pigs, the validity of continuous and instantaneous scan sampling techniques was investigated on detecting aggression and activity, respectively. Behaviour was quantified by video recordings covering lorry compartments each holding 27–29 pigs (~0.2 m^2/pig) from four journeys of 23 h. Behaviour was recorded during transport at a deck height of 60 cm (lowest commercially used height) and 90 cm (the highest tested alternative). Via instantaneous scan sampling at 1-min intervals from departure to arrival, pigs were counted as standing, lying or sitting. The time and duration of aggressive interactions between at least two pigs were quantified by continuous sampling. To determine whether longer sampling intervals reflected the behaviour as accurately as the 1-min intervals, the results were compared to data obtained from sampling of the same video recordings at 5-, 15-, 30- and 60-min intervals. The proportion of the sum of pigs standing, lying or sitting in all scans per hour did not differ when sampled every 1, 5, 15, 30 or 60 min. For the aggressive interactions, the continuous observations showed that aggression occurred sporadically, and 79 (SD = 45, range 9–136) aggressive interactions per compartment per journey were observed. The duration of an aggressive interaction was 11 s (SD = 24 s, range: 2–243 s). Time sampling of aggressive events during the first 20 min every other hour from departure significantly overestimated the number of events per hour. Sampling of aggressive interactions the first and last two hours of the journey did also not correlate with the total number of events per journey (Pearson's r = 0.6). In conclusion, dependent on aim and which other measures are used, instantaneous scan sampling intervals as high as once per hour seem sufficient to describe the proportion of pigs lying, sitting or standing. In our following study, we use 15-min intervals. Time sampling of aggressive interactions was inaccurate due to sporadic patterns. Thus, if the aim is to determine the level of aggression during transport, longer intervals than 20 min every other hour should be observed.

Poster N° 54

Validation of scan sampling techniques for nursery pig feeder and enrichment use

Emiline R. Sundman[1*], Daytona L. Fortney[1], Nicholas K. Gabler[1], Anna K. Johnson[1], Suzanne T. Millman[2,3], Kenneth J. Stalder[1], Cassandra R. Stambuk[1]

[1] *Department of Animal Science, Iowa State University, Ames, IA, USA*
[2] *Veterinary Diagnostic & Production Animal Medicine, Iowa State University, Ames, IA, USA*
[3] *Biomedical Sciences, Iowa State University, Ames, IA, USA*
[*] *Presenting author: esundman@iastate.edu*

Two fundamental types of behavioral patterns are events, which are relatively short in duration, and states, which are relatively long in duration. The methodology used to collect events and states differ. The objective of this study was to validate scan sampling intervals for nursery pig feeder use (state behavior) and enrichment use (event behavior). Forty Camborough pigs, aged 19 to 24 d (BW 5.8 ± 0.31 kg), were placed into four nursery pens. Pens were randomly assigned one of four treatments: negative control (NEG), positive control (POS), strawberry jam (JAM), and maternal pheromone (MP). Enrichment biscuits hung on cotton ropes were provided on the feeder daily from day of nursery placement until 7 d after placement. Color video was continuously recorded. Pigs were individually identified by numbers on their backs. One trained observer with an inter-observer reliability score with the trainer of 84% reviewed 29, 30-min video clips using continuous observation (gold standard) for enrichment and feeder interactions. Clips equally represented each treatment and covered the first 30 min after enrichment biscuits were replaced daily (4 treatments x 7 d = 28 clips). One clip was randomly repeated to assess intra-observer reliability, which was determined to be 97%. Clips were blinded and presented to the observer in a randomized sequence. Scan sample times of 10 and 15 s were compared against continuous methodology for enrichment use. Scan sample times of 15, 30, 45 and 60 s were compared against continuous methodology for feeder visits. Data were normally distributed, and statistical analyses were performed using PROC GLIMMIX in SAS. Continuous observation of enrichment use was not different from the 10 s scan ($p = 0.70$), while the continuous and 15 s scans tended to be slightly different ($p = 0.052$). Continuous observation of feeder use was not different from the 30 s scan ($p = 0.88$), but was different for 15, 45 and 60 s, respectively ($p \leq 0.05$). In conclusion, 10 s scan sampling for enrichment use and 30 s scan sampling for feeder use were as accurate as the gold standard for nursery pig behavior. Implementing these scan sampling intervals may save observers considerable time in behavior observations.

Poster N° 55

Exploring variation in feeding behaviour traits within and between gestating sows

Iris J.M.M. Boumans*, Eddie A.M. Bokkers

Animal Production Systems Group, Wageningen University & Research, the Netherlands
** Presenting author:iris.boumans@wur.nl*

Electronic sow feeders (ESF) are frequently used in groups of gestating sows, especially in larger groups. ESF can record sow visits, including animal identification, feed intake and time stamps of entering and leaving a feeder. These data are already commercially used, e.g. to identify sows that missed their daily allowance. Other potentially valuable feeding behaviour traits that can be retrieved from ESF, however, are not commonly used, while they might serve as indicators for performance and sow welfare. These traits include (non-)feeding visits, meal duration, feeding rate, feeding time and feeding order. One of the reasons for not using these traits is the large variation within and between individuals that hampers interpretation. The aim of this study was to explore the variation of these feeding behaviour traits within and between gestating sows. Data were collected at a conventional Dutch farm using 12 ESF (Nedap, The Netherlands) within a dynamic group of gestating sows (group size ~640) from February-October 2021. Records of 239 gestating sows (parity 1-9) with at least 100 days of feeding data were included in the analysis. Data were cleaned (e.g. removing missing values and extreme outliers) and aggregated from info per visit to daily and full gestation period datasets. Data were explored via descriptive statistics and visualisations. In addition, distributions of feeding behaviour traits were tested for differences among individual sows using the Kruskal-Wallis test. Sows visited an ESF on average 3 (±SD 2.8) times per day, including 1 visit with feed allowance and 2 visits without feed allowance. Meal duration was on average 18 (±SD 3.7) minutes, daily feeding time 19 (±SD 3.2) minutes, feeding rate 151 (±SD 18.7) gram/minute. ESF were visited throughout the entire feed cycle (24 hour), with highest occupation in the hours after the start of a new feed cycle (17:00). All feeding behaviour traits showed significant ($p<0.01$) differences in distributions between sows and especially large effects were observed for the hour they first visited the ESF, rank in the feeding order, number of visits without feed allowance and feeding rate. Also large variation in interquartile range (indicating statistical dispersion) indicating variation within sows was observed for the latter feeding behaviour traits. These preliminary results show that individual sows vary in their feeding behaviour and consistency. Understanding variation among sows might be used to identify normal and deviating feeding behaviour traits and improve detection of performance and welfare problems via ESF.

Poster N° 56

Introducing the aWISH project: Animal Welfare Indicators at the SlaughterHouse

Jarissa Maselyne, Tuna Coppens, Anneleen Watteyn, Anneleen De Visscher, Eline Kowalski, Marijke Aluwé, Frank Tuyttens*

ILVO (Flanders Research Institute for Agriculture, Fisheries and Food), Belgium
** Presenting author: frank.tuyttens@ilvo.vlaanderen.be*

The objective of aWISH is to develop and offer a cost-efficient solution to evaluate and improve the welfare of meat-producing animals at a large scale, across Europe. This approach will be developed and evaluated in close collaboration with all actors involved, from primary producers up to policy makers and citizens. At the heart of the aWISH solution is the automated assessment at the slaughterhouse of complementary animal-based indicators for monitoring welfare on-farm, during (un)loading, transport and slaughter. Besides that, existing or routinely collected data (slaughterhouse data, antibiotics usage, farm data, etc.) and needed technologies on-farm or on-transport to complement the measurements at slaughter will be exploited. Piloting and development activities will be done in 6 broiler chicken and fattening pig production chains across Europe (FR, PL, ES, NL, AT, RS), using a lean multi-actor approach, in order to test and validate the project results. Novel sensor technologies and artificial intelligence algorithms will be developed, and a feedback tool and interface will allow each actor in the chain to get direct feedback of each slaughter batch, visualize trends and benchmark animal welfare outcomes. An Animal Welfare Indicator Catalogue will disseminate all validated indicators and standardized data collection methods. From the pilot data, animal welfare initiatives taken at operator, chain, regional or national level will be assessed alongside their environmental and socio-economic impact at operator and sector level. Next to that, 9 Best Practice Guides will be developed to improve key welfare issues in pigs and broilers, and to help external actors deploy the aWISH technologies and feedback tool. How the feedback loop guides and motivates each party to take actions to improve animal welfare will be tested in a longitudinal study, and the needs, perceptions and barriers of all actors from farm to fork incl. the consumer will be researched to maximize impact of the aWISH results. aWISH is a 4-year Horizon Europe project (nr. 101060818) starting autumn 2022 with 24 partners across the EU.

Poster N° 57

Sow and piglet welfare in farrowing housing systems: a systematic review

Bianca Vandresen[1*], Jen-Yun Chou[2,3], Maria José Hötzel[1]

[1] Laboratório de Etologia Aplicada e Bem-Estar Animal, Departamento de Zootecnia e Desenvolvimento Rural, Universidade Federal de Santa Catarina, Florianópolis, 88034-001, Brazil
[2] Institute of Animal Welfare Science, University of Veterinary Medicine, Veterinärplatz 1, 1210, Vienna, Austria
[3] Pig Development Department, Animal & Grassland Research and Innovation Centre, Teagasc, Moorepark, P61 C996, Co. Cork, Ireland
[*] Presenting author: vandresen.bianca@gmail.com

Views about animal welfare vary among different stakeholders; the public is mainly concerned about naturalness and animals' affective states, while animal production stakeholders tend to prioritize biological functioning. The pig industry would benefit from adopting alternative farrowing systems based on scientific evidence that addresses all stakeholders' concerns about pig welfare, given that housing systems that fail to do so may prove to be socially unsustainable in the long term. This systematic review summarizes which parameters have been used to assess pig welfare in farrowing housing systems and investigate whether the published scientific literature addresses all stakeholders' expectations regarding pig welfare. Publications identified via literature searches in Scopus and Web of Science (n=708) were included if they were peer-reviewed empirical research articles investigating the effect of farrowing housing on at least one welfare outcome of sows and/or piglets. A final sample of 72 publications was retained for the review; ranging from 1990 to 2021. Welfare outcomes were categorized based on the nature of the parameter investigated: behavioral, physiological, performance, and health. Studies comparing farrowing crates and loose farrowing pens were the majority (50%), followed by studies comparing crates and group housing (15%), and all three systems (7%). Crates and outdoor farrowing were compared in 7% of the studies, and one study compared loose farrowing pens to group housing. Most studies assessing piglet welfare addressed performance (54%; e.g., pre- (74%) and post- weaning (44%) growth) and behavioral parameters (pre-weaning 51%; post-weaning 28%), 10% investigated physiological and 4% health parameters. Behavioral outcomes were the most used to assess sow welfare (49%), followed by performance (28%), health (26%), and physiological outcomes (25%). Sow posture changes (71%), sow activity (43%), and nursing (40%) were the behaviors most used to investigate sow welfare. Although sow behavior was the main parameter used to assess sow welfare, many studies focused on the effects of sow behaviors on piglet survival and performance (e.g. posture changes and nursing behavior). No studies investigated the impacts of the farrowing systems on animals' affective states, which is a main issue underpinning public concerns with sow housing. This review identified that most studies on pig welfare comparing farrowing housing systems focused on production related aspects. Research must provide evidence to support sustainable reforms regarding farrowing housing systems, and the knowledge gap on the welfare aspects that concern the public need to be addressed to improve decision-making towards socially sustainable alternatives to conventional farrowing crates.

Poster N° 58

Reliability and repeatability of behavioural welfare measures for grazing dairy cows

Lydiane Aubéab[1,2*], Marie-Madeleine Mialon[1], Luc Mouniera[2], Frédéric Launay[3], Luc Delaby[4], Estelle Mollaret[2], Isabelle Veissier[1], Alice de Boyer des Rochesa[2]

[1] UMR Herbivores, INRAE, Université Clermont Auvergne, VetAgro Sup, Site de Theix, 63122 Saint-Genès-Champanelle, France
[2] Chaire Bien-Etre Animal, VetAgro Sup, 1 avenue Bourgelat, 69280 Marcy l›Etoile, France
[3] UEP Unité Expérimentale du Pin, INRAE, Borculo, 61310 Le Pin-au-Haras, France
[4] UMR 1348, Physiologie, Environnement, Génétique pour l›Animal et les Systèmes d›Elevage, INRAE, AgroCampus Ouest, Le Clos, 35590 Saint-Gilles, France
[*] Presenting author: lydiane.aube@gmail.com

Grazing is considered beneficial for environment and cow welfare. However, grazing cows welfare is not always optimal. To date, there is no standardised protocol to assess it. Based on the 4 principles of Welfare Quality® (WQ), relevant measures were identified including measures from WQ (e.g. injuries), measures from WQ that require to be adapted to pasture conditions (e.g. observation of social behaviour) and new measures. Validation of welfare measures is crucial to build an operational protocol. The objective of this study was to investigate inter- and intra-observer reliabilities and repeatability at short-term and over the grazing season for several potential measures to assess the welfare of grazing cows. Six behavioural measures were studied: four individual-level (agonistic, affiliative and fly dislodging behaviours observed continuously 5 min/cow, and avoidance distance at pasture) and two herd-level measures (queuing at watering trough and reactivity when moved from the paddock for milking). Photos and video were observed twice by 5 trained observers to assess inter- and intra-observer reliabilities (except avoidance distance). The four individual-level measures were then applied to 48 dairy cows among a herd of 144 grazing cows from April to November. Observations were repeated two days apart to assess short-term repeatability and 7 times (5 weeks interval) to assess repeatability over the season at individual animal-level. Intra-class correlation (ICC) and Kendall›s concordance (KW) coefficients were calculated to assess reliability and repeatability at individual animal-level. Inter-observer reliability was good (ICC>0.75; KW>0.7) to very good (ICC and KW>0.9) for all measures, except for agonistic behaviour on the second scoring session (KW and ICC between 0.6 and 0.7). Intra-observer reliability was good to very good for all measures for 4 of the 5 observers. Individual animal-level repeatability of social and fly dislodging behaviours was poor whereas repeatability of avoidance distance at pasture was moderate (both at short term and over the season). In conclusion, all measures were validated in terms of inter- and intra-observer reliabilities except for one observer suggesting that training should be improved. Poor short-term repeatability of behaviours at individual level raises the question of daily variation of these behaviours, probably according to environmental parameters at pasture (meteorological conditions, access to resources, etc.). Low repeatability during the season indicates that a single assessment is not sufficient. Further work is necessary to confirm these results at farm-level and determine precise conditions and frequency of observations to obtain a representative assessment over the whole grazing season.

Poster N° 59

The restraint enclosure effects on the reproductive ethology and efficiency of boars and sows of the free range Greek autochthonous black breed

Christos Kalfopoulos[1*], Ioannis Poulkas[2], Georgios Vatzias[1]

[1] Laboratory of Reproductive Physiology, Department of Agronomy, Aristotle University of Thessaloniki, Greece
[2] Poulkas farm, Polykastro, Regional unit of kilkis, Greece Corresponding author: Georgios Vatzias, gvatzias@agro.auth.gr
[*] Presenting author: xr.kalfopou@gmail.com

Pigs were raised in Greece since the Homeric era. In Ulysses is described a six hundred sow unit in the island of Ithaca!! Following World War II, the introduction to farmers of genetically improved and high yield European breeds and the initiation of intensive pig production had a negative impact on the free-range black pigs. Today, with the exemption of a very limited number of farms, the vast majority of the autochthonous black breed pigs, are raised in pastures with basic confinement infrastructures. Due to African Swine Fever, the farmers forced to comply with strict biosecurity measures for the last two years. The aim of this study was to record and determine differences in the reproductive ethology patterns and reproductive efficiency between breeding stock raised in confinements vs those that were forced to move from the pastures to a total confined setting. Data was collected from two farms, from the region of Macedonia in Northern Greece. Both farms are located in mountainous regions. The breeding stock (220 sows and 15 boars) of the first farm was raised in a free range (FR) farming system with continuous access to pasture, while the sows (150) and boars (12) of the other farm had a limited access (LA) to pasture grazing. Sows were bred with natural service twice a year. The boars' ethology patterns and the libido (Lsc-in a scale of 1 to 5, with 1.: not mounting, 2.: mounting but no protrusion, 3.: delayed mounting followed by protrusion but no penetration, 4.: multiple mountings, delayed penetration - ejaculation, 5.: aggressive mounting – penetration, ejaculation) was evaluated at the pericopulatory time. Breeding records were evaluated for wean to estrus interval (WEI) and conception rate (CR) in sows. A two - sided Student's t – test was used for the analysis of data. P–values ≤ 0.05 were considered statistically significant. The results, showed that the majority of the LA boars exhibited a similar ethological reproductive pattern (Lsc:5, 12/15 boars, $P \leq 0.05$), while the FR boars' ethology varied from lethargic (Lsc:1) to highly aggressive (Lsc:5 $P \geq 0.05$). Similarly, the LA sows had a higher CR and a normal WEI compared to the FR sows ($P \leq 0.05$, 85% vs 65%, 7d vs 11d). The above results indicate that the long term enclosure had a negative effect on the reproductive parameters and the ethology of the FR breeding stock.

Poster N° 60

Welfare parameters of Banat Naked Neck and Sombor Crested chickens in extensive production system

Sava Spiridonović*, Mirjana Đukić Stojčić, Lidija Perić

Faculty of Agriculture, University of Novi Sad, Serbia
** Presenting author: sava.spiridonovic@stocarstvo.edu.rs*

In recent years, more attention has been paid to the welfare of laying hens. Welfare problems are most common in intensive farming systems, however, chickens from extensive farming systems are also affected by these problems. Banat Naked Neck and Sombor Crested are dual-purpose breeds of chickens, indigenous to Serbia. This study aimed to identify the incidence of welfare problems that occur in these indigenous chicken strains reared in free range system. 30 chickens of each strain, at the end of the first year of the production cycle, were randomly sampled. The welfare parameters analyzed in this study were: keel bone damage (KBD; keel deformations and keel fractures), plumage, comb pecking wounds, skin lesions, footpad dermatitis (FPD), and claw length.
Keel deformation and keel fractures were separately assessed on a scale from 0 (no damage) to 3 (severe damage). The plumage was assessed on a scale from 0 (severely damaged) to 4 (very good). Footpad dermatitis, skin lesions, and comb pecking wounds were assessed on a scale from 0 (no damage) to 2 (severe damage). Claws were assessed by their length and were described either as normal or long. Statistical analysis was performed in the program Statistica 13.5 using the Kruskal-Wallis test. Post hoc analysis was performed using Dunn's test.
The genotype significantly affected the plumage condition of laying hens. Sombor Crested had a significantly better plumage score (3.9) compared to the Banat Naked Neck (3.3) ($p<0.05$). Keel bone deformation and FPD were not affected by genotype ($p>0.05$), although chickens of the Banat Naked Neck had a higher occurrence of KBD (0.53) and FPD (0.43) compared to Sombor Crested (0.26 and 0.23, respectively). No birds had keel fracture. No statistically significant differences were found between genotypes in the case of comb pecking wounds ($p>0.05$), however, Sombor Crested (0.26) had a higher prevalence compared to Banat Naked Neck (0.13). No chickens with skin lesions and long claws were found in both genotypes.
Based on the obtained results, it can be concluded that the genotype significantly influenced the plumage score of chickens. On the other hand, genotype did not significantly affect the occurrence of KBD and FPD. No skin lesions and long claws were found in both genotypes of laying hens. In general, both breeds had good welfare parameters at the end of the production cycle, which can be primarily attributed to the housing system.

Poster N° 61

Nigerian indigenous chicks show age related difference in vocalization characteristics during short term social isolation

Oluwaseun S. Iyasere[1*], Peta S. Taylor[2], Samuel O. Durosaro[3], Victor J. Oyeniran[1], Oluwatowo E. Oyekunle[1], Tunmise F. Ehigbor[1]

[1] Department of Animal Physiology, Federal University of Agriculture, Abeokuta, PMB 2240 Nigeria;
[2] Environmental and Rural Science, University of New England, NSW, 2351, Australia;
[3] Department of Animal Breeding and Genetics, Federal University of Agriculture, Abeokuta, PMB 2240 Nigeria.
[*] Presenting author: iyasereos@funaab.edu.ng

Vocalization is related to animal emotion. Chicks separated from their conspecifics make distress calls indicative of discomfort or the need to reunite. We intend to answer the question whether distress call vocalization differs with age of chicks. This study was designed to investigate age influence on distress call, change in surface body temperatures (SBTs) and the relationship between distress call characteristics and change in SBTs. Ten Nigerian indigenous chicks each of two different age groups (Group 1= 5-6 weeks old chicks, Group 2= 5-7 days old chicks) were subjected to a 5 mins isolation test in a wooden test arena (L×B×H= 88×116×138cm) and provided with feed, water and a wooden perch. The distress calls made by each chick was recorded using a phone voice recording app. The SBTs of each chick was measured from the eyes (ET), under the wings (WT) and head (HT) before and after the isolation test and the change (Δ) calculated. The change in SBTs were assumed to be the physiological response to the isolation stress. The vocalization of the chicks were analyzed using Raven Pro v 1.6 (Lisa Yang Center for Conservation Bioacoustics (2019) to extract vocalization characteristics (duration of call (DC), high frequency (HF) and peak frequency (PF)). One distress call from each minute was analyzed per chick. The final call in the first bout of distress calls at each minute (i.e. 0:00, 1:00, 2:00 min) was selected. Data obtained on vocalization characteristics and ΔSBTs were subjected to Independent T-sample test. Pearson correlation was used to establish relationship between vocalization and ΔSBTs. There was no significant age effect ($P>0.05$) on DC, HF and ΔSBTs (e.g. ET increased by 0.6 and 0.3 in 5-6 weeks old and 5-7 days old chicks respectively). However, PF was greater ($t(17) = -3.212$, $P=0.005$) in the 5-7days than the 5-6 weeks old chicks (3466 vs 2830 Hz). For the 5-6 weeks chicks, there was a negative correlation between DC and HF ($r = -0.677$, $P<0.05$), ΔWT was positively correlated with the PF ($r =0.713$, $P<0.05$). For the 5-7 days chicks, ΔET was negatively correlated with DC ($r = -0.758$, $P<0.05$), there was a negative correlation between ΔHT and ET ($r = -0.730$, $P<0.05$), a positive correlation between ΔHT and ΔWT ($r = 0.856$, $P<0.001$). Conclusively, 5-7 days old vocalized at higher peak frequency and ΔSBTs that correlated with vocalization characteristics differed between chick age groups.

Poster N° 62

Welfare assessment of migratory Gaddi goats of North-Western Himalayan region

Madan Lal Kamboj[1*], Ankaj Thakur[2], Pardeep Kumar Dogra[2], Brij Vanita[2], Rakesh Thakur[2]

[1] *ICAR-NDRI, Karnal,*
[2] *CSKHPKV, Palampur*
[*] Presenting author: *kamboj66@rediffmail.com*

Gaddi (White Himalayan) goats, reared by nomadic pastoralists, migrate from foothills of Himalayas in winters to high altitude Alpine ranges during summers on four migratory routes covering a distance of 400-500 km over an elevation gradient of 13000 ft. These goats may face welfare challenges of uncertain pasture availability, harsh climate, inadequate housing and healthcare; predation and infrequent supervision. The aim of this study was to develop a welfare assessment protocol for migratory goats and to assess the welfare of different flock sizes. The assessment protocol was adapted from AWIN framework for goats (AWIN, 2015). The protocol was categorized into five welfare domains (feeding, environment/facility around camping, health, behavior and performance) with 32 welfare indicators (5, 6, 9, 5 and 7 from each domain respectively) with each domain assigned a welfare score (WS) of 25,15,30,15 and 15 respectively based on expert consultation. The welfare scores were aggregated into 100 for overall assessment with higher value indicating better welfare. The adapted protocol was tested its validity by expert judgment and reliability by Cronbach's alpha. Welfare assessment was performed at low hills on two migratory routes on 24 flocks categorized into small (S<100), medium (M=100-200) and large (L>200) with eight flocks each. The adapted welfare assessment protocol was found valid (91.3% of experts agreement) and reliable with the value of Cronbach›s α as 0.90. WS were compared using one-way ANOVA with DMRT using SSPS. S flocks scored higher (P<0.05) than M and L in feeding (14.25±0.8 vs. 11.00±1.3 and 10.12±0.8), health (26.25±1.1 vs. 24.25±.9 and 21.37±0.8) and environmental domains (12.3±0.6 vs.10.37±0.5 and 10.00±0.8). WS of behavioral domain in S (14.75±0.2) were higher (P<0.05) than L (12.75±0.4) but were not different from M flocks (13.62±0.5) whereas scores of performance were higher (P<0.05) in S (12.75±0.7) and M (9.75±1.0) than L flocks (8.62±1.0). Overall WS in S (80.62±2.4) were higher (P<0.05) than L (62.87±3.3) and M flocks (69.00±3.7). Welfare was found acceptable (WS>60) at all S flocks, 75% of M flocks, 50% of L flocks and 75% of all studied flocks. Body condition score, environmental protection to kids, animal losses, hair coat condition, healthcare practices, familiar human approach test and abortions were most compromised welfare indicators at large and medium flocks. In conclusion, welfare of most of Gaddi goat flocks was acceptable with animals in small flocks performing better than medium and large flocks.

Poster N° 63

There is hope for aged roosters to be sexually active and produce good quality semen

Mariam Logunleko[1*], Oluwaseun Iyasere[1], Samuel Durosaro[2], Mathew Wheto[2], Tawakalitu Olawoyin[1], Oluwafeyisarami Omotayo[1], Grateful Akande[1], Adebukola Agbaoye[1], Aduragbemi Eburuike[1], James Daramola[1]

[1] Department of Animal Physiology, Federal University of Agriculture Abeokuta, Nigeria.
[2] Department of Animal Breeding and Genetics, Federal University of Agriculture Abeokuta, Nigeria.
[*] Presenting author: logunlekomo@funaab.edu.ng

Ageing in roosters come with several welfare issues such as reduced sexual activity and semen quality. For good productivity, roosters need to be sexually active and produce good quality semen to fertilize eggs produced by the hens. Spices like onion have been reported to enhance feeding and comfort behaviour in broilers, while a combination of onion and garlic increased sperm count in broiler cocks. However, there is limited information on the influence of onion on the sexual activity of aged roosters. This study hypothesized a beneficial effect of dietary onion supplementation on sexual activity and semen quality of aged Nigerian indigenous roosters. Thirteen roosters of 52 weeks of age (most matured in the flock of Nigerian indigenous chickens raised on our farm) were randomly grouped into one of three onion treatment groups; 0g (n=5), 5g (n=4) and 10g (n=4) of chopped onions daily for four weeks in addition to 100g of concentrate feed/bird/day. Roosters were housed individually in mobile wired pens and had visual and auditory contact with each other but no physical contact with themselves and with any hen. On the 2nd and 4th week of onion treatment, roosters were gently restrained for semen collection using abdominal massage techniques. Semen samples were analysed for semen volume, pH, sperm motility, concentration and abnormality. At the end of the 4th week of onion supplementation, each rooster was introduced into a deep litter pen of six hens and the sexual activity (waltz dance, attempted mounts and wing flapping; henceforth referred together as appetitive phase) and successful mating of each rooster was recorded for 50 minutes each in the morning (9:00- 9:50 am) and in the evening (4:00-4:50 pm) using Closed-Circuit cameras attached in a corner of each pen. Behavioural data was extracted from the videos using the Behavioural Observation Research Interactive Software (BORIS). Data obtained were subjected to One- Way ANOVA. The frequency of appetitive sexual behaviour and successful mating was similar ($P>0.05$) in the three treatments. However, the total duration spent on appetitive sexual behaviour (which indicates sexual desire or courtship activities) increased ($F_{2,12} = 5.348$, $P=0.026$) in roosters offered 5g chopped onion per day compared to the other two treatment groups. Interestingly, roosters offered 5g chopped onion per day had the highest semen volume and sperm concentration. Conclusively, supplementing 5g of chopped onions daily for 4 weeks has the potential to stimulate sexual desire and improve the semen quality of aged roosters.

Poster N° 64

Brooding behaviours differ between the two ecotypes of Nigerian indigenous chickens

Victor J. Oyeniran[1*], Oluwaseun S. Iyasere[1], Samuel O. Durosaro[2], Fasasi B. Fasasi[1], Peace O. Odetayo[1], Sulaiman A. Ogunfuyi[1], Paul O. Odetunde[1], Taiwo C. Akintayo[1], James O. Daramola[1]

[1] Department of Animal Physiology, Federal University of Agriculture, Abeokuta, Nigeria.
[2] Department of Animal Breeding and Genetics, Federal University of Agriculture, Abeokuta, Nigeria.
[*] Presenting author: victoroyeniran@gmail.com

The Nigerian indigenous chickens are known for their ability to brood and hatch their eggs on their own. During brooding, they show readiness to sit on their eggs and provide appropriate conditions (temperature, relative humidity and carbon IV oxide) required for embryonic development and subsequent hatching of chicks. Studies have investigated the brooding behaviour of the Yoruba ecotype but none have compared the two ecotypes. There has been increase in research on different behaviour of the Yoruba ecotype; however, none have compared the two ecotypes. The brooding behaviours of the two ecotypes were compared in this study. Ten (10) Yoruba and 5 Fulani hens were used. Behaviours such as sitting on eggs, eye opening and closing, feeding, drinking and egg turning were monitored for three days during the first two weeks and daily during the last week of brooding. The behaviours were monitored for 6 h in a day (07:00-09:00h, 11:00-13:00h and 15:00-17:00h) using CCTV cameras positioned in the pens. Data collected were analyzed weekly using a Mann-Whitney U-test. The percentage of time spent sitting on the eggs was greater in the Yoruba ecotype hens for the three-week brooding period, week 1 ($U=125.500$, $z=-2.281$, $P=0.013$), week 2 ($U=112.500$, $z=-2.858$, $P=0.004$) and week 3 ($U=87.500$, $z=-3.320$, $P=0.001$). Also, the Yoruba ecotype hens while sitting on their eggs spent a longer time with their eyes opened especially during the first ($U=142.500$, $z=-2.138$, $P=0.033$) and third ($U=120.000$, $z=-2.542$, $P=0.011$) weeks of brooding. The other behaviours such as feeding, drinking and egg turning were similar ($P>0.05$) for the two ecotypes over the three weeks of brooding. Although, this study did not consider the hatchability of the chicks, the Yoruba ecotype hens seem to be good sitters during brooding and seem to be more alert during the brooding periods with eyes opened. It can be concluded that the two ecotypes showed difference in brooding behaviour.

Poster N° 65

On-farms dairy cattle welfare assessment in Nyala city, Sudan

Saber Y. Adam[1*], Abdelkareem A. Ahmed[1, 2]

[1] Department of One Health, Medical and Cancer Research Institute, Nyala, Sudan
[2] Department of Physiology and Biochemistry, Faculty of Veterinary Science, University of Nyala, Nyala, Sudan; Botswana University of Agriculture and Natural Resources, Private Bag 0027, Gaborone, Botswana.
[*]Presenting author: saaber5757@gmail.com

The cattle in Sudan have multi-functional roles in production systems, milk production is important for increasing income and home-consumption needs. Welfare Quality® (WQ) protocols were used for on-farm dairy cows assessing. However, there is no previous information on cattle welfare assessment in Sudan, particularly in Nyala. The present study was conducted from January to March 2021 in 11 dairy farms of cross- breed cows. The main objective of the study was to assess welfare problems facing dairy cows. There were 155 female cross-breed cows evaluated in this study by random selection in the farms. Data were collected through direct observation of dairy cows. Appropriate behaviors, emotional status, body condition, lameness, lesion and injury, health status, and body cleanliness were assessed. The study revealed the following percentages of affected animals: 21.3% showed anxiety behavior, 23.2% showed fearful emotion, 54.2% of cows had thin body condition score, while 27.1% of cows had very thin body condition score. 20.0% of cows were mildly affected hock, 13.5% had swollen knee without skin damage, and 11.6% of cows had swollen knee with skin damage. Moreover, 21.3% of cows had mastitis, 27.1% present of hair loss area, 28.4% had abnormal nasal discharge, 31.6% had abnormal ocular discharge, and 69.0% ectoparasites present. 32.3%, 52.3%, 49.7%, and 43.2% of cows showed dirty udder, dirty hind quarter, dirty lower legs, and dirty flank, respectively. We conclude that health status, dirty coat, ectoparasites, and injuries are the main welfare issues identified in this study. Awareness and veterinary services is needed to improve welfare status of the dairy cattle in study area.
Keywords: Nyala city; dairy cattle; welfare

Poster N° 66

Behaviour of Gaddi goats reared under nomadic pastoralism in North-Western Himalayan region in India

Ankaj Thakur[1*], Madan Lal Kamboj[2], Pardeep Kumar Dogra[1], Madhu Suman[1], Nishant Verma[1]

[1] *CSKHPKV, Palampur*
[2] *ICAR-NDRI, Karnal,*
[*] *Presenting author: ankajthakur27@gmail.com*

Gaddi goats, native to North-Western Himalayan region in India, are reared by Gaddi tribe under migratory/transhumance production system. Gaddis along with their goat flocks migrate to high- hills (>1800 m) during summers for grazing on alpine meadows on four migratory routes covering a distance of 400-500 km at elevation gradient of 13000 ft. Goats live and breed here for two months in May and June. They descend back to Shiwalik foothills (350-650 m) in winters where kidding takes place. During migration flocks camp for short periods at mid-hills (651-1800 m) during postkidding. Aim of study was to investigate behavior of these goats at different physiological stages completed at different altitudes during migration. Behaviours were recorded at key stages of production cycle during post-kidding (PK) at low-hills, during mid- lactation (ML) at mid-hills and at mid-pregnancy (MP) at hill-hills. Behaviours were recorded for 15 min/hour for 8 hours of grazing daily for four consecutive days using focal sampling by video cameras on four flocks (n=248±15.1;10 percent from each flock). Data were analyzed using one-way analysis of variance (ANOVA) in SSPS. Total daily feeding time (browsing plus grazing) was higher ($P<0.05$) at ML (234.42±2.8 min; 58.77±0.5%) as compared to PK (222.08±5.6 min; 56.33±1.1%) and MP (214.92±2.7 min; 54.58±0.4%). Time devoted to browsing was higher ($P<0.05$) at ML (196.50±2.6 min; 45.87±0.5%) as compared to PK (149.10±3.8 min; 36.06±0.7%) and MP (16.33±0.9 min; 8.40±0.1%) while daily grazing time was greatest at MP (197.86±3.6 min) followed by PK (72.98±4.8 min) and ML (27.94±3.3 min). Standing time was greater ($P<0.05$) at MP (46.83±3.7 min) and PK (39.80±1.9 min) as compared to ML (24.01±2.1 min). Daily times spent on walking, rumination and lying were similar at three stages. Frequency of bipedal stance was higher ($P<0.05$) at ML (28.50±2.1) as compared to PK (12.50±1.7) and MP (4.17±0.6). Frequency of self-grooming was higher ($P<0.05$) at PK (14.00±2.1) than at ML (5.83±1.5) and MP (1.0±0.6) while frequencies of allogrooming and water drinking were similar at three stages. Frequency of object grooming was greater ($P<0.05$) at ML (2.16±0.6) as compared to PK (1.0±0.3) and MP (0.00±0.0). Results showed that Gaddi goats spend most of day time in feeding and walking with little time spent on standing, lying and rumination. Feeding was undertaken through grazing predominantly at high-hills and through browsing in bipedal stance during lactation at low and mid-hills. Grooming activities were most evident at post-kidding and during lactation at low and mid-hills.

Poster N° 67

Expert opinion on welfare risks of migratory goat production system of India

Brij Vanita[1*], Ankaj Thakur[1], Madan Lal Kamboj[2], Pardeep Kumar Dogra[1]

[1] CSKHPKV, Palampur
[2] ICAR-NDRI, Karnal,
[*]Presenting author: brijvanitathakur@gmail.com

Pastoralism support 20 million households by using 25% of the world's land and produces 10% of the meat for human consumption. Small ruminants of the north-western Himalayan region are mainly reared under transhumance pastoralism (migratory). Welfare of the migratory goats is generally perceived to be better than the intensively reared goats due to their freedom to express natural behavior. However, unrestricted aspect of migratory goat production does not automatically guarantee high standards of welfare and these systems often pose unique and complex problems for the animals. To address the above issue, the current study was designed to identify the main welfare issues of the migratory goat production system, which will form the basis for their comprehensive welfare assessment. An online survey was conducted using Google forms, to know about the perception of the experts towards the welfare issues of migratory goat production system in India. The survey was accessible Jan 2020-July 2020. Welfare issues were represented to the experts using 1-5 Likert Scale (1-No compromise to 5-extreme compromise). Descriptive statistics and Principal Component Analysis (PCA) of the welfare issues were performed using SPSS. Composite score for the components was calculated by adding the likert score for each variable in the component and taking its average. A total of 46 experts comprising of 16 scientists, 10 veterinarians, 20 academic researchers completed the survey. Experts were having; 10 years (44.18%), 10-20 years (30.23%) &<20 years (25.58%) of experience in the field of migratory goat production. Among the 24 welfare issues presented to the respondents quality of pasture (4.23/5), poor access to pasture (4.02/5), endoparasitism (3.93/5) were perceived to be greatest welfare issues while metabolic disorders (2.93/5), chronic fear (2.84/5) and mastitis (2.73/5) were the least. PCA of the database identified two welfare components viz. Environmental (35.6 % of variance) and Managemental (9.52% of variance) while two welfare issues (Migratory stress and Neonatal mortality) remained independent. Migratory stress was considered to pose greatest risk to the welfare (3.80/5), followed by the Environment (3.60/5), Neonatal Mortality (3.57/5) and Management (3.37/5).The findings from this survey can further be used for the development of a framework for welfare assessment and monitoring potential causes of welfare compromise in migratory goat production system.

Poster N° 68

Investigating the effects of jute nesting material and enriched piglet mats on sow welfare and piglet survival

Lucy Markland[2*], Jay S. Johnson[1], Brian T. Richert[2], Marisa A. Erasmus[2], Donald C. Lay, Jr.[1]

[1] *USDA-ARS Livestock Behavior Research Unit, West Lafayette, IN USA 47907*
[2] *Department of Animal Sciences, Purdue University, West Lafayette, IN USA 47907*
[*] *Presenting author: Lucy.Markland@teagasc.ie*

Domesticated sows are highly motivated to perform nesting behavior prior to farrowing. However, due to the potential for clogging slurry manure systems, large amounts of nesting material are not practical to use in most production systems. Therefore, the study objectives were to assess the effect of an alternative nesting material on sow welfare and piglet survival, and to investigate the effect of a nesting environment on piglet survival and growth performance. We hypothesized that the provision of jute nesting material would decrease sow stress and decrease farrowing duration, and that the provision of piglet nesting mats would allow piglets to remain euthermic and improve survival and growth. Twenty sows were randomly assigned to 1 of 2 treatments: farrowing crate with jute nesting material (Nest; n=10; 3 pieces of jute, each 40.6x21.6cm) and two enriched piglet mats made from an acrylic board (28.0x86.4cm) covered with a microfiber material, or the farrowing crate without nesting material (Control; n=10) and 1 standard plastic mat (28.0x86.4cm) for piglets. Three jute pieces were attached to the front of the crate to prevent substrate from falling through the slatted floors. Saliva samples were collected, to non-invasively measure cortisol and immunoglobulin A (IgA) to assess stress, on d -1, 0, 1, and 2 relative to farrowing, and at weaning (d 16.9±0.18). Blood plasma was collected from 4 piglets/litter to measure immunoglobulin G (IgG) at 48 h, d 7, and weaning, as the ability to perform nesting behavior has been shown to increase piglet IgG. Piglet skin temperature was measured from two piglets/litter using an infrared camera at 0800, 1200, 1600, and 2000 h on d 1, 2, and 3 of age. Video was continuously coded for observations of jute-directed and crate-directed interactions. Data were analyzed as a mixed model analysis of variance in SAS 9.4. Nest sows performed less crate-directed behavior than Control sows, 35.9±9.44 vs. 100.6±21.78 minutes, respectively ($P=0.02$). Cortisol tended to be less in Nest sows ($P=0.08$), but there was no difference in IgA concentrations ($P>0.40$). Nest piglets had greater IgG concentrations ($P=0.03$), greater skin temperatures ($P=0.02$), and tended to be heavier on d 7 ($P<0.10$). There were no differences between Nest and Control in farrowing duration, 219.4±32.08 vs. 234.7±20.95 minutes, respectively ($P>0.07$), or number of stillbirths ($P>0.70$). The jute material and piglet nests positively impacted sow welfare and piglet measures but did not translate into a decreased farrowing duration or improved piglet survival.

Poster N° 69

Dealing with the challenge of early-life piglet hypothermia during the keeping of outdoor farrowing sows

Jens Malmkvist, Lene J. Pedersen*

Department of Animal Science, Aarhus University, Denmark.
** Presenting author: Lene.juulpedersen@anis.au.dk*

We aim to explore improvements of the housing for farrowing sows and their piglets, during free-ranging outdoor conditions being mandatory in the Danish organic production. One concern is the high piglet mortality, recently estimated across herds to on average 29.5% of total born. In in-door systems, provision of additional heat increased piglet vitality and reduced mortality, however these measures have not been tested under the wider range of thermal fluctuations present in outdoor herds. Early-life hypothermia in piglets contributes to reduced welfare, and may in combination with low milk intake and unsupported lay-down movements of the sow increase crushing events. Therefore, we tested the effect of access to a heated creep area for piglets early in life, in huts designed by Vanggaard Staldmontage Denmark, developed for outdoor farrowing on paddocks. The huts facilitated mobility across paddocks for four sows/litters in individual pens (half with heated, half with unheated piglet creep area). We present preliminary results on piglets' use of unheated vs. heated piglet creep area, based on video analysis of 25 TN70 sows (parity 2 or higher) farrowing March to August, delivering on average 15 (SD: 3.7) liveborn piglets per litter. Newly born piglets were quicker to enter the creep area if heated (survival analysis: χ^2_1=6.9, P=0.009), with an estimated hazard ratio of 3.2 (95% CI: 1.3-8.0) relative to litters with unheated creep area. The median [25%; 75%] latency time from birth of first piglet until one piglet of the litter entered the creep area was 80 [70; 191] min for the heated (0% censored) and 219 [110; 245] min for the unheated (23% censored) group. Further, the proportion of the litter inside the creep area was higher in heated (mean ±SE of litter: 25 ±5.5%) than in unheated (8 ±3.3%) area (χ^2_1=5.2, P=0.022), observed every 15 min for 24h on day 2 after birth. As the experiment is on-going, additional results are to be expected. In conclusion, provision of additional heat resulted in earlier and more extensive use of the piglet creep area early in life. These preliminary results suggests that novel hut features may reduce the risk of early-life piglet hypothermia during the keeping of farrowing sows in the outdoor production. The project PPILOW has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°816172.

Poster N° 70

Nutritional strategies to prevent post-weaning diarrhoea in organic piglets

Marc Bagaria[1*], Berta Baulida[1], Lluís Vila[2], Pino Delàs[2], Emma Fàbrega[1]

[1] *Animal Welfare Program, IRTA, Monells (Spain)*
[2] *Llavora, S.L., Ventalló (Spain)*
[*] *Presenting author: marc.bagaria@irta.cat*

Organic livestock farming is an ongoing production system committed to high environmental and animal welfare standards. However, animal health is not always ensured, and pathologies such as post-weaning diarrhoea (PWD), caused by the proliferation of *Escherichia coli*, may appear. Nutritional strategies have been implemented to prevent the negative consequences of PWD in organic pig production. The main objective of this study was to assess if a decreased crude protein diet or the supplementation of liquid whey would prevent PWD in organic piglets without compromising growth rate, behaviour, or welfare. A total of 134 piglets were fed one of three diets: high crude protein (17.8%, control, C), low crude protein (16.8%, LCP), and low crude protein supplemented with liquid whey (LCP+W). Piglets were studied weekly after weaning, from 49 to 71 days of age. The following parameters were assessed: diarrhoea incidence, daily weight gain, behaviour using instantaneous scan (positive and negative social encounters, enrichment and pen exploration, resting) and continuous sampling (positive and negative social encounters, enrichment exploration, eating, drinking, tail or ear biting), and health (respiratory, thermal comfort, body condition, skin and tail condition, body manure). Four piglets with severe diarrhoea were treated following the standard procedure of the farm. Samples from voided faeces were taken to analyse intestinal microbiota. Data was analysed using LMM and GLMM models with R software. No significant effect of diet on diarrhoea incidence (X^2=1.39,df=2,p>0.05) was found, but LCP+W diet increased daily weight gain (0.221±0.026, 0.132±0.018, 0.163±0.021 Kg in LCP+W, LPC, and C respectively, (F2,126=9.88,p=0.0004). Pigs fed with the LCP+W diet presented a lower percentage of negative (F2,52=4.93,p=0.0109) and drinking (F2,52=6.48,p=0.0030) behaviour compared with C diet, and pigs in the LCP presented higher exploration (F2,52=3.73,p=0.0304) compared with C pigs. The intestinal microbiota composition analysis reported Chao1 diversity index differences amongst diets both at family and genus levels, pigs in the LCP+W diet presenting a higher abundance of *Clostridiaceae* compared to LCP pigs (p<0.05). Although liquid whey did not reduce diarrhoea incidence, it was found to be a valuable supplement to a plant-based low protein diet in terms of growth rate. This could be explained by a better hydration due to higher liquid intake, and also by the higher abundance of *Clostridiaceae*, a butyrate producer family with beneficial effects on pigs' gastrointestinal tract. Thus, liquid whey could be an optimal supplement to organic diets, which could increase the efficiency and sustainability of organic pig production.

Poster N° 71

Removal of confinement 3 days post-partum does not steadily increase exploratory behaviour nor reduce inactivity in domestic lactating sows

Gudrun Illmann[1, 2*], Sébastien Goumon[1, 3], Helena Chaloupková[2], Iva Leszkowová[1]

[1] Department of Ethology, Institute of Animal Science, Přatelství 815, 104 00 Prague-Uhříněves, Czech Republic.
[2] Faculty of Agrobiology, Food and Natural Resources, Czech University of Life Sciences Prague, Kamýcká 129, 160 21 Praha-Suchdol, Czech Republic.
[3] Animal Physiology, Institute of Agricultural Sciences, ETH Zurich, Universitätstrasse, 2. 8092. Zürich, Switzerland.
[*] Presenting author: gudrun.illmann@vuzv.cz

Permanent crating exposes lactating sows to a very unchanging and inescapable environment, which may induce boredom-like states. In farrowing pens with temporary crating, sows are only confined during the first days post-partum (pp). We hypothesised that removal of confinement few days after parturition and the associated increase in space would improve sow welfare by promoting the expression of motivated behaviour, thus reducing boredom-like states. We predicted that crate opening on day 3 pp would increase the expression of exploratory behaviour and reduce inactivity while awake in sows during lactation compared to permanent crating. Sows were crated from 5 days pre-partum to either weaning (permanently crated - PC group; N = 14) or to day 3 pp (temporarily crated - TC group; N = 13). Weaning was performed on day 28. The short (i.e., first 24h post crate opening) and long term (i.e., on day 25) effect of removal of confinement was evaluated by continuously monitoring exploratory and inactive behaviour, which was analysed using all occurrence sampling. Behavioural measures included durations of exploration of the bedding, the bars or wall of the pens or crate (for PC sows) and inactivity while awake (sitting and standing) by the sows, assessed on both days. Data were analysed using PROC MIXED in SAS 9.4 including housing and litter size as fixed effects. The duration of bedding exploration by TC sows was greater shortly after crate opening ($P = 0.007$), while there was no difference on day 25 compared to PC sows (NS). TC sows spent more time exploring their pen compared to PC sows, both during the first 24h post crate opening ($P < 0.0001$) and on day 25 ($P < 0.0001$). Time spent inactive while awake did not differ between TC and PC sows 24h post opening and on day 25. Our results show that crate opening on day 3 pp increased the expression of some forms of exploratory behaviour in the short (bedding exploration) and long term (pen exploration) but did not affect inactivity levels. Therefore, the extent to which crate opening alone promotes exploratory needs of sows and may reduce boredom-like states remains unclear and calls for further research.

Poster N° 72

Effects of housing system on behaviour of middle growing broilers

Mirjana Đukić Stojčić*, Lidija Perić

University of Novi Sad, Faculty of Agriculture, Trg Dositeja Obradovića 8, Novi Sad, Serbia;
** Presenting author: djukic@polj.uns.ac.rs*

The aim of this study was to examine the behaviour of broilers chickens reared in two different production systems: barn reared, and traditional free range system. For this purpose 120 middle growing Redbro hybrid were used. During the first four weeks, all birds were reared in the poultry house. After 4 weeks broilers were divided into two groups with four subgroups of 15 birds each. First group stayed in the poultry house, barn reared (11 birds/m^2) in a deep litter system, and second group was moved in the free range system. The free range broilers were provided with a grass range of 2 m^2/bird with feeders, drinkers and overnight pens. Broilers were observed by scan sampling at 10 min intervals throughout the 5th, 6th and 7th week of age during morning. The numbers of chickens engaged in different behavioural activities were recorded: active, inactive, eating (head is in/ above the feeder), drinking, and other (scratching, preening, foraging, wing stretch, dust bathing, exploring). The data were analyzed by ANOVA and means were separated by Duncan's post hoc test using Statistica, StatSoft computer package. Results showed that the production system affected birds behavior. In both rearing systems broilers performed the same behavioral elements, with different time budgets. In all three observed weeks, animals kept on free range rested less than in poultry house, but there were no statistically significant differences. Rearing system had a significant effect ($P < 0.01$) on eating and other behavior. During all three weeks broilers kept in barn spent significantly more ($P < 0.05$) time on feeders then broiler on the pasture (25%, 32%, 21% vs. 10%, 6%, 9%). In the 6th and 7th week broilers kept indoor showed significantly less ($P < 0.01$) scratching, preening, wing stretching, dust bathing, and exploring then birds on free range. Compared to the barn, foraging and exploring increased when the broilers had access to pasture. Time spent on dust and sunbathing increased with increasing age on the posture (5^{th} - 0.2%, 6^{th} - 2.3%, 7^{th} - 2.7%, respectively).The present study illustrated that different production systems have different effects on the activity and behavior of middle growing broilers.

Poster N° 73

Shearing rams in winter increased their physical activity and decreased their resting time

Madeleine Guerrero*, Josefina Irazábal, Claudia Perez Irazábal, Paula Meerhoff , A. Freitas-de-Melo, J. Giriboni1, R. Ungerfeld

Facultad de Veterinaria, Universidad de la República
Presenting author: madeleineguerrero@gmail.com

Shearing generates thermoregulatory and metabolic changes in sheep, that trigger behavioral changes, including a decrease in the time resting and an increase of their time standing up and grazing. However, rams are larger, and have different basic behavioral patterns than ewes, so the aim of this experiment was to determine the effects of winter shearing on the behavioral pattern of rams. Twenty-two adult Corriedale rams, that were sheared one year before, were assigned to two homogeneous groups according to age and body weight. While 11 rams were sheared, 11 remained as controls. The rams were distributed in 4 pens (6m X 4m): two pens with 5 and 6 shared rams, and the other two pens with 5 and 6 unshared rams. Animals received alfalfa hay and ration according to their maintenance requirements and water ad libitum. The behavior of rams was recorded 3 days before shearing, and 7 days after it (from 1 to 4 days, and on 7, 9 and 11 days after shearing) for 8 h/day (mean environmental temperature: 12°C and mean humidity: 79%). Scanning recordings were performed every 10 min by 2 observers, each recording behaviors in two pens of each ram that included if it was eating, ruminating, standing up, lying down and walking. The percentage of observations in which each ram was doing each activity/day was calculated, and compared with a mixed model. The model included the treatment (sheared or wooled), the day of recording, as well as their interaction as fixed effects. Sheared rams were observed standing up and walking more frequently (standing up: 49.4% ± 1.6 vs 41.4% ± 1.6, P= 0.001; walking: 8.3% ± 0.6 vs 6.3% ± 0.6, P= 0.02), but less frequently lying down than wooled rams (42.4 % ± 1.6 vs 52.3% ± 1.6, P <0.0001). There was an interaction between treatment and time for lying down (P= 0.06): sheared rams spent less time lying down on days 1, 2, 4, 7, 9, and 11 after shearing than wooled rams (P <0.0001 for all the comparisons). In conclusion, after winter shearing, rams increased their physical activity and decreased their time lying down, likely to save energy, as it generates heat and decreases heat loss due to the removal of the wool.

Poster N° 74

The influence of the bedding material on dairy cows' behaviour

Gustavo Campos Bueno Dias[1*], Tarcis Alexandre Januario Raimundi[2], Marcos Inacio Marcondes[3], Polyana Pizzi Rotta[2]

[1] Departament of Preventive Veterinary Medicine and Animal Health, University of São Paulo, Pirassununga, SP, Brazil
[2] Animal Science Departament, Federal University of Viçosa, Viçosa, MG, Brazil
[3] Departament of Animal Science, Washington State University, Pullman, WS, USA
[*] Presenting author: dias.gustavo@usp.br

Behaviour is an essential and sensitive measurement that changes quickly according to the environment. The behaviour changes as welfare alter, and those reflect in the production and reproduction. Regarding bedding material, the cow can change the lying, standing, ruminating, and feeding behaviour in frequency as much as duration. Thus, this study aimed to compare the behaviour of Holstein cows housed with two bedding materials, sawdust, and sand. We hypothesized that it is possible to replace sand (SN) bedding with sawdust (SW) without any detriment. Sixteen Holstein cows were elected to two groups, SN (n=8) and SW (n=8) bedding. The trial lasted for 30 days, with additional previous 30 days for adaptation. The cows were blocked by weight, days in milk, parity, and milk production. The animals were allocated in two different pens, with a bedding per animal, at the same stall. The bedding material was replaced once a week. The behaviour evaluation took place on three periods of 48 hours each, during the experimental days 13 and 14, 20 and 21, and 27 and 28. The behavioural measurements included the time standing, laying down, feeding, and ruminating and were recorded every 5 minutes. The methodology of DeVries et al. (2003) was used to estimate the meal criteria, mealtime, frequency, and duration of each animal. Then, the data were analyzed as a completely randomized design, using $P < 0.10$ for significance. All analyses were run using R software. The total time standing did not vary; however, SN cows stood up more times than SW (14.1 vs. 12.3 events/day; p=0.078). The treatment did not influence any variable related to laying. Regarding feeding time, the SN cows had shorter meals than SW (25.6 vs. 30.1 min/event; p=0.065). The SN cows ruminated less than SW according to the mealtime of rumination (821.04 vs. 879.86 min/day; p=0.008). Furthermore, the SN animals had more events of rumination per day than SW (17.1 vs. 15.3; p=0.099), and those events lasted less time (48.9 vs. 58.0 min/day; p=0.013). The behaviour expressed in both bedding materials differed. SN cows stood up more times, had shorter meals, less mealtime of rumination with more events of rumination per day. The cows showed a normal daily budget in both bedding types and both could be recommended for dairy cows.

Poster N° 75

An overview of the effect of different tree arrangements of silvopastoral system on cattle behavior

Karolini Tenffen de Sousa[1*], Matheus Deniz[1], João Ricardo Dittrich[2], Maria José Hötzel[3]

[1] Ph.D. candidate, Programa de Pós-Graduação em Zootecnia (PPGZ), Universidade Federal do Paraná (UFPR), Curitiba, Brazil.
[2] Professor, Departamento de Zootecnia, PPGZ-UFPR
[3] Laboratório de Etologia Aplicada e Bem-Estar Animal (LETA), Universidade Federal de Santa Catarina, Florianópolis - SC, Brazil
[*] Presenting author: karoltenffen10@hotmail.com

It is known that the tree arrangement, like density and design, of the silvopastoral system (SPS), can affect the local microclimate, which can result in cattle modifying their behavior. In this study, we presented a systematic review performed to summarize the data available in the literature of cattle behavior on different tree arrangements of SPS. We conducted a search using Web of Science and Google Scholar to identify key literature on the effect of silvopastoral systems on the behavior of dairy and beef cattle. The resulting articles (n=191) underwent a 4-step PRISMA appraisal process; we only considered studies that statistically compared different tree arrangements. Of the 12 articles that fitted our criteria, 6 evaluated dairy cows and 6 evaluated beef cattle, performed between 2010 and 2021. Only 1 study (from Colombia) was not carried out in Brazil. Of the 12 articles, 3 evaluated dispersed trees on pasture, 9 evaluated the single-row arrangement, and 7 evaluated the multiple-rows arrangement. The main difference among the tree arrangements was tree density (range: 5 to 800 trees/ha); however, 2 articles did not report this information. The number of animals evaluated ranged from 12 to 30. Of the 12 articles, 6 evaluated behaviors (dairy: 5; beef:1), and 6 evaluated animal performance (dairy: 1; beef: 5). The articles that investigated behavior did not use the same measure of unit (like frequency, minute, etc.) to present the results. Also, some articles statistically compared the seasons (e.g., summer and winter), periods (e.g., morning and afternoon) and did not compare the tree arrangements, which impairs performing a meta-analysis. The studies evaluated the following behaviors: grazing, rest, rumination, frequency of visits to the water trough, and posture (standing and lying). Of the 6 articles that evaluated behavior, 3 did not find differences in grazing and idling time between different tree arrangements. On the other hand, 3 of 5 studies that evaluated ruminating behavior, found that cattle spent more time ruminating in higher tree density systems (range: 100 to 714 trees/ha). No difference was found between tree arrangements for the number of visits to the water trough in 5 articles. We conclude that the effects of tree arrangements on cattle behavior are scarcely explored in the studies. Consequently, it is difficult to reach a consensus on the effects of different tree arrangements of silvopastoral system on cattle behavior since it was not possible to carry out a meta-analysis of the results.

Poster N° 76

Effect of water and shade availability on grazing behaviour of cows in a Voisin Rational Grazing System

Luiz Carlos Pinheiro Machado Filho*, Fidel de Sousa Pretto, Sergio Acuña Ballestero, João Pedro Donadio da Silva Pereira, Kevin Oliveira, Priscila Signor

LETA - Laboratório de Etologia Aplicada e Bem-estar Animal, Departamento de Zootecnia e Desenvolvimento Rural, Universidade Federal de Santa Catarina, Brazil
** Presenting author: pinheiro.machado@ufsc.br*

Shade and water are important factors affecting the behaviour of grazing ruminants. Cattle may adapt grazing activity to cope with heat stress and limited water. The objective of this study was to investigate the effect of water and shade availability on grazing behaviour of cows in a Voisin Rational Grazing, a rotational pasture management system. The present study was conducted at the Federal University of Santa Catarina Experimental Farm of Ressacada, during the summer 2021/22. 32 cows were divided into four groups with eight animals each (4 Braford and 4 Jersey), in a 4 x 4 Latin square design, with 4 periods of 5 days each, being two days of adaptation, and three days of observation. The four treatments were: SWA: shade, plus water available 24h; SWL: shade, plus water available from 12:00 to 12:30pm and from 5:30 to 6:00pm; RWA: no shade, plus water available 24h; RWL: no shade, plus water available from 12:00 to 12:30pm and from 5:30 to 6:00pm. The cows were observed by direct observation for 24h over two periods of 12h each (7am-7pm and 7pm-7am), by four trained observers. The following variables were scanned at 10min interval: grazing, ruminating, idling, laying. During the observational period, diurnal temperature ranged from 18.1ºC to 32.7ºC, and air humidity from 67.1 to 99.0%. There was effect of treatment on diurnal grazing time ($p<0.0001$), being higher for SWA and RWA treatments (water 24h). However, when cows were in SWL and RWL treatments, they grazed longer at night ($p<0.0045$), but when compared over 24h period, no difference was found ($p=0.13$). No differences were found among treatments on total ruminating time over 24h. Cows increased diurnal idling behaviour when water was restricted ($p\leq0.0003$) and decreased diurnal laying time when shade wasn't available ($p\leq0.05$). Apparently, water availability is more important than shade for diurnal grazing, and cows will idle longer during the day when water is restricted. On the other hand, when shade isn't available, they lay less, probably because the ground temperature is high, and they facilitate the air flow over their body while standing. When water and shade were available, cows had higher diurnal grazing and lying time, indicating better welfare.

Poster N° 77

The effect of hot summer condition on the behavior of the captive red panda

Ayuka Sanada[1*], Risa Uchimoto[1], Kyohei Inada[1], Maho Yamanaka[1], Hideaki Hayashi[2], Ai Tanaka[3], Keisuke Nanto[3], Takuji Hirayama[1]

[1] Faculty of Bioresources and Environmental Sciences, Ishikawa Prefectural University, Japan
[2] School of Veterinary Medicine, Rakuno Gakuen University,Japan
[3] Ishikawa Zoo,Japan
[*] Presenting author: pikoume0402@gmail.com

Environmental temperature is one of the factors that have an important influence on behavior of animals. The captive animals are often bred in a climate different from their original habitat. In animals that live in alpine areas, it is necessary to be careful in the hot summer condition. We investigated the effect of hot summer condition on behavior of captive red panda. The research was conducted using two red pandas (*Ailurus fulgens*) housed at Ishikawa Zoo (Ishikawa Prefecture, Japan). The temperature in the back room is kept cool during the hot summer months (July and August). In the exhibit room, a structure imitating a tree is installed. And the red panda is bred that they can move freely between the back room and the exhibit room. The temperature in the back room and the exhibit room, and the behavior of the red panda were recorded. The behavior of the red panda was recorded by two video cameras. We analyzed the frequency of movement from the exhibit room to the back room and the spent time at each location using the recorded data. The behavior was categorized into locomotion, feeding, resting, grooming, marking, exploration and others, and each time of behavior and frequency of occurrence were analyzed. We examined the relationship between behavior and temperature using Kendall's rank-order correlation (τ). The average temperature in the exhibit room was 30.4°C, and the average temperature in the back room was 23.8°C. There was no significant correlation between the temperature and each behavior's time on the tree. There was significant positive correlation between the temperature in the exhibit room and the spent time in the cool back room ($P<0.05$). In the exhibit room, there was significant negative correlation between the temperature and the spent time ($P<0.05$). There was significant negative correlation between temperature differences in the back room and the exhibit room and the resting frequency ($P<0.05$). These results suggested that the red panda may have moved to the cool back room to avoid hot. On the other hand, these result shows that more time in the back room means less time in the exhibit room during hot summer. It may lead to reduce the satisfaction level of visitors. Therefore, we need ingenuity to avoid the heat in the exhibit room.

Poster N° 78

Welfare concerns with mounted load carrying by working donkeys

Syed S. U. H. Bukhari[1*], Sarah M. Rosanowski[2], Alan G. McElligott[3,4], Rebecca S. V. Parkes[1,4]

[1] Department of Veterinary Clinical Sciences, Jockey Club College of Veterinary Medicine and Life Sciences, City University of Hong Kong, Hong Kong SAR, China
[2] Equine Veterinary Consultants (EVC) Limited, Hong Kong SAR, China
[3] Department of Infectious Diseases and Public Health, Jockey Club College of Veterinary Medicine and Life Sciences, City University of Hong Kong, Hong Kong SAR, China
[4] Centre for Animal Health and Welfare, Jockey Club College of Veterinary Medicine and Life Sciences, City University of Hong Kong, Hong Kong SAR, China
[*]Presenting author: habukhari2-c@my.cityu.edu.hk

Working donkeys (Equus asinus) are essential for human livelihoods and are important for carrying goods. Current recommendations suggest donkeys should only carry loads of up to 50% of their own body weight. We investigated the mounted loads carried by working donkeys in Pakistan. A cross-sectional questionnaire study of donkey owners (n = 332) was conducted, and variables associated with mounted loads were identified using multivariable logistic regression models, with outcomes based on percentage body weight ratio (%BWR). Owners estimated that the median weight of their donkeys was 110kg (interquartile range (IQR) 100-120kg), carrying a median mounted load of 81.5kg (IQR 63-99kg). Owners reported that 87.4% of donkeys carried loads greater than 50% BWR. The median BWR carried was 77.1% (IQR 54.5-90.7%), and 25.3% of donkeys carried greater than 90% BWR. Overloading based on current recommendations (50% BWR) was common. Donkeys carrying more than 50% BWR were 4.2 times more likely to adopt sternal recumbency when loaded than those carrying less weight (p=0.01). Donkeys working in peri-urban and urban areas had a higher BWR than those working in rural areas (p=0.001), as did ones carrying construction versus agricultural materials (p=0.004). Younger donkeys aged 1 to 5 years carried more weight than donkeys aged 15 or older (p=0.03), whilst mixed breed donkeys carried more weight than other breeds of donkeys (p=0.01). In total, 42% (n=138) of owners reported that their donkey had been lame while working. The variables associated with the loading of donkeys in this population have previously been linked to the poor welfare (wounds, lameness, and joint swelling) of working donkeys. Donkeys used in brick transport had more welfare issues (higher skin lesions) as compared to those used for other purposes in previous research, as donkeys working for the brick industry carry more weight. Moreover, while donkeys might appear mature at the age of 2 years, they are still not skeletally developed unless they are 3 to 4 years old, and it has been proposed that donkeys must not carry load until they are 5 to 6 years old to prevent osteoarthritic abnormalities from overloading and overworking. Furthermore, donkey welfare is also affected by harmful practices, working hours per day, harsh environmental conditions, and lack of inclusion in legal systems. Donkey welfare can only be improved with community recognition of the impact of donkey loading practices. Research is critical for developing evidence- based loading guidelines to enhance working donkey welfare.

Poster N° 79

Breed differences of cognitive traits in the domestic dog (*Canis familiaris*)

Saara Junttila[1*], Anna Valros[1], Katariina Mäki[2], Katriina Tiira[3]

[1] *Research Centre for Animal Welfare, Department of Production Animal Medicine, University of Helsinki*
[2] *International Partnership for Dogs*
[3] *smartDOG Ltd and Department of Equine and Small Animal Medicine, University of Helsinki*
[*] *Presenting author: saara.junttila@helsinki.fi*

The extraordinary genetic and phenotypic diversity of dog breeds provides a unique opportunity for addressing questions about the heritability of cognitive traits, which is still a largely unknown topic in non-human animals. The aim of this study was to investigate differences between dog breeds in a standardized test battery (smartDOG) which included multiple tests measuring cognitive traits and personality. The tests were all based on existing cognition research and involved solving various problems with food rewards. Dogs were privately owned, testing lasted a maximum of 1.5 hours per dog, and none of the tests involved aversive situations. The test results of a total of 1,002 dogs were analyzed using logistic and multiple regression. Only breeds with over 40 individuals per breed were included. This resulted in 13 breeds: Australian Kelpie, Australian Shepherd, Belgian Shepherd Malinois, Border Collie, Cocker Spaniel, Finnish Lapphund, German Shepherd, Golden Retriever, Hovawart, Labrador Retriever, Mixed breed, Shetland Sheepdog, and Spanish Water Dog. Age and sex were included in the models as control variables. Statistically significant breed differences were found for understanding of human gestures ($p < 0.01$), spatial problem-solving in a V-detour task ($p < 0.01$), inhibitory control in a cylinder test ($p < 0.001$), human-directed behaviour during an unsolvable task ($p < 0.01$) and following a misleading pointing gesture ($p = 0.01$). No significant differences between breeds were found in tasks measuring memory or logical reasoning. Breed differences emerged mainly in tasks measuring social cognition, personality, and inhibitory control, suggesting that these traits are likely to have a heritable component. The results increase our understanding of behavioural differences between dog breeds and allows us to gain a deeper understanding about dog behaviour and the suitability of different breeds for their roles as pets and working dogs.

Poster N° 80

Performance of laying hens in the 8-arm radial maze task

Ľubor Košťál*, Katarína Pichová, Zuzana Skalná

Centre of Biosciences, Slovak Academy of Sciences, Bratislava, Slovakia
**Presenting author: Lubor.Kostal@savba.sk*

The 8-arm radial maze was introduced by Olton and Samuelson in 1976 to measure spatial learning and memory in rats. Literature on the use of radial maze in birds is limited. We tested the hypothesis that the behaviour of laying hens in the radial maze is affected by housing conditions (deep litter vs. enriched cage) and the version of the radial maze task (with or without restricting access to the arms between choices to prevent serial clockwise or counterclockwise visits to the arms). The performance of laying hens in the custom made 8-arm radial maze 354 cm in diameter with automatically controlled access to the arms was video-recorded from above by a wide-angle camera. The subjects of the study were 10 White Leghorn laying hens, 5 housed in deep litter pens and 5 in enriched cages. All arms of the maze were baited with the mealworm placed in a bowl. The test session finished after the hen visited all arms or it was terminated after 15 min. Animals were subjected to 31 trials, out of which 21 were without the restriction of the access to the arms between choices (sessions 1-9, 15-21 and 27-31), and 10 with the restriction (sessions 10-14 and 22-26). The number of correct choices out of the first eight visits of the arms (learning score) was recorded. Analysis of variance, using the GLIMMIX procedure of SAS, showed that the housing conditions did not have a significant effect on the learning score of hens ($F_{1,299} = 0.09$, $P = 0.767$). Nevertheless, there was a significant effect of the task version. In the version without the restriction of the access to the arms between their visits, hens used a serial strategy. In the case of restricting the access for 5 s and thus preventing serial clockwise or counterclockwise visits strategy, the learning score was significantly lower ($F_{1,299} = 52.76$, $P < 0.001$).

Poster N° 81

Optimization of the operant judgement bias test for the assessment of laying hens welfare

Katarína Pichová*, Zuzana Skalná, Ľubor Košťál

Centre of Biosciences SAS, Dúbravská cesta 9, 840 05 Bratislava, Slovakia
** Presenting author: Katarina.Pichova@savba.sk*

The judgement bias test (JBT) is a tool for the assessment of animal affective states. However, the results of the JBTs are in case of poultry inconsistent. Based on our previous findings, this study aimed to optimize the design of JBT for laying hens using the operant Go-NoGo task in a custom-made Skinner box. The next aim was to compare the affective states of hens in two housing systems (enriched cages versus deep-litter pens). The subjects of this study were 40 laying hens (20 hens kept in enriched cages and 20 hens kept in deep-litter pens). Animals were trained in a visual discrimination task to peck at a positive stimulus, rewarded by a mealworm, and refrain from pecking at a negative stimulus, punished by white noise. Half of the animals were trained with a white circle on the touch-screen as a positive and a 80% grey circle as a negative stimulus, while for the other half of the animals the colour assignment was reversed. At the JBT testing stage, half of the animals from each housing system were in addition to positive and negative stimuli exposed to one ambiguous stimulus (40% grey), while the other half was tested with three ambiguous stimuli (20%, 40%, 60% of grey). Ambiguous stimuli were neither rewarded nor punished. A higher proportion and shorter latency of reactions to ambiguous stimuli reflect positive (optimistic) judgment bias and correspondingly better welfare. Mean proportion and latency of reactions to ambiguous stimuli were not affected by the housing system neither in tests with one (mean proportion $F_{1,104}$=0.32; P=0.569, latency $F_{1,104}$=0.10; P=0.756) nor with the three ambiguous stimuli (mean proportion $F_{1,194}$=0.04; P=0.832, latency $F_{1,194}$=0.35; P=0.555). These findings suggest that the differences between housing systems are not large enough to induce changes in affective states of laying hens or that this type of JBT is not sensitive enough for detecting this extent of changes. To eliminate possible loss of ambiguity with repeated presentation of ambiguous stimuli in comparison to previous experiments we also decreased the proportion of ambiguous stimuli to rewarded and punished ones from 3:2 (45 ambiguous : 30 reference stimuli per session) to 1:2 (15 ambiguous : 30 reference stimuli per session). This change in design successfully eliminated the phenomenon with lower variability in responses to ambiguous stimuli between days in test with one than in test with three ambiguous stimuli.

Poster N° 82

Preliminary results: effectiveness of cage enrichment for reducing aggressive behavior in group-housed unfamiliar breeding does.

Liesbeth G.W. Van Damme[1,2,*], Nusret Ipek[3], Jan Verwaeren[3], Frank A.M. Tuyttens[1,2]

[1] Animal Sciences Unit, ILVO, Scheldeweg 68, 9090 Melle, Belgium
[2] Department of Veterinary and Biosciences, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, 9820 Merelbeke, Belgium
[3] Department of Data Analysis and Mathematical Modelling, Faculty of Bioscience Engineering, Ghent University, Coupure Links 653, 9000 Gent, Belgium.
[*]Presenting author: liesbeth.vandamme@ilvo.vlaanderen.be

Society increasingly expects social farm animals, including rabbits, to be housed in group. Maternal protective behavior, however, induces aggressive behavior and skin lesions when breeding does are grouped. This study aimed to evaluate the effectiveness of cage elements for reducing the frequency and intensity of aggressive behavior in group-housed does. Eighty does with their 22 days old kits were allocated to 20 group-pens (1x2 m with a 0.30x2 m raised platform) so that each pen housed four unacquainted does and their litters for a period of 10 days (until weaning). Pens were subjected to one of the following treatments: small pressed alfalfa blocks as distraction material (A), three wooden panels attached underneath the platforms, visually separating the pen into four areas (P), both alfalfa and wooden panels (AP), or no extra elements (controls, C). This experiment was replicated for three reproduction cycles ensuring that each doe and pen never received the same treatment. Skin lesions were scored one, three, six, eight and ten days after grouping with a tagged visual analogue scale. For ethical reasons, sick, severely injured or overly aggressive animals were removed from the experiment. Activity detectors were implemented using computer vision techniques and calibrated to rate rabbit activity continuously throughout the entire experiment. Detectors were set to specifically detect agonistic behavior on a subset of three pens per treatment and cycle. One day after grouping, 67% of the does and 13% of the kits acquired new injuries. This prevalence increased to respectively 82% and 33% after ten days in group. Neither the severity nor the number of injuries were affected by treatment but both were highest on the sixth day for the does ($P<0.001$) and on the tenth day for the kits ($P<0.001$). Activity showed an interaction effect between treatment and day in group ($P<0.001$). During the first three days, activity was highest in C and lowest in AP ($P<0.01$). Compared with C, activity was lowest in AP on the sixth day ($P=0.03$). Between the first and second day, activity decreased significantly in all treatments ($P<0.001$) further decreasing on the third day except in AP. Although treatment did not significantly affect the number or severity of skin lesions, providing cage elements reduced activity during the first days after grouping. Ongoing imaging analysis will document activity levels for the remaining pens, and the full dataset will be used for elucidating links between activity, agonistic behavior and skin lesions.

Poster N° 83

Impact of stocking density and exercise on the maintenance behaviours and herd synchrony of developing beef heifers

Courtney L. Daigle[1], Reinaldo F. Cooke[1], Logan Rahmel[2*], Aiden E. Juge[1], Kelsey M. Harvey[2]

[1] Department of Animal Science, Texas A&M University, College Station, TX
[2] Prairie Research Unit, Mississippi State University, Prairie, MS
[*]Presenting author: lmw534@msstate.edu

To examine the effects of confinement stress and restricted physical activity on the behaviour of heifers reared in high stocking densities, 90 Angus (¾) × Brahman (¼) heifers were ranked by age and BW that was measured approximately 15 d after weaning (7 months of age) and allocated to: a) 1 of 6 drylot pens (10x14 m pens; 10 heifers/pen) resulting in a stocking density of 14 m2/heifer (DENS), or b) 1 of 3 paddocks (2-ha paddocks; 10 heifers/paddock) resulting in a stocking density of 2,000 m2/heifer (CON). After two weeks of acclimation, 3 DENS pens were randomly selected to utilize an exercise area during the experimental period (DENS-EX). All heifers were fed a concentrate diet daily, and CON paddocks were mowed weekly. Heifers were allowed to enter the exercise area (a 30x150 m narrow paddock with no forage) 3 times/wk (Mon/Wed/Fri) for 1 h. Live behaviour observations, conducted on two consecutive days (Sat/Sun), recorded the proportion of animals within each pen either feeding, drinking, walking, standing, or lying using instantaneous scans conducted every 10 minutes from 08:00 to 17:00 during wk 0 (prior to exercise implementation), and wk 1, 3, and 6 after exercise regimen began. For each pen, Shannon's Diversity index was calculated using the observed behaviours. Behaviours were averaged by week and the impact of treatment, week, and their interaction was evaluated using a Generalized Linear Mixed Model (PROC GLIMMIX) with differences evaluated using Least Squared Means with a Bonferroni correction. When an interaction was detected, differences among treatments were evaluated within week. Neither drinking, lying, nor Shannon's D were impacted by treatment or wk. Walking was impacted by treatment ($P = 0.01$) where a greater proportion of CON cattle (4.3%) were observed walking compared to DENS (1.9%; $P = 0.03$) and DENS-EX (2.5%; $P = 0.02$) cattle. The proportion of animals feeding and standing were impacted by the treatment by week interaction ($P = 0.01$), where CON cattle were observed feeding more (43.5%) and standing less (22.1%) compared to DENS (20% feeding; 47% standing) and DENS-EX (21% feeding; 47% standing) cattle throughout the study. Our results illustrate that cattle with increased space allowances will engage in feeding behaviour even when forage is unavailable and will actively move throughout the enclosure. Exercise regimen did not impact heifer behaviour on non-exercise days. These results suggest that stocking density, but not exercise regimen, impacts cattle feeding, standing, and walking behaviours, but does not impact drinking, lying, or herd synchrony. Supported by USDA-NIFA #2021-67015-34083.

Poster N° 84

Synchronous observations of behaviour of five species of felids in three Swedish zoos

Claes Anderson[1*], Jenny Loberg[2], Ulrica Ahlrot[2], Lisa Lundin[1], Maria Andersson[1]

[1] *Department of Animal Environment and Health, Swedish University of Agricultural Sciences, Sweden*
[2] *Foundation Nordens Ark, Sweden*
[*] *Presenting author: claes.anderson@slu.se*

Many feline species are endangered, and captive felids in zoos play a crucial role in maintaining viable populations. Conservation efforts on breeding and possible future reintroduction take place all over the world. In captivity, animals are subjected to a challenging environment, and it is often difficult to maintain good animal welfare and reproduction success. Research on the behaviour and welfare of felids in zoos, however, clearly has some limitations. There are normally too few individuals in a specific zoo to get sufficient data to draw reliable inferences concerning their welfare. The aim of this study was therefore to perform synchronous observations in several zoos with the same research question and the same study design to evaluate if this may be an approach that can be used on a greater scale to gather more data on the welfare of felids. Activity patterns and enclosure-use can tell us about how enclosures are affecting individual animals, and how resources in the environment can be distributed, regardless of species. Cheetahs, Pallas's cats, Amur tigers, Amur leopards and Eurasian lynx were simultaneously observed by five different observers in three different zoo settings in Sweden, resulting in behavioural data from a total of four adult individuals per species. One female and three male cheetahs were observed, and in the other four species two males and two females were observed. Following an ethogram, the frequencies of 19 behaviours were recorded, and 12 hours of behavioural data were obtained from each individual feline. Our results showed that the most frequent recorded behaviour in all five species were walking/pacing (15-38%) and the second most recorded behaviour was standing/sitting (13- 28%), consistent with much previous research on which type of behaviours felids mostly express in captivity. The third most recorded behaviour was lying (4-9%). The pattern was consistent between all five species. In terms of methodology, we believe that simultaneous observations in several different zoo setting of ecologically similar felid species may be a useful approach to gather data of species of which it is difficult to obtain many individuals. We see that this approach has the potential when assessing the animal welfare in zoo enclosures in relation to enclosure design (time budget and use of resources), especially for related species with similar behavioural ecology.

Poster N° 85

How should the public contribute to improving cattle welfare? Ambivalence in perspectives from veterinarians and animal scientists

Beth Ventura[1*], Dan Weary[2], Nina von Keyserlingk[2]

[1] School of Life Sciences, University of Lincoln, United Kingdom
[2] Animal Welfare Program, University of British Columbia, Vancouver, Canada
**Presenting author: bethventura2@gmail.com*

The human dimension of animal welfare has received increased attention over the last decade, including understanding the perspectives of different stakeholders. Veterinarians and animal scientists, for example, help shape farming practices and have a role in bridging industry and social expectations regarding animal welfare. However, their views on public participation are underexplored. This qualitative study used five focus groups of veterinarians, veterinary researchers, and animal scientists (n=50 in total), recruited at a European animal welfare meeting focused on the topic of cattle welfare. Participants were prompted with questions to elicit their perspectives of public concerns and how public input should be included when developing solutions. Discussions were moderated by trained facilitators, audio-recorded and transcribed, and transcripts thematically analyzed via content analysis. Groups identified specific practices viewed as concerning to the public, including zero grazing, behavioral restriction, and painful procedures. Discussions about these concerns and the role of the public were often framed around the assumption that the public was ignorant about farming, and that this ignorance should be rectified through public education. Participants were generally ambivalent about whether, and how, the public should contribute to discussions on improving farm practices, but many suggested that consumers should pay more for products to help shoulder the costs of welfare-oriented improvements.

Poster N° 86

Do you feel what I feel? Emotional contagion in domestic pigs – a pilot study

Annika Krause*, Helena Maudanz, Jan Langbein

Institute of Behavioural Physiology, Research Institute for Farm Animal Biology (FBN), D- 18196 Dummerstorf, Germany
**Presenting author: krause@fbn-dummerstorf.de*

There is increasing evidence that social partners are sensitive to indicators of affective states in others. This sensitivity can trigger emotional contagion (EC), which refers to the most basic form of empathy and is the shared emotional state without necessarily requiring conscious processing. The few available studies on EC in pigs suggest that they are capable of this phenomenon and that it might have a crucial impact on animal welfare. The aim of this pilot-study was to investigate EC in pigs using an observer-demonstrator paradigm. We examined if EC is stronger in negative contexts compared to neutral and/or positive situations and how previous experience may affect EC. Fourteen pigs were exposed pairwise to different test situations, in which a naïve individual (observer) observed a conspecific demonstrator during a situation that induced a change in the demonstrator's emotional state. Four test situations (2 minutes each) were applied: restraint behind shelf (C-), human present (C0), gentle handling (C+) and food-ball (C++). To investigate the impact of previous experience, the role of observer and demonstrator were switched in a second phase. The effects of test situation (C-, C0, C+, C++) and phase (t1, t2) on behaviour (contact to grid, gaze to demonstrator) and physiology (heart rate (HR) and HR- variability) were analysed using repeated measurements ANOVA. Our results revealed an impact of the test situation on the duration of exploring the grid ($F=_{3,35}=4.98$, $p<0.01$) and gazing at demonstrators ($F_{3,34}=3.2$, $p<0.05$). Observers explored longer at the grid when the demonstrator was restrained (C-) compared to the other test situations and gazed longer towards the demonstrator in C- compared to C++. We assumed that observers showed attentional arousal and vigilance towards a stressed conspecific indicating socially-mediated arousal. Demonstrators revealed elevated HR in C- compared to C++ ($p<0.01$) while observers tended to show elevated HR during C- compared to C+ ($p<0.1$). A significant difference in HR between demonstrator and observer was apparent in t1 ($p<0.05$) and disappeared in t2. Previous experience seemed to play a role regarding physiological synchronization. Our study showed that the test situation of the demonstrator elicited a behavioural and physiological reaction in the observer, indicating EC. The strongest reaction was found in the negative condition. Previous exposure to the situation did not influence behavioural but physiological indicators of EC. The evidence of EC provided insights into the emotional experience of animals and could have implications on animal welfare, especially for group- housed animals.

Poster N° 87

Housing a male giraffe with females triggers more aggressive behaviors from a high-ranking female towards a low-ranking female

Miho Saito[1*], Masayuki Matsunaga[2], Hiroki Fukuizumi[2], Kodzue Kinoshita[3]

[1] *Graduate School of Asian and African Area Studies, Kyoto University, Japan*
[2] *Kyoto City Zoo, Japan*
[3] *Wildlife Research Center, Kyoto University, Japan*
[*] *Presenting author: saito.miho.2w@kyoto-u.ac.jp*

Wild giraffes (*Giraffa camelopardalis*) live in fission-fusion societies in which the herd members change within hours or days. Therefore, belonging to a herd made up of the same individuals for months or years is uncommon in nature, but common in captivity. To understand the impact of male presence on female stress levels and to provide useful information to improve the housing of giraffes, we investigated female stress physiology (fecal glucocorticoid metabolite level; fGCM) and social behavior (aggressive behavior) in captive giraffes under two conditions: a male present or absent. The subjects were one male (M1) and two females at Kyoto City Zoo, Japan. The two females were kept in the same enclosure throughout the study. When the females were together with M1, they were always in the large outdoor enclosure. Behaviors were observed for approximately 300 h to record the occurrence and direction of approach and nonaggressive and aggressive behavior. Captive female giraffes form a dominance hierarchy and their rank is positively affected by their age and time spent in the herd. Therefore, we considered the older female that had spent more time in the zoo to be high-ranking. There were no significant differences in the fGCM levels of females under the two housing conditions (Wilcoxon rank sum test for female 1 [14 fecal samples from male present condition, 17 fecal samples from male absent condition]: $W=135.5$, $p = 0.512$); Wilcoxon rank sum test for female 2 [13 fecal samples from male present condition, 17 fecal samples from male absent condition]: $W=139$, $p = 0.245$). However, the frequency of approach and nonaggressive and aggressive behaviors from the high- ranking to the low-ranking female increased significantly when the male was present (GLM for aggressive behavior: Estimate $\pm$ SE = 1.382 ± 0.201, $z = 6.871$, $p < 0.01$). The low-ranking female was significantly less likely to approach the high-ranking female when a male was present. We also found that the frequency of nonaggressive and aggressive behavior from the low-ranking to the high-ranking female decreased in the presence of the male. Despite the small number of studied individuals, these results suggested that when we consider the social housing of giraffes, it is important to consider not only the fGCM level but also the frequency and direction of social behaviors.

Poster N° 88

Public knowledge of the legislation, awareness, and attitudes towards animal welfare: a study among clients of Department of Veterinary Services Malaysia

Razlina Raghazli

Veterinary Regulatory Division, Department of Veterinary Services, Podium block, Lot 4G1, Wisma Tani, Precinct 4, 62630 Putrajaya, Malaysia
** Presenting author: razlina@dvs.gov.my*

Malaysia is heading to be a developed country with a society that loves and cares for its animals. Various promotions and awareness on animal welfare and legislation have been held intensively since 2015. Nonetheless, no studies have been conducted to examine the effectiveness of the promotional activities over the years. Understanding knowledge and public attitudes towards animal welfare can be used to design more effective promotional activities and give more insight into general behaviour towards animal welfare issues. The current study explores the knowledge of legislation and attitudes on animal welfare among clients of the Department of Veterinary Services Malaysia (DVS). This group represents a sample of people working closely with animals or in the related animal care industry. An invitation to answer the online questionnaire was uploaded on the official social media platform of DVS, to which 200 people responded. There are three parts of the questionnaire: demographic, awareness of the current legislation, and general attitudes toward specific animal welfare issues. Results show that more than 80% of respondents in the study were aware of the animal welfare legislation in Malaysia. Most urban dwellers, which comprised 22% of the total respondents, think that animal welfare information in Malaysia is still insufficient. However, in principle, most promotional activities are carried out in urban areas. Most respondents believe that stray population issues, lack of veterinary care, treatment of farm animals and living conditions of zoo animals are the main issues of animal welfare in Malaysia ($P > 0.05$). In addition, 90% of the respondents are aware of the five basic needs of animals and are willing to pay more for products from animals with good welfare conditions. At the same time, there were no significant differences between respondents who feel the need to keep good welfare of farm animals and respondents who think the welfare of the animals is not as important as long as they can produce food. There was also no significant difference ($p > 0.05$) between the number of respondents that think there are sufficient or insufficient choices of animal welfare products in the market. In conclusion, most of the respondents are aware of the legislation and basic animal welfare needs. However, many were focused on pets› welfare, particularly dogs and cats. Awareness of the welfare of farm and research animals should be given more attention in future promotional campaigns.

Poster N° 89

Don't get in their way: How outing conditions relate to the motivation of movement-restricted cattle to access an outdoor exercise yard

Nadège Aigueperse[1, 2], Véronique Boyer[2], Elsa Vasseur[2*]

[1] University of Clermont Auvergne, INRA, VetAgro Sup, UMR Herbivores, F-63122 Saint-Genès-Champanelle, France
[2] Department of Animal Science, McGill University, Ste-Anne-de-Bellevue, QC, H9X 3V9, Canada
[*] Presenting author: elsa.vasseur@mcgill.ca

Providing regular outdoor access could represent an enrichment for movement-restricted cows; however, the characteristics of the enrichment is likely to impact their motivation. Thus, our study addressed the question of how the outing experience provided (handling, duration and space) relates to the motivation of cows for an enrichment (here, increasing the opportunity for movement for movement-restricted animals). In a series of 3 trials (analysed independently), sixteen tiestall cows in winter (W) and summer (S), and fifteen in the fall (F) were provided with daily outdoor access in groups of 2 (W,S) or 3 (F) cows for 8 (W,S) or 5 (F) weeks. Go- out and go-in trips to and from the outdoor paddock were assessed for trip duration, cow locomotor behaviour, and for instances of attempts from cows to resist the handlers or to force their way forward. Differences between the duration of go-out and go-in trips were analysed using t-tests, while cows' behaviours were analysed through LMr comparisons on PCA scores for each trial, with go-out and go-in as fixed factors. The same two dimensions were revealed for all three seasons: 'Trip Speed' (duration vs speed, caracoling and running) and 'Stops Quality' (resistance and balking vs free stops). These dimensions accounted for cow reactions to handling. LMr comparisons of cows' scores on the two dimensions were also tested for outing conditions (time: 1h, 2h; and space provided: 20, 40, 60, 80 m²). Gaps between the go- out and the go-in trips speed differed between all three seasons. These, as well as the Trip Speed and Stop Quality dimensions scores, yielded three different motivation profiles which corresponded to the three trials: 1) "Outdoor enthusiasts" (Profile F) had increased travel times during go-ins (possibly indicating a lack of motivation to return indoors) and exhibited caracoling and running behaviors in the alleyway during go-outs, potentially expressing positive emotion. 2) "Mile a minute" cows (Profile W) showed similar quick travel speeds on go-outs and go-ins; 3) "Thwarted motivation" cows (Profile S) had longer go-out trips and expressed frustration through negative interactions with humans, which resulted in resistance and forced stops, to the point they were becoming dangerous to handle. Our results also showed greater speed on go-ins after 2h than after 1h, and more negative interactions with handlers with the smallest paddock. We concluded that the cows' experience led to different motivation profiles, and that outing conditions impact motivation for enrichment, and therefore its effectiveness.

Poster N° 90

Can straw or compost satisfy the rooting motivation of fattening pigs?

Christina Rufener[1*], Sarah Lopez[1,2], Mirjam Holinger[3]

[1] Center for Proper Housing: Ruminants and Pigs, Federal Food Safety and Veterinary Office FSVO, Agroscope, Ettenhausen, Switzerland
[2] Vetsuisse Faculty, University of Bern, Bern, Switzerland
[3] Research Institute of Organic Agriculture FiBL, Frick, Switzerland
[*] Presenting author: christina.rufener@agroscope.admin.ch

Pigs are highly motivated to root, but most commercial housing environments do not provide adequate rooting materials to fulfil pigs' behavioural needs. The aim of this study was to assess how different substrates in a rooting area can satisfy the motivation to root in fattening pigs. Using conditioned place preference tests (CPP) and preference tests (PT), we hypothesized that pigs that could satisfy their rooting motivation in their home pens would prefer freely accessible food over food they had to root for. This concept has been described as "contrafreeloading" previously. Fifty-seven pigs (Swiss Large White) were housed in three growing-finishing pens providing an area with compost, deep straw, or a minimal layer of straw. Eight pigs per pen were selected for CPP and eight pigs per pen were assigned to PT. Both tests were conducted twice; at the beginning and the end of the fattening period. For CPP, pigs were trained to associate a chamber and a colour with a stimulus: freely accessible apple slices (feeding) or apple slices hidden in sawdust (rooting). On the test day after the training period, pigs had access to both chambers with the corresponding colours, but without stimulus. For PT, two feeders with the stimuli (feeding or rooting) were provided next to each other without visual separation during training and testing. On test days, the first decision (feeding or rooting), latency to decision, duration of stay per stimulus, and number of changes were recorded. Data were analysed using (generalized) linear mixed effects models. In the CPP, minimal straw pigs tended to enter the rooting chamber first ($p=0.01$). Minimal straw pigs entered the chambers slowest ($p=0.03$), especially when choosing the feeding chamber ($p<0.001$). Compost pigs were faster with their decisions, especially when choosing the rooting chamber. Treatment did not affect the duration of stay per chamber ($p=0.36$), but duration of stay correlated with the first decision ($p<0.001$): pigs spent more time in the chamber they entered first. In the PT, compost pigs chose the feeding trough first more often than other pigs ($p=0.02$). Compost and minimal straw pigs stayed at the feeding trough longer than deep straw pigs ($p=0.04$). Based on our results and because the outcomes were not consistent among the behavioural tests, we cannot conclude whether straw or compost can satisfy the rooting motivation of fattening pigs better. Our results indicate that CPP and PT should be interpreted with caution and, ideally, in combination.

Poster N° 91

Reduction in body lesions of pigs through the provision of novel enrichment

Katarína Bučková[1*], Ramon Muns[2], José Cerón[3], Ilias Kyriazakis[1]

[1] [1]nstitute for Global Food Security, School of Biological Sciences, Queen›s University Belfast, Belfast BT9 5DL, UK
[2] Monogastric Research Group, Sustainable Agri-Food Sciences Division, Agri-Food and Bioscience Institute, Belfast BT9 5PX, UK
[3] Interdisciplinary Laboratory of Clinical Analysis, Interlab-UMU, University of Murcia, 30100, Campus de Espinardo s/n, Murcia, Spain
[*]Presenting author: k.buckova@qub.ac.uk

Most pigs in slatted systems are provided with enrichment meeting only minimum legal requirements. We aimed to explore the effects of fodder beet as novel enrichment for pigs in slatted systems, and to investigate the timing of enrichment provision on stress resilience. We used 280 pigs allocated to a standard (S, meeting only minimum legal requirements) or enriched (E) treatment after weaning at 4 weeks of age. S enrichment consisted of a suspended plastic toy and a piece of softwood. E pigs were in addition provided daily with fodder beet on racks and jute bags. Each treatment was replicated on 14 groups balanced for BW and gender (10 weaners/group). At 10 weeks of age, pigs were moved to a finisher accommodation and were either kept in the same enrichment treatment (EE and SS) or switched from enriched to standard (ES) and vice versa (SE). Each treatment was replicated on 5 groups (14 finishers/group). Occurrence of ear bites, tail bites and body lesions were recorded twice a week in all pigs until the end of the study (i.e., 21 weeks of age). Ten males per treatment were sampled for saliva on days 1, 2, and 4 post-weaning and after the housing switch, respectively. Saliva samples were analysed for adenosine deaminase, haptoglobin, amylase, and cortisol to measure stress response to weaning and the housing switch. Five days before the housing switch as well as at the end of finishing stage, hair samples from the same animals were taken, which were analysed for cortisol to measure chronic stress response. Hair cortisol concentrations were analysed by glm. Other variables were analysed by glmm for repeated measures. We found the significant effect of the interaction between enrichment treatment during weaning and finishing stage on body lesions ($F_{1,15}$=4.91, P=0.04). Post hoc analysis revealed that EE pigs had decreased occurrence of body lesions compared to pigs on the other three treatments (estimates: EE 1.60, SS 1.99, ES 2.09, SE 2.11 per 11 weeks; $P \leq 0.05$) during finishing stage which is an indication of reduced fighting among EE pigs. There were no other significant differences caused either by enrichment treatment during weaning/finishing stage, or their interaction. We conclude that fodder beet in a combination with jute bags may be promising enrichment for pigs, but further researcher is needed to address other aspects of pig welfare.
This research was part of the HealthyLivestock project funded by grant 773436.

Poster N° 92

Rehoming dogs from commercial breeding kennels: behavioral and management factors to set them up for success

Shanis Barnard*, Alessia Diana, Hannah Flint, Traci Shreyer, Candace Croney

Department of Comparative Pathobiology, Purdue University, 625 Harrison St., West Lafayette, IN, USA
**Presenting author: barnard4@purdue.edu (SB)*

Rehoming dogs from commercial breeding kennels (CBKs) at the end of their breeding careers is an ethical and humane practice. However, how well these dogs cope with the transition to a home environment is unknown. Rehoming may be distressful, especially if the kennel's socialization and management practices do not adequately set retiring dogs up for success in homes. This study aimed to examine relationships between CBK behavioral and management factors and dog rehoming outcomes.A total of 590 adult dogs from 30 breeding kennels in the Midwestern US were directly assessed for levels of social and non-social fear, and for physical health. Kennel management information was collected via questionnaire. Dogs from 12 kennels were followed after rehoming. One month after adoption, 32 owners completed a survey asking about their dogs' health and behavior in their new homes. A Principal Component Analysis extracted four behavioral components (PCs) including food motivation (i.e., accepting and eating offered treats), sociability (i.e., response to an unfamiliar person), boldness (i.e., response to inanimate objects), and responsiveness (i.e., response to startling stimuli like an opening umbrella). Multiple regression models indicated that higher sociability scores in the kennel were associated with lower stranger-directed fear ($p=0.005$) and non-social fear ($p=0.005$), and with higher trainability ($p=0.013$) after rehoming. Similarly, dogs scoring higher on the boldness factor (i.e., being more explorative and less fearful of novel objects), were less likely to show non-social fear at home ($p=0.021$). Management practices were found to have an effect on both the in-kennel behavioral assessment as well as the rehoming outcomes. For instance, a lower number of dogs per caretaker ratio was associated with dogs showing higher sociability levels ($p<0.05$). Further, performing regular low stress handling during husbandry procedures was associated with dogs being scored as more trainable by the owners at home ($p=0.014$). Results suggest that a comprehensive behavioral assessment of rehoming candidates while in CBKs can help identify areas of intervention, such as implementing practices that reduce social and non-social fear in the kennel, which may help dogs transition successfully to new homes.

Poster N° 93

Thinking outside the (shoe)box: Refining rat housing and handling to enhance animal welfare

Carly I. O'Malley[1*], Halimatou Tambadou[1], Emilie Paterson[1], Erik Moreau[1], Olufemi Ekundayo[2], Jukka Puoliväli[2], Patricia V. Turner[1,3]

[1] Global Animal Welfare & Training, Charles River, Wilmington, MA, USA
[2] Discovery Services, Charles River, Kuopio, Finland
[3] Department of Pathobiology, University of Guelph, Guelph, ON, Canada
[*]Presenting author: carly.o'malley@crl.com

There is increasing emphasis on the importance of natural behaviors and postures on the health and welfare of research rats. In this study we investigated behavioral and physiological differences between rats housed in different environments and examined the effect of gentle handling on human interactions and response to restraint for different housing types. Seventy Crl:CD(SD) Sprague Dawley rats (34 males, 36 females; 5 wk old) were randomly assigned to housing treatment: standard cage (C): 24.1 cm L x 45.7 cm W x 20.3 cm H; n=3 rats/cage, 8 cages or primate cages modified for housing rats (T): 81.3 cm L x 81.3 cm W x 88.9 cm H; n=5-6 rats/cage, 8 cages. Rats received 15s of gentle handling 3 days/wk over the 18-day study period. Rats were scored on levels of anxiety (using elevated plus maze (EPM); 5 min), human interactions (using latency to approach novel human during human approach test (HAT) before and after blood collection; 1 min), general behavior at 3 time periods over the study period (10 min duration during an active phase), blood glucose levels in response to restraint (mg/dL), and body weight (g). Data were analyzed using linear mixed models with fixed effects of treatment, sex, and time period, and random effect of cage. Overall, rats provided with more space and resources showed behavioral evidence of improved welfare. T rats were less anxious than C rats, spending less time in the closed armed of the EPM ($P=0.003$) and more time in the open arms ($P=0.019$). T rats were more active ($P<0.0001$) and spent less time eating ($P<0.0001$), grooming ($P=0.020$), and in cage exploration ($P=0.005$). T rats also spent more time in vertical posture ($P=0.012$) and less time in lying ($P=0.026$) and sitting ($P=0.001$) postures. C and T rats had similar latencies in the HAT, approaching a novel person faster before blood collection than after ($P>0.05$). T rats spent less time in contact with the human ($P=0.013$) during the HAT suggesting an interaction between housing environment and human interactions that needs to be further explored. No differences were noted in blood glucose levels between T and C rats ($P>0.05$). There was a trend for T rats to weigh less than C rats at Day 14 ($P=0.094$), and in both groups, resource exploration declined towards the end of the study period suggesting a need to further examine the long-term impacts of environment on the welfare of rats.

Poster N° 94

Development of a novel digital enrichment system to enhance the welfare of zoo-housed chimpanzees

Yumi Yamanashi[1,2*], Ryoko Aoki[3], Zon Ito[3], Nobuaki Yoshida[4], Yuko Ikkatai[5]

[1] *Center for Research and Education of Wildlife, Kyoto City Zoo, Kyoto, Japan*
[2] *Wildlife Research Center, Kyoto University, Kyoto, Japan*
[3] *Artist*
[4] *Advanced Science, Technology & Management Research Institute of Kyoto, Kyoto, Japan*
[5] *Faculty of Social Science, Kanazawa University, Kanazawa, Japan*
[*] *Presenting author: yumi.yamanashi.kycz@gmail.com*

Providing mental stimulation is important to achieve positive animal welfare. Although the environment of modern zoos has evolved to meet the various needs of animals, it is still limited in the amount of stimulation and control that animals have over the environment. We developed a novel digital enrichment system to increase stimulation in the captive environment of zoo-housed chimpanzees and to understand their motivation to explore their environment. We aimed to create an easy-to-implement system which is small and does not require a person to operate inside of enclosure. For this study, the subjects were a group of chimpanzees living in the Kyoto City Zoo, Japan (N = 6). The facility included both indoor and outdoor enclosures and the enclosures had structures and vegetations to climb. Foraging enrichment were provided in addition to three main meals. We installed interactive movies that the chimpanzees could change the contents of by physically interacting with the movies or by moving a buoy near the movie projection screen in the indoor enclosure of the facility. The system consisted of Yupo paper attached to a glass wall to project the movies, and computers, projectors, and sensors (Intel RealSense) were used to detect the chimpanzees' behaviors. We installed the interactive movies for 8 days from December 18 to 26, 2021. We recorded the rate and types of interactions using the device and the chimpanzees' emotional expressions and spatial use within the indoor enclosure using surveillance cameras. We used continuous sampling method to record the interactions with the devices and recorded locational data of all individuals every 3 mins. The chimpanzees engaged with the enrichment system throughout the study period (max 86 times/day; min 23 times/day). All chimpanzees used the device at least once. Some individual differences were observed (Chi-squared test, $\chi^2 = 1072$, df =5, $p < 0.001$), with young chimpanzees using the device more often than adults and sometimes showing indicators of positive emotion, such as the "play face". These results that some of the chimpanzees showed positive responses to the devices suggest the new system is promising as a tool for enrichment and research involving animals.

Poster N° 95

Stranger-directed fear in breeding dogs linked with management practices in commercial breeding kennels

Aitor Arrazola*, Shanis Barnard, Traci Shreyer, Candace Croney

Department of Comparative Pathobiology, Purdue University, West Lafayette, Indiana, United States of America
** Presenting author:aarrazo@purdue.edu*

Public perceptions of dog welfare in commercial breeding kennels (CBKs) are overwhelmingly negative despite the scarcity of research evaluating the well-being of dogs in CBKs. In-kennel welfare assessments indicate that most breeding dogs studied are generally physically healthy. However, fear of unfamiliar people can present a welfare challenge. Understanding how kennel management impacts stranger-directed fear, and subsequent dog welfare outcomes, warrants more research. The objective of this study was to investigate relationships between dogs' responses to strangers and in-kennel management practices. A total of 129 dogs from 9 USDA- licensed CBKs were enrolled for this study. Dogs were intact females, at least two years old, and not heavily pregnant or nursing puppies. Social fear was assessed individually in their home pens using a three-step stranger approach test (approach, open pen door, and reach to touch the dog). At each step, the dog's behavioral response to the stranger was noted as fearful (moving away), non-fearful (moving forward or undisturbed), or ambivalent (cautious approach). During the reach step, the dog's acceptance of being touched was also recorded. A management questionnaire was developed to interview facility owners about their in-kennel management and behavioral support practices such as how often dogs are provided with enrichment, socialization, low stress handling, positive caretaker interactions, exercise opportunities, and training. Generalized linear mixed models were used to analyze the effect of management practices on fearful response scores with pen and breed as random effects. Thirty-five percent of dogs showed fearful responses, 28% non-fearful/affiliative responses, and 37% ambivalent responses during the stranger approach test. Stranger-directed fear was negatively associated with frequency of low stress handling techniques and socialization. Dogs in kennels that provided socialization daily tended to show fewer signs of stranger-directed fear than those in kennels that did so only weekly. Dogs that were often handled outside their home pens in separate quiet areas were less fearful than those that were never handled in a low stress area ($P<0.001$). Also, dogs that were provided daily positive caretaker interactions beyond husbandry were more likely to accept touch than those that were provided positive caretaker interactions only weekly ($P=0.02$). These results suggest that the nature and quality of CBK management can influence the emotional well-being of breeding dogs. Increased frequency of positive caretaker interactions and evaluation of the quality and nature of handling in dogs' home pens should be further evaluated as interventions to help mitigate social fear in breeding dogs.

Poster N° 96

The effects of foster cow rearing on dairy calf health and welfare

Olivia Bolton*, Gemma Charlton, Emma Bleach

Department of Animal Production, Welfare & Veterinary Sciences, Harper Adams University, Newport, Shropshire, UK
**Presenting author: obolton@live.harper.ac.uk*

Foster cow-calf rearing systems may present an opportunity to rear dairy calves in a more natural way, however, uptake is minimal and there is no consensus on the effects of foster cow-calf rearing on calf health and welfare. The aim of this study was to establish the influence of foster cow rearing on calf health, calves' ability to cope with stress and the calves' response to approach by a novel person. The study was conducted on a spring block calving dairy farm in NW England, UK. Calves (n=35) were removed from their dams within 6 hours of birth and received 2 teated bottle feeds of colostrum (2L) milked from their dam within 12 hours of birth. Heifers (n=16) and bulls (n=19) were randomly allocated to either Foster-cow (n=17) or Control (n=18) for 8 weeks. Foster calves had unlimited access to foster cows (2.8 calves/cow, approximate 4.3L/calf/day) and Control calves were fed unpasteurised whole milk (4L/calf/day) from teated bar feeders. Calves were group housed as per treatment, on straw with *ad libitum* access to grass silage, concentrate and water. Avoidance distance to an unfamiliar person was measured at 5 and 56 days old and was analysed using repeated measures GLM. Calf behaviour was recorded and assessed during 15-minute isolation tests at 42 days old and data analysed using Mann-Whitney U tests. Calf health was recorded twice weekly using Wisconsin Health Scoring system (0-3 where lower scores are indicative of better health) and analysed using repeated measures GLM. Data were processed in SPSS (V. 28). Mean avoidance distance of calves during approach from an unfamiliar person at 5 days and 56 days old did not differ between groups (5 d/o: 5.6cm (±4.1) vs. 17.3 (±7.3); 56 d/o: 16.9cm (±9.6) vs. 32.0cm (± 10.0), for Control vs. Foster calves, respectively, ($P=0.132$) with a tendency effect of time ($P=0.092$)). There was no difference in the frequency of behaviours shown during 15-minute isolation tests between the two groups ($P>0.05$). Health scores of foster calves were lower ($P=0.016$) than Control calves. Foster calves did not show a greater avoidance distance suggesting that foster calves do not have greater fear towards a novel person. During periods of isolation, control calves showed similar behavioural responses to foster calves suggesting that foster calves do not experience greater stress during isolation than group housed artificially reared calves. Foster-cow rearing improved the health of calves in early life and may therefore be a suitable alternative option for calf rearing.

Poster N° 97

Pasture-based dairy cow and calf suckling system

Sandra Ospina-Rios[1*], Caroline Lee[2], Sarah Andrewartha[1], Megan Verdon[1]

[1] Tasmanian Institute of Agriculture, College of Science, Engineering and Technology, University of Tasmania, Burnie, TAS 7320, Australia
[2] CSIRO, Agriculture and Food, Locked Bag 1, Armidale, NSW 2350, Australia
[*]Presenting author: sandra.ospinarios@utas.edu.au

Separating dairy calves from their dams at birth is of concern to the public. Cow-calf suckling systems have been studied under indoor dairy management systems, but a feasible cow-calf system for seasonal calving, pasture-based dairy production has not been developed. Thirty dairy heifers (Friesian x Holstein, Jersey) and their dams were studied. Fourteen cow-calf pairs were separated at birth and managed as per standard commercial production (‹commercial› treatment). Commercial cows were managed in a 300 animals' herd and milked twice per day. Commercial calves were reared indoors in a pen and offered 8 L/day of milk via an automatic calf feeder. The other 16 cow-calf pairs remained together post-birth. They grazed a paddock together during daylight hours and were separated (fence-line contact) during the night. Cows were milked once per day in the morning before being reunited with their calves, and milk yield data collected daily. Calves were weighed at birth, weeks 3, 6, and 9 of age and weaned when reaching a 90-Kg average. The effects of dam-rearing on behavioural development were assessed in a 5-minutes open field test when heifers were 8.4-months of age. In the open field test, commercially reared heifers (n=14) took less time (s) to start grazing (Mann-Whitney U- test: Md=135.27, U=160, z=2.47, p=0.01), had more grazing bouts (Md=3, U=57, z=-2.19, p=0.03), and spent more total time grazing (Md=6.76, U=55, z=-2.26, p=0.02) than dam-reared heifers (n=15, Md=300, 1 and 0 respectively). No other differences in behaviour were detected (P>0.05). During rearing, average daily milk yield was lower for suckled-cows than commercial cows; however, daily milk yield was comparable between groups at post-weaning (16.0 ± 3.0 and 26.4 ± 3.23 L/cow at week 8 vs 26.0 ± 2.9 and 26.1 ± 3.4 L/cow at week 10 respectively, F9,28=93.5, p<0.001). Dam-reared calves had higher average daily growth from weeks 3 to 9, compared to commercially reared calves (means ± SD; 0.91 ± 0.09 Kg and 0.79 ± 0.10 Kg respectively, F1,28=11.7, p=0.002) and so were weaned earlier (9 ± 0.4 versus 11 ± 0.6 weeks of age). Dam-reared calves reduced grazing activity in the open field test may be due to increased stress when isolated from the herd. Thus, dam-rearing may have long-term effects on the behavioural development of dairy heifers. Our suckling system has the potential to provide a scalable, commercially viable cow-calf management option for pastoral dairies as an alternative approach to traditional heifer rearing practices.

Poster N° 98

The presence of non-maternal social models in early life affects long-term dairy heifer responses to a novel object

Laura Field[1*], Lauren Hemsworth[1], Ellen Jongman[1], Megan Verdon[2]

[1] *Animal Welfare Science Centre (AWSC), Faculty of Veterinary and Agricultural Sciences, University of Melbourne, Parkville, VIC, 3052*
[2] *Tasmanian Institute of Agriculture, University of Tasmania, Burnie, TAS, 7320*
[*] *Presenting author. lfield@student.unimelb.edu.au*

As most commercial dairy farms separate calves from cows within 24h of calving, heifers rarely interact with older animals until their first lactation. Early-life social experiences can affect behavioural development, with long-term consequences. This study explores the potential for enriched social environments to improve dairy heifer development and welfare. We investigated the effects of rearing dairy heifers with adult dry cows as social models on behavioural responses to a novel object 15 months after the treatment period. Sixty dairy heifers were mixed into groups of 10 at 2wk of age, and one of three treatments applied until weaning at 13wks: 1. Hand-reared, group-housed calves at pasture with 3 unrelated dry cows (+S), 2. Hand-reared, group-housed calves at pasture (-S), and 3. Hand-reared, group-housed calves in sheds as a commercial control (CC). At weaning, all groups were mixed and managed as a single herd by the research farm. At 18 months, 11 heifers were removed from the experiment for reproductive failure; the responses of the remaining 49 heifers to the presence of a novel object were tested in an enclosed arena over 4 days (+S=15, -S=17, CC=17). On each testing day groups of 12-15 heifers, balanced for treatment, were habituated to the arena for 10mins before being individually introduced to the arena, now containing a novel object (an umbrella), with behaviour continuously recorded for 7 minutes. Behavioural data were analysed using Kruskal-Wallis Tests to compare responses across treatments. Median values are reported with 25-75 percentile ranges. Only 8 heifers interacted with the novel object; 7 +S heifers, 1 CC heifer and 0 -S heifers. The difference in the proportion of animals per treatment to interact was analysed using a Pearson Chi-Square ($p=0.01$). +S heifers also entered within 1m of the umbrella more frequently than both other treatment groups ($p=0.019$, +S=0, range 0-4 times vs. -S and CC=0, range 0-0 times). Compared to +S and -S heifers, CC heifers displayed vigilance more frequently ($p=0.009$, +S=3, range 1-5 vs -S=3, range 0.5-4 vs CC=6, range 3.5-8.5) and for a longer duration ($p=0.008$ +S=15s, range 3.5-28.6s vs -S=16.3s, range 1-34.8s vs CC=46.3s, range 20.8-70.7s), while +S heifers stood stationary most frequently ($p=0.032$, +S=12, range 10-17 vs. -S=10, range 8-11 vs. CC=11, range 9-13.5). These results suggest that providing dairy heifers with exposure to social models and enriched physical environments during early life may improve behavioural responses to stressful or novel situations later in life.

Poster N° 99

Laying hens increase litter use in the presence of a novel object

Laura Candelotto*, Klara J. Grethen, Yamenah Gomez, Michael J. Toscano

Center for Proper Housing: Poultry and Rabbits (ZTHZ), Division of Animal Welfare, VPH Institute, University of Bern, Burgerweg 22, 3052 Zollikofen, Switzerland
**Presenting author: laura.candelotto@vetsuisse.unibe.ch*

Chickens are motivated to explore novel features of their environment but are kept within a relatively standardized environment during commercial production. The aim of this study was to investigate the relationship between the use of resource-related zones of a semi-commercial aviary and exploration by means of a novel object test within the home environment. Six pens of a semi-commercial aviary were used with 225 hens (Dekalb White) per pen of which 18 focal hens were equipped with a backpack. The aviary was divided into five resource-related zones and all inter-zone transitions were registered by a tracking device in the backpack. Three novel object tests were performed by placing one of three unfamiliar objects (traffic cone, painted wooden rod or PET bottles) in the litter area on each side of the aviary. The objects were placed and removed during the night to minimize human impact and were accessible for the full light period of the following day. In reference to the litter, the number of transitions, total duration within, and latency to visit the first time were extracted for the full light period per day (15h) for each novel object test (test day) and subsequent day (post-test day). As a baseline, the described variables were extracted from a 3 week period before the first test day and the average over all days was calculated per individual. Generalized linear mixed models with a negative binomial distribution and a linear mixed model were used with a stepwise model reduction to compare the movement and location variables between the baseline, test day, and post-test day, with individual, object and testing order included as random factors. The presence of a novel object did not affect the number of transitions into the litter ($p > 0.05$) but led to a reduced estimated latency of 30.29 min compared to the baseline (61.91 min) and the post-test day (39.37 min) ($p < 0.001$). Furthermore, the estimated duration in the litter was highest on the test day (6.52 h) followed by the post-test day (5.98 h) and baseline (5.86 h) ($p < 0.001$). Our results indicate that focal hens adjusted their movement in favour of the litter area, potentially due to the presence of novel objects. Exploration tendency might affect how animals move within their home environment as well as the use of outdoor areas while improving animal welfare.

Poster N° 100

A buffet of litters - Broiler chicken responses to multiple litter choices

Regine Victoria Holt[1*], Judit Vas[1], Guro Vasdal[2], Ruth C. Newberry[1]

[1] Norwegian University of Life Sciences, Faculty of Biosciences, Department of Animal and Aquacultural Sciences, P.O. Box 5003, 1432 Ås, Norway
[2] Norwegian Meat and Poultry Research Centre, Animalia AS, P.O. Box 396, Økern, 0513 Oslo, Norway
[*] Presenting author: regine.victoria.holt@nmbu.no

While peat is an attractive litter material for broiler chickens, use of peat raises environmental sustainability concerns and alternatives are needed. Because different materials vary in composition, their functional value for different activities is likely to differ and there may be no single peat alternative. Instead, the option to choose between multiple materials for different activities may be better for welfare. To investigate this hypothesis, we observed the responses of broilers to a choice between seven different litter types (100% peat, 70% peat:30% wood shavings, 100% wood shavings, finely-chopped conifer bark, finely-chopped rape straw, crushed rape straw pellets, oat and wheat straw pellets). We predicted that the number of birds using the different materials would vary according to the behaviour being performed. In two commercial broiler flocks reared on peat litter, we provided buffets of seven adjacent 1 m2 litter boxes, each containing a different material, with one buffet in each of two different locations in the house (total 14 boxes). Observations were conducted once weekly for four weeks. Each buffet was observed for 31.5 min before and 31.5 min after adding 5 L of fresh material to each box. Boxes within each buffet were observed in a pre-determined balanced order. A box observation started with an instantaneous scan of the total number of birds in the box, followed by a 15-s scan to determine the number of birds performing different behaviours (1-0 sampling). Every 45 s, a different box was sampled (total 24 observations/litter type/week). Based on generalised linear mixed models, our results (mean±SE number of birds/box/week) confirm that broiler chickens selected different litter types for different behaviours (lying: $\chi 26=63.6$, $P<0.001$; dustbathing: $\chi 26=43.1$, $P<0.001$; ground scratching: $\chi 26=40.7$, $P<0.001$). For lying, 100% wood shavings attracted the most birds (Tukey-adjusted pairwise comparisons: 88±16.9 vs 100% peat: 42.0±9.16, $P=0.013$). Finely-chopped rape straw was used most for dustbathing before adding fresh material (5.33±1.73 vs 100% peat: 1.33±0.50), and at similar levels to 100% peat and peat mixed with wood shavings when fresh ($P<0.05$). The 100% peat (1.83±0.30) and mixed peat (1.65±0.28) attracted the most birds for ground scratching, followed by wood shavings (1.07±0.21) and finely-chopped rape straw (0.91±0.19), regardless of freshness. In conclusion, finely-chopped rape straw was a good alternative to peat for dustbathing but not for all behaviours. Consequently, providing a variety of litter choices would improve quality of life for broilers.

Poster N° 101

Is one water trough enough for beef calves reared with cows?

João Pedro Donadio da Silva Pereira[1*], Fidel Pretto[1], Karolini de Sousa Tenffen[2], Matheus Deniz[2], Luiz Carlos Pinheiro Machado Filho[1]

[1] LETA - Laboratório de Etologia Aplicada e Bem-estar Animal, Departamento de Zootecnia e Desenvolvimento Rural, Universidade Federal de Santa Catarina, Brazil
[2] Programa de Pós-Graduação em Zootecnia (PPGZ), Universidade Federal do Paraná (UFPR), Brazil
[*]Presenting author: jp.donadio@gmail.com

It's already known that bovines prefer to drink water from larger and deeper troughs. However, in grazing beef livestock, this can lead to two problems: (1) as calves are kept with cows, they may have difficulty accessing the water due to the height of the water trough (WT), and (2) calves can be the main victims of agonistic interactions when trying to access the WT. Thus, this study aimed to evaluate whether having two WT of different sizes on the paddocks influence drinking events of calves raised with cows. This study was carried out in a Voisin Rational Grazing area in Southern Brazil. Ninety crossbreed beef cattle were divided into two groups [n=45; 15 cows, 15 calves (9 males; 6 females), and 15 heifers]; the calves in both groups had similar weight (92.6 ± 17.7kg) and age (4.5±0.58 months). The animals were allocated into two different treatments: T1: one WT (90cm-diameter x 60cm-height); and T2: two WT 10m apart (WT-tall: 90cm x 60cm; WT-short: 100cm x 35cm). Both WT were made of polyethylene, had the same shape (cylindrical) and color (black). The experiment design was a crossover experimental design, where every animal transit on both treatments for four days (two days per treatment) after two days of adaptation. Both groups were simultaneously observed from 8 am to 6 pm by two trained observers, with inter-observer reliability of 90%. The variables observed were time spent at the drinker, number of visits at the WT, and agonistic interactions towards calves. All data were analyzed by ANOVA using the statistical software R. The calves visited ($p=0.05$) the WTs more frequently at T2 (170) than T1 (132). However, there was no difference ($p=0.23$) on the number of visits at the WT-tall (91) and WT-short (79) within the T2. Also, there was no difference ($p=0.77;0.79$) on the time spent at the drinker between treatments (T1:1.61min; T2:1.63min) and WTs (WT-tall:1.62s; WT-short:1.65s). In total, 66 agonistic interactions were recorded, and the number of agonistic interactions suffered by calves in T1 (44 times) and T2 (22 times) did not differ ($p=0.12$). These results indicate that adding a water trough for calves reared with cows, independent of its height, can be beneficial to the calves, as they increase the number of visits to the water trough.

Poster N° 102

Influence of environmental enrichment on growth, behaviour and physiology of juveniles of *Clarias gariepinus* under laboratory conditions

Oluwaseun C. Ojelade*, Abiodun O. Akinde, Mathew B. Oladepo, Comfort A. Sopein, Abiodun S. Bhadmus, Mary Olateju

Department of Aquaculture and Fisheries Management, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria
**Presenting author: ojeladeoc@funaab.edu.ng*

Improving the housing conditions or environmental enrichment of cultured fishes represents a means of enhancing the welfare of aquatic animals for increased productivity. Studies evaluating the effect of environmental enrichment (EE) on the behaviour and physiological attributes of tropical C. g*ariepinus* (African catfish) are very few. Hence, this study examined the influence of some forms of environmental enrichment on growth, behavioural and physiological responses of juveniles of C. *gariepinus* under laboratory conditions. 120 juveniles of C. *gariepinus* were randomly allocated at 10fish/tank and subjected to plant enriched (PE), fine sand substratum enriched (SE), plant and fine sand substratum enriched (PSE) and barren (control) tanks in triplicates. The growth (mean weight gain (MWG), specific growth rate (SGR) and feed conversion ratio (FCR)), behavioural (feed response, aggressive act and swimming rate) and physiological (blood glucose) responses of the fish under laboratory conditions were examined during a 56-days culture period. Growth parameters were monitored weekly, and behavioural acts were observed twice per week using a focal sampling technique. Ethical approval was obtained, and glucose levels in blood samples were evaluated fortnightly. Data were normalized using Shapiro-Wilk and later analyzed using the Kruskal-Wallis test. The growth indices were significantly ($p<0.05$) different across the treatments, with the highest (51.67±2.49g) and least (49.4±1.04g) MWG in SE and PE tanks, respectively. However, there was no significant difference ($p>0.05$) in the FCR and SGR of the African catfish between treatments. Behaviourally, there was a significant ($p<0.05$) difference between the feed response of C. *gariepinus* exposed to the different forms of EE. African catfish exposed to SE and PE forms of EE were less aggressive ($p<0.05$), while a higher ($p<0.05$) swimming rate was found in PSE and control tanks. Furthermore, the different EEs affected ($p<0.05$) the glucose level of C. gariepinus during the study. The highest (59.64±3.89mg/dl) and least (29.17±0.64mg/dl) glucose values were recorded in PSE and NE, but there was no significant ($p>0.05$) difference between glucose results obtained in PE and SE. Thus, the results highlight the effect of EE on the behaviour and physiology of the juveniles of C. *gariepinus*. Environmentally enriched tanks with SE resulted in the best MWG without compromising the glucose level in the blood samples of the species under laboratory conditions. It is recommended that the fine sand substrate form of EE could be used at commercial levels to boost the growth-rate and improve the housing conditions of C. *gariepinus* for fish sustainability.

Poster N° 103

Impact of European starlings (*Sturnus vulgaris*) on lactating dairy cow behavior

Callan Lichtenwalter*, Amber Adams Progar

Department of Animal Sciences, Washington State University, USA
** Presenting author: c.lichtenwalter@wsu.edu*

Recent research revealed the significant economic impact invasive European starlings (Sturnus vulgaris) have on U.S. dairy farms by eating and spoiling feed (USD$55/cow annually), but the impact of starlings on dairy cattle behavior and welfare has not been investigated. The goal of our study was to collect preliminary data to discern if lactating dairy cows altered their daily activity time budgets when the number of European starlings present changed, and if any behavior changes had implications for cow welfare. During mid-November to mid-December of 2021 and March of 2022, we counted starlings during a two-hour observation period at sunset on eight non- consecutive days. More specifically, birds were counted as they entered the two freestall barns for lactating cows to roost. All data were collected at the Knott Dairy Center (KDC) at Washington State University (Pullman, WA, USA). The sampling days (4 days/collection period) were each one week apart during the mid-November to mid-December collection period and the March collection period. Over the eight days of observation, bird count estimates ranged from 350 birds to 1377 birds. Cow behavior data from 180 cows across two pens were recorded using Cow Manager®, an ear tag that measures cow behavior and health by analyzing their movements (validated by Pereira et al., 2018). The behaviors of interest were inactivity, ruminating, eating, activity, and high activity. Each behavior was averaged across each two-hour observation period of bird estimates for every cow. Average cow behavior during the two-hour observation period was then compared to bird count estimates by analyzing our data with a Poisson regression using the PROC GENMOD procedure of SAS with repeated measures and cow as the experimental unit. No differences ($P > 0.05$) in cow inactivity or high activity behavior were detected. Time spent ruminating ($P = 0.0002$; range: 15.37 to 19.66 min/hr.; StdDev: 8.53 min), eating ($P = 0.006$; range: 5.60 to 11.66 min/hr.; StdDev: 7.39 min), and being active ($P = 0.003$; range: 5.94 to 7.09 min/hr.; StdDev: 3.39 min) were significantly related to bird count estimates. Although these data are preliminary, they indicate that lactating cows alter their behavior in response to the presence of different numbers of European starlings. In particular, cows altered their eating and rumination behavior, which could negatively affect cow nutrition and, potentially, cow health. Additional research needs to be conducted to validate these results and understand how European starlings impact overall lactating cow welfare.

Poster N° 104

Cage dividers reduce aggression and differentially affect corticosterone and testosterone levels in mice of different ranks

Christina Streiff[1], Adrian Herrera[1], Bernhard Voelkl[1], Rupert Palme[2], Hanno Würbel[1], Janja Novak[1*]

[1] Animal Welfare Division, Vetsuisse Faculty, University of Bern, Bern, Switzerland.
[2] Unit of Physiology, Pathophysiology, and Experimental Endocrinology, Department of Biomedical Sciences, University of Veterinary Medicine, Vienna, Austria
[*]Presenting author: janja.novak@vetsuisse.unibe.ch

Home cage aggression in group housed male mice is a welfare concern and may compromise scientific validity. Laboratory mice form hierarchies with the dominant mouse usually targeting subordinates. Standard laboratory cages may prevent flight or retreat, increasing the likelihood that agonistic encounters result in injury. Moreover, differences in behaviour and physiology between mice of different dominance ranks may be exacerbated by social context and cage structure. Interventions that reduce aggression may, therefore, not only reduce injuries and stress, but may also stabilize social hierarchy, thereby reducing variability between cage mates. Here we assessed if housing mice with partial cage dividers reduces aggression and modulates differences in hormone levels (corticosterone and testosterone) in mice of varying social rank. Male mice of two strains (BALB/cByJRj and RjOrl:SWISS) and two group sizes (three or five) were housed in Type III cages with or without cage dividers (n=24 cages, 2 (strain) x 2 (housing) x 2 (group size) x 3 replicates). Mice were inspected for wounding weekly at cage change. Home cages were recorded at five and eight weeks of age for two consecutive days, and also after 6h of isolation housing of cage mates at 14 weeks of age, to assess aggression and assign individual social ranks. All occurrences of aggression (bite, chase, attack, mount) were recorded across the first six hours of the dark phase. After isolation housing mice were euthanised and fur was collected to quantify levels of corticosterone and testosterone. Housing mice with cage dividers did not reduce injuries (GLMER, interaction; z=-1.69, p=0.09). However, it reduced aggression in BALB/cByJRj, but not in RjOrl:SWISS mice (GLM, interaction: z=-2.71, p=0.01). When mice were reunited after isolation housing, we found no effect of housing on aggression (GLM, interaction: z=-0.88, p=0.38). We found a relationship between hormone levels and social rank depending on housing type. In cages without cage dividers, dominant males had higher levels of hair corticosterone compared to subordinate males, while no such difference was found in cages with dividers (LMER, interaction: F1,16=4.61, p=0.04). Similarly, dominant males housed without cage dividers had lower hair testosterone compared to subordinate males, but no such effect was observed in mice housed with dividers (LMER, interaction: F1,16=11.18, p=0.004). Our findings suggest that cage dividers may reduce aggression and modulate the activation of hypothalamic–pituitary–adrenal (HPA) and hypothalamic-pituitary-gonadal (HPG) axes in mice, thus reducing phenotypic variability between mice of different ranks.

Poster N° 105

Effect of social isolation at a zoo on behavioural state in the bush dog (*Speothos venaticus*)

Akitsu Tozawa[1*], Haruki Saito[1], Kanae Shimada[2], Yumi Yamanashi[2, 3]

[1] *Teikyo University of Science, Japan*
[2] *Kyoto City Zoo, Japan*
[3] *Center for Research and Education of Wildlife, Kyoto City Zoo, Japan*
[*] *Presenting author: akitsu-t@ntu.ac.jp*

The bush dog (Speothos venaticus) is a small canid and lives in social groups that of the basic social unit is a monogamous pair and extended family. Rearing social animals in zoos, it might become social isolated under some situation such as breeding programs. To investigate effects of social isolation on behaviour and welfare, behaviour of one adult male bush dog was observed at two periods, living with his daughter and social isolated. The adult male bush dog was born at the overseas zoo in 2011 and moved to Kyoto City Zoo in 2014. The daughter was born at Kyoto City Zoo in November 2019 and moved to another zoo in October 2020. The male bush dog reared isolated after the daughter moved because there was no plan to introducing others. Behaviour data were recorded 09:00 to 17:00 each day for 11days in May to June 2020 when living with his daughter and 12 days in October 2021 after became isolated. Maintenance behaviour as resting, moving, and hiding inside the U-shaped gutter block at the outdoor space, were recorded using instantaneous time sampling with 3 minutes intervals. Urination, solitary play, affiliative behaviour and social play behaviour were recorded using behaviour sampling. Abnormal behaviour such as stereotypic behaviour (e.g. pacing) was excluded from behavioural element that rarely expressed at the preliminary observation. A Wilcoxon signed rank test was used to evaluate differences of each behaviour between two periods. Mean percentage of resting behaviour did not change between living with daughter (17.0±8.3 %) and isolation (18.3±20.1 %, $P = 0.97$). Mean percentage of moving (80.6±8.4, 48.7±9.8 %) and hiding inside the U-shaped gutter block (0, 29.9±20.6 %) were increased at the isolation period ($P < 0.01$). Particularly, the behaviour of hiding inside the U-shaped gutter block did not appear at the period when living with others. The time spent solitary play did not changed ($P = 0.25$) but the time of urination decreased between two periods (8.5±2.1, 4.9±1.6 sec/h, $P < 0.01$). Affiliative behaviour and social play behaviour did not appear at the isolation period. These results indicate that the bush dog, as a social animal, living solitary situation, not only lose the opportunity of expressing social behaviour but also decrease activity and increase the opportunities to hide in the space where visitors could not see. More suitable situation or enrichment might be needed to the bush dog lives naturally and vigorously.

Poster N° 106

UFAW and ISAE – the importance of collaboration

Birte L Nielsen*, Huw D.R. Golledge

Universities Federation for Animal Welfare (UFAW), The Old School, Brewhouse Hill, Wheathampstead AL4 8AN, United Kingdom
** Presenting author: nielsen@ufaw.org.uk*

In the constitution of the ISAE, one of the aims of the Society is "*to encourage, where appropriate, links between applied animal behaviour science and other disciplines. This can be realised by encouraging presentations, discussions and publications and by maintaining contacts with appropriate scientific societies*". One of the scientific societies that has benefited from collaborating with the ISAE, is the Universities Federation for *Animal Welfare* (UFAW). We are an independent registered charity that works with the animal welfare science community worldwide to develop and promote improvements in the welfare of animals. Just like the ISAE, UFAW is concerned with farm, companion, laboratory, and captive wild animals, as well as animals in the wild when their welfare is affected by human activity. Our tag line is Science in the Service of Animal Welfare, and it epitomises our commitment to promote evidence-based animal welfare globally through scientific and educational activity. The UFAW name can be somewhat misleading because we are not funded by universities, nor are we a federation. As a charity, UFAW is dependent on legacies, donations, and membership fees to carry out our work. We publish the UFAW/Wiley-Blackwell animal welfare book series as well as Animal Welfare, a quarterly scientific journal (IF: 2.244), which since 1992 has been published in-house, with any profit ploughed back into our charitable work. As well as publishing animal welfare science, UFAW funds research through studentships, grants, and awards, and we regularly run scientific meetings. We also promote animal welfare science education internationally, especially through our LINKS scheme, a network of people from research institutes and universities across the globe. At the 2021 ISAE conference, a joint UFAW/ISAE session was organised on the welfare of animals used in research and teaching. UFAW chaired the session and sponsored the plenary speaker. Likewise, at the 2022 UFAW conference, held in Edinburgh in June, a workshop on how to improve study design in animal welfare research was organised jointly with the ISAE UK/Ireland region, who had planned to hold their regional meeting the following day. These are examples of how the two organisations can benefit each other, by collaborating on outlets for scientific discourse. UFAW is looking forward to working with ISAE on other projects and meetings in future.

Poster N° 107

Impact of bedding type on cattle behaviour while housed in a biocontainment facility

Jessica Porter[1*], Claudia C.G. Lozada[2], Zach Kahn[3], Brandon Dominguez[3], Courtney L. Daigle[1]

[1] Department of Animal Science, Texas A&M AgriLife Research
[2] Food Safety Net Services
[3] Texas A&M University Global Health Research Complex
[*]Presenting author: jessica_porter21@tamu.edu

Bedding is important to confined cattle welfare but provides considerable complications for waste management systems (WMS) in biocontainment facilities, which must sterilize all waste produced. To evaluate the feasibility of providing confined cattle with different types bedding, cattle behaviour was video recorded while they were housed in pens (n=4 pens, 2 calves/pen) in the Texas A&M Global Health Research Complex over a four-week period. Calves were fitted with colored collars for individual identification. Each pen experienced each bedding type (e.g., wood shavings, bedding pellets, Absorb® - a powdered desiccant, and no bedding) for five consecutive days in a Latin square design with a two-day washout period where the bedding was cleared, and pens were sterilized. Water consumption (L/pen) was recorded daily. Video recordings from three consecutive days (T/W/R) were decoded from 12:00 to 17:00 using continuous observation for the duration (sec/d) that individual calves spent allogrooming, bar licking, tongue rolling, drinking, feeding, lying, standing, and ground/substrate licking as well as head butt initiation frequency (count/d). Differences among treatments were evaluated using a Generalized Linear Mixed Model (PROC GLIMMIX). Cattle spent less time allogrooming and bar licking ($P<0.01$) when housed with shavings compared to all other bedding types. Cattle performed more headbutts ($P=0.008$) while housed on Absorb (18.2±2.4) than while housed on pellets (9.7±2.1) or shavings (9.0±1.8). Cattle spent more time (h/d) lying while housed either with no bedding (3.4±0.4) or shavings (3.3±0.1) compared to when they were housed on either Absorb® (2.5±0.2) or pellets (2.4±0.1; $P<0.0001$), and they spent the most time (h/d) standing (2.1±0.2) while housed on Absorb® ($P=0.03$). No differences among bedding types were observed for the time spent feeding, drinking, and ground/substrate licking and tongue rolling. Cattle consumed more water while housed on shavings or without bedding ($P=0.0007$). Calves appeared to prefer shavings as bedding, as the calves tended to lie more and spent less time performing agonistic or abnormal behaviours, yet shaving were found to be unsuitable for the WMS. The pellets had few negative impacts on cattle behaviour and were the easiest to manage in the WMS. Calves appeared to dislike being housed on the Absorb® as reflected in their increased time spent standing, bar licking, head butting, and the decreased time spent lying, and this product became a sludge in the WMS. These results demonstrate that it is possible to provide cattle in biocontainment facilities with bedding without damaging WMS.

Poster N° 108

Methods in feline personality assessment: a scoping review

Sabrina T. M. Sato*, Luís Fernando C. Garrido, Ruan R. Daros

Graduate Program in Animal Science, School of Life Sciences, Pontificia Universidade Católica do Paraná, Curitiba, PR, 80215-901, Brazil
**Presenting author: sabrinati_@hotmail.com*

In the last decades interest in the study of feline personality research increased. Personality can be defined as individual behavioral patterns consistent through time and context that can be used to improve animal management and welfare by meeting environmental needs and even improve successful adoption rates in domestic cats (*Felis catus*) by matching the animal with a potential adopter. Although the assessment of personality in domestic cats has been previously described, there is no literature focused on reporting personality assessment methodologies. The aim of this scoping review is to summarize and report the methodologies described in the scientific literature regarding the assessment of personality in domestic cats. The database sources used in this research were Scopus and Web of Science. Only original articles that conducted personality assessments in domestic cats were included in the review. Following the PRISMA 2020 protocol for scoping reviews, from 536 articles in the initial search 21 articles were included. The most frequent methods to assess feline personality applied qualitative methods where the owner or observer filled surveys rating the animal's emotional state or body postures (10/22). Another method commonly used was the combination of rating (qualitative) and measuring (quantitative) cat behavior (9/21). Only two studies included exclusively behavioral tests that quantified behaviors to assess feline personality. The quantitative tests applied overall, evaluated the frequency and duration of behaviors displayed by the animal, either through direct observation of cat behavior on-site or applied standardized behavioral tests. Furthermore, three previously validated standardized protocols for feline personality assessment were used in some studies: *Feline Temperament Test* (FTP) (4/21), which uses a combination of behavioral tests that are rated by the observer; *Feline Five Model* (FFM) (4/21), a survey based in the human Five Factor Model, answered by the animal's owner, and *Feline-ality*™ (2/21), a combination of behavioral observation and behavioral tests conducted in shelter cats. Finally, we found no agreement among personality traits or dimensions used to categorize the feline personality and a great variability among the methodologies applied in the assessment protocols reviewed. This outcome is in line with personality research in other species (e.g. dogs, bovines and humans). Further research should seek out to reach a consensus in terminology and to either combine protocols to assess all personality dimensions or clearly state which dimensions are being assessed.

Poster N° 109

Initiation of university dual study programs in field of animal sciences in albania and kosovo (Erasmus+ DualAFS)

Skender M[1], Heinrich S[2], Ardita J[3], Myqerem T[4], Muhamet K[1], Enkelejda E[4], Anila H[4], Alltane K[1], Arben M[1], Bajram B[1*]

[1] University of Prishtina, Prishtinë, Kosovo;
[2] University of Applied Sciences of Nürtingen-Geislingen, Germany;
[3] Savonia University of Applied Sciences, Iisalmi, Finland;
[4] Agricultural University of Tirana, Tirana, Albania.
[*]Presenting author: bajram.berisha@uni-pr.edu

The Erasmus+ project "Dual Curricula – Study and Work Practice in Agriculture and Food Safety" (DualAFS) approved by European Commission, and 2001 started its implementation in albanian speaking universities in Republic of Albania and Republic of Kosovo. The project is coordinated by our EU partners Nuertingen-Geislingen University (Germany) in cooperation with Savonia University of Applied Sciences (Finland). The local beneficiary partners are Agricultural University of Tirana (Albania), University of Korca (Albania), Faculty for Agriculture and Veterinary, University of Prishtina (Kosovo) and University of Mitrovica (Kosovo). In addition, some work-life partners (non-university partners from agribusiness, animal production and food safety) from Albania and Kosovo have also benefited from this project. The main objective of the project is the preparation of a dual program structure (curricula) in Bachelor and Master levels in field of animal sciences, which will be comparable and consistent with counterparts from partner EU universities. In addition, animal behavior and welfare courses will be included in order to provide a strong basis for a career in this field of science, which is becoming increasingly important. For some reasons, the University of Prishtina in the framework of this project will just significantly increase the practical part within the existing classical curriculas (in order to approach the system of dual study programs). Based on the experiences of some EU countries, the dual studies model is considered as one of the most successful model of applied tertiary studies in Europe. This model is more successfully developed and implemented by German University of Cooperative Education and University of Applied Sciences. These models of studies are also implemented, with minor modification, in some other European countries. In addition to the main objective (the development of innovative models of dual Bachelor and Master curricula), the project Consortium has identified also the needs for: (a) strengthening practical skills of graduates through a better integration of theoretical and practical curricula of the university studies (in the current study programs), (b) earlier integration of the students into farm work life, as well as (c) the development of lifelong learning (LLL), extension and technology transfer mission ("Third mission") of universities toward agriculture, livestock and food. In conclusion, our Erasmus+ project (DualAFS), means the re-structuring and reforming of the study programs in the sector of agriculture, according to global trends of higher education and market needs, will promote and support economic growth, employment and sustainable development in Albania and Kosovo.

Poster N° 110

Can we predict Lippizan horse's personality based on anatomical characteristics?

Elena Gobbo*, Nataša Debeljak, Manja Zupan Šemrov

Department of Animal Science, Biotechnical Faculty, University of Ljubljana, Slovenia
**Presenting author: elena.gobbo@bf.uni-lj.si*

Identification of horse personality traits, especially fearfulness, is important for safe and efficient horse-human interaction. The most widely used method for assessing personality traits is behavioural testing. However, such tests are often costly and time consuming, requiring a specialised testing site, various equipment, and the involvement of several people with specialised knowledge. Attempts to link personality and non-behavioural traits, such as body characteristics, have been previously done in a variety of species. Authors proposed these associations may occur due to correlational selection on behavioural and non-behavioural traits. The goal of this project is to determine whether personality traits in horses can be predicted based on more easily measured characteristics, namely anatomical measurements. First, we conducted a pilot study with 35 Lippizan horses. To assess various personality traits, the horses were subjected to three behavioural tests that were analysed using a predefined ethogram. The umbrella test (the horse was led through a passage formed with two umbrellas), the bag test (the bag was swung in front of the horse), and the target training test (the horse had to repeatedly touch a yellow ball) were used to assess behaviours related to fearfulness, handling, and learning. Anatomical measurements (n = 120) were performed using two approaches. The first involved the use of a sartorial meter in the field, with different distances and circumferences measured twice by the same experimenter. The second approach involved taking photographs of the horse›s front and side profile and measuring distances using CoordGen8 computer software. Utilizing a standard clustering method, we discovered four different groups of responses to fear and learning situations in horses, but none of them correlated with anatomical measures. However, while calculating the predictive value of the anatomical measurements over the behavioural observations regardless of the group, the coefficient of determination (CD) showed shorter horses were less trustworthy during the bag test (CD = 0.35) and that horses with broader muzzles were calmer during the umbrella test (CD = 0.33). Having discovered some anatomical measures could be indicative of the behavioural responses, our next step is to conduct a larger scale study. Our project, called LiPPA, will involve approximately 150 Lippizan horses, a larger number of anatomical measurements (n = 143), and four behavioural tests with increasing valence of stimuli (passivity, visual stimuli, moving visual stimuli, and visual/auditory stimuli) specifically targeting one personality trait - fearfulness.

Poster N° 111

Lameness in pregnant sows altered placental cortisol and cortisone ratio and gestation length

Marisol Parada Sarmiento[1, 2, *], Leandro Sabei[1], Matteo Chincarini[2], Lydia Lanzoni[2], Rupert Palme[3], Adroaldo José Zanella[1], Giorgio Vignola[2]

[1] Center for Comparative Studies in Sustainability, Health and Welfare Department of Veterinary Medicine and Animal Health, School of Veterinary Medicine and Animal Science, FMVZ, University of São Paulo - USP -, Pirassununga, SP 13635-900 - SP, Brazil
[2] Università degli Studi di Teramo, Facoltà di Medicina Veterinaria, Loc. Piano d'Accio, 64100, Teramo, Italy
[3] University of Veterinary Medicine, Unit of Physiology, Pathophysiology and Experimental Endocrinology, Department of Biomedical Sciences, Veterinärpl. 1, 1210 Wien, Austria
[*] Presenting author: mparadasarmiento@unite.it

Almost half of pregnant sows, from commercial pig farms globally, may experience lameness, which is a condition that causes pain and compromises animal welfare. In this study, we aimed to identify reproductive performance and placental glucocorticoid concentrations in sows with different locomotion scores during the last third of pregnancy. The present study was approved by an ethical committee under protocol numbers 9870211117 and 639/2021-PR. Periodic locomotion assessments were carried out by the same trained person in two commercial pig farms (Farm 1 N=582; Farm 2 N=171) using a validated scoring system, from 0 to 5, being 0 an easy locomotion and 5 a downer animal. A sample of sows from both farms chosen by gestational contemporaneity and parity with at least three assessments before farrowing were selected and grouped by an average of their locomotion scores. On-farm 1, 30 sows were grouped as Not Lame (NL=16; $\bar{x} = 0$ to 1) or Lame (L = 14; $\bar{x} \geq 1.1$). On-farm 2, 39 sows were divided as Not Lame (G1=12; $\bar{x}$= 0 to 1), Moderate Lame (G2=13; $\bar{x}$= 1.1 to 2) and Severe Lame (G3=14; $\bar{x} \geq 2.1$). Reproductive data (gestation length, piglets' birth weight, and total live/stillborn piglets) were registered from the selected sows in both farms. On farm 2, we measured placental cortisol and cortisone and reported the ratio as cortisone results from the HSD1 and HSD2 enzyme action on cortisol. Three placenta samples from each sow were collected for extraction to determine cortisol and cortisone concentrations by enzyme immunoassays. A linear mixed model was used to analyze data with the number of piglets per litter and parity as a random effect. The main results showed that lameness during pregnancy is highly prevalent since more than 40% of the assessed animals had different degrees of lameness. Gestation length was reduced in Lame compared with Not lame sows for both farms ($p=0.06$). Finally, we found that G2 sows had a higher placental cortisol/cortisone ratio than G1 and G3 ($p<0.01$). G3 sows were treated with painkillers (1.1 mg/kg of flunixin meglumine intramuscular for three days) for each lameness event detected with a score ≥ 3, as requested by the ethical committee. No differences were found in the remaining variables. In conclusion, lameness is disturbingly prevalent in the sows assessed from both farms, possibly decreasing pregnancy length and placental efficiency to protect offspring from cortisol.

Poster N° 112

Grazing behavior of different breeds in a Voisin Rational Grazing System

Fidel de Souza Pretto*, João Pedro Donadio da Silva Pereira, Kevin Bernardes de Oliveira, Priscila Deotti Signor, Sergio Acuña Ballesteros, Luiz Carlos Pinheiro Machado Filho

LETA - Laboratório de Etologia Aplicada e Bem-estar Animal, Departamento de Zootecnia e Desenvolvimento Rural, Universidade Federal de Santa Catarina, Florianópolis, Brasil
**Presenting author: prettofidelpretto@gmail.com*

Grazing behavior can be influenced by different factors, including the availability of water and food, social hierarchy and breed associated with climatic factors. Therefore, the objective of this study was to investigate whether grazing behavior differences exist among Braford and Jersey cows in a Voisin Rational Grazing System (VRG). VRG is an agroecological pasture management system. Different from extensive systems the total pasture area is divided into paddock, being based on four laws of rational grazing. The present study was conducted at the Federal University of Santa Catarina Experimental Farm of Ressacada. 32 cows were divided into four groups with eight animals each (4 Braford and 4 Jersey). The animals were distributed in a 4 x 4 Latin square design, with 4 periods of 5 days each, being two days of adaptation one day of observation, one day of rest and another day of observation. The animals were allocated in four treatments: SAV: shade + water 24 h; SAL: shade + water from 12:00 to 12:30 pm and from 5:30 to 6:00 pm; RAV: no shade + water 24 h; RAL: no shade + water from 12:00 to 12:30 pm and from 5:30 to 6:00 pm. The variables observed were grazing time, idle standing/laying down and ruminating standing/laying down. The behaviors were registered by direct visual observation through scan sampling at 10-minutes interval for 24 hours. All data were analyzed by ANOVA using R statistical software. There was no difference in grazing time between breeds. However, dominant cows usually have access to better quality forage. Breed had no influence in rumination time. Jersey cows tended ($p = 0.144$) to remain idle longer in RAL. There was also a tendency ($p = 0,110$) to lie idle in RAV, which may be a strategy to minimize heat in treatments without shade, since taurine breeds suffer more with the effect of high temperatures; there is an increase in idle time under higher solar radiation. These results indicate that the availability of shade and/or water does not change the grazing behavior between Braford and Jersey breeds. However, the unavailability of shade shows a tendency of longer idle time in the Jersey breed.

Poster N° 113

Temperament evaluation in feedlot-housed Brahman heifers

Makala Herman*, Jocelyn Johnson, Gustavo Toro

ST Genetics 22575 SH6 South, Navasota, TX 77868
**Presenting author: makala.herman@gmail.com*

The temperament of individual animals is a variable trait that can be influenced by both genetic and environmental factors. Research to identify animals or management practices that result in more relaxed animals is warranted since behavioral patterns impact profitability, safety of animal handlers, and herd-mate interactions. The objective of this paper is to evaluate the change in temperament over time (d = 70) when three groups (n = 36, n = 57, n = 22) of pasture-raised Brahman heifers are put in feedlot-housing with brushes and daily interactions of the same two animal handlers that walk the pens to evaluate and report the health of the herd. There are five different temperaments that can be observed (agitated = displays warning signals; anxious = animal will seek location within the pen that is farthest away from human; curious = maintains a large flight zone, may sniff the air in the direction of human, the animal may approach the human if human is silent and still; relaxed = animal allows human to approach and does not have a large flight zone; interactive = animal approaches human and may initiate contact with human), and those are recorded within a week of Day 0, Day 45, and Day 70 during a 70-day trial. Day 0 evaluations found anxious temperaments most common (54%), Day 45 found most heifers (63%) with a curious temperament and Day 70 found most heifers (65%) had a relaxed temperament. While there is a certain amount of stress that comes from moving cattle into a new environment, the results from this trial indicate that cattle can become more relaxed over time as 72% of cattle became gentler throughout the duration of this trial. For a flightier breed it is promising to see that management practices can be put in place to reduce the flightiness of the cattle. The daily human-animal interactions or brush-use may be the cause for an increase in docility over time, but this trial did not evaluate the significance of either interaction which may be due a genetic predisposition. The data presented is part of an ongoing investigation of how much genetics, brush-use and daily human-animal interactions play a part in Brahman behavior after being placed into a new environment.

Poster N° 114

Genotypic differences in open field behaviours of FUNAAB Alpha broiler chickens

Samuel Durosaro[1*], Oluwaseun Iyasere[2], Babatunde Ilori[1], Victor Oyeniran[2], Samuel Adu[1], Taye Eniafe[1], Michael Ozoje[1]

[1] *Department of Animal Breeding and Genetics, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria.*
[2] *Department of Animal Physiology, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria.*
[*] *Presenting author: durosaroso@funaab.edu.ng*

Open field test is used to measure fearfulness and exploration in animals. There is a negative correlation between fear and exploration. Genetic differences in open field behaviours have been reported in chickens but none exists for FUNAAB Alpha broiler chicken (FABC). The FABC is a slow growing bird developed in Nigeria. The birds have tropical adaptive features such as disease resistance and heat tolerance. The birds have three genotypes which are naked neck, frizzle feather and normal feather. This study examined the effect of genotype on open field behaviours of FABC at 3rd week of life (representing starter phase) and 6th week of life (representing finisher phase). All the birds were managed based on the protocol of Animal Care and Use Committee of College of Animal Science and Livestock Production of Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. Thirty (30) each of normal feather (NF), naked neck (NN) and frizzle feather (FF) chickens were used for the behavioural study. All the 90 birds were raised together in an home pen (8 m × 8 m). At the 3rd and 6th weeks of life, birds were placed in the centre of a novel wooden arena (1.2 m × 1.2 m × 1.2 m) subdivided into 16 equal floor squares. Behaviours such as defecation, attempted escape, ambulation, wall pecking, preening, floor pecking and vocalisation were observed in a 5-min open field test. A Kruskal-Wallis test was used to determine the effect of genotype on frequency and duration of the open field behaviours. There was no significant genotype effect on all the open field behaviours except duration of wall pecking (χ^2=6.55, df=2, p=0.04) at the starter phase, with NF and NN having the same duration of wall pecking (p=0.17). Genotype had significant effect on number of floor squares explored (χ^2=7.80, df=2, p=0.02), ambulation duration (χ^2=7.69, df=2, p=0.02) and vocalization duration (χ^2=12.30, df=2, p=0.00) at the finisher phase. There was no significant difference in number of floor squares explored (p=0.32) and ambulation duration (p=0.12) of NF and NN at the finisher phase. This study concluded that genotypic differences existed in duration of wall pecking of FABC at starter phase as well as number of floor squares explored, ambulation and vocalization durations at the finisher phase. Based on the significant behavioural responses, FF chickens are the most fearful and the least exploratory. The NF and NN can therefore be used in production of meat.

Poster N° 115

Effects of individual hatching system factors on stress responsivity in laying hens

Catharina M.H. Broekmeulen*, Yamenah Gómez, Sabine G. Gebhardt-Henrich, Michael J. Toscano

Center for Proper Housing: Poultry and Rabbits (ZTHZ), Division of Animal Welfare, VPH Institute, University of Bern, Burgerweg 22, 3052 Zollikofen, Switzerland
**Presenting author: catharina.broekmeulen@vetsuisse.unibe.ch*

With the ongoing development of in-ovo sexing techniques for poultry, on-farm hatch (OFH) systems will become feasible for the laying hen sector though the relative importance of possible environmental factors during hatching are poorly understood including effects of perinatal stimuli on lateralization of brain development and consequent visual cue processing and side preferences. Our experiment sought to investigate influences of relevant factors during OFH in terms of cognitive abilities and stress responsivity. Hatching eggs (n= 44-48 eggs/ treatment) were exposed to one of the following treatments from 18 days of development to hatch (3 pens/treatment): light (L), litter shavings (LIT), feed and water (FW), as well as all factors missing (CON) or present (ALL). Body weight and plasma corticosterone (CORT) concentrations were measured at three time points after hatch (pre-handling, post-handling (involving vaccination, sexing, grading), recovery) to examine short-term treatment effects in male chicks as a proxy for females. Subsequently, 15 focal chicks (female) per treatment were selected to assess treatment effects during a step detour test at 29-34 and 43-48 days of age (DOA). Behavioral observations focused on side preference and latency to leave a start box (LAT), time needed to finish the step detour test. Focals were weighed at 1, 7, 35 and 58 DOA. Data were analyzed using linear mixed models with treatment as a fixed effect and chick-ID nested in pen as a random factor. Body weight was 1.84g greater at recovery compared to pre-handling ($p < 0.001$). Concentrations of CORT at pre-handling were reduced for FW compared to LIT and CON ($p < 0.05$). No treatment effects were found for LAT ($p > 0.05$) though a DOA effect was identified ($p < 0.0001$). From 29 to 30DOA, LAT was 7.35 times more likely to become equal to one second (OR=7.35, CI[2.57,20.96]) and less for the later days (on average across all DOAs 2.58 times (OR=2.58, CI[2.09,3.18]). For LAT larger than one second, LAT decreased by 48.7% from 29 DOA to 30DOA (<0.001). In conclusion, findings indicate that BW and CORT concentrations were not influenced by treatment, but were affected by aging. Decreased LAT is influenced by aging and possibly related to habituation and learning ability. Subsequent studies are planned to investigate specific hatching system factors and their interactions.

Poster N° 116

Effect of dark brooders on activity level in layer pullets

Janja Sirovnik[1*], Albert Martin-Cirera[1,2], Mark Dunn[3], Maciej Oczak[1,2], Anja B. Riber[4]

[1] Institute of Animal Welfare Science, University of Veterinary Medicine, Veterinärplatz 1, 1210 Vienna, Austria
[2] Precision Livestock Farming Hub, University of Veterinary Medicine, Veterinärplatz 1, 1210 Vienna, Austria
[3] Leading Edge Research, Moggill, Brisbane, Australia
[4] Department of Animal Science, Aarhus University, Blichers Alle 20, DK-8830 Tjele, Denmark
[*] Presenting author: janja.sirovnik-koscica@vetmeduni.ac.at

Dark brooders are horizontal heating elements equipped with curtains that provide chicks with warmth and shelter during the early rearing period. They can be effective at preventing feather pecking and cannibalism. The separation of resting individuals under the brooder from the active chicks outside the brooder may play a role in the prevention of injurious pecking through the reduced disturbance of the resting individuals. We hypothesised that due to less disturbance of rest, reduced general activity would be observed in brooded pullets compared to non-brooded individuals. To verify our hypothesis we placed day-old layer chicks in 22 groups of 100 individuals per group. Each littered pen (2 m × 4 m) contained seven automatic water nipples and two feeders. There were two treatment groups; 16 pens were equipped with a dark brooder for the first 35 days of life, and 6 pens had no brooder. Brooders differed in size (i.e., either 54 cm2/chick or 72 cm2/chick) and whether they were movable or stationary (i.e., raised for 10 min every 4 hours on days 1-4 or maintained at the same height during brooding) so that four brooder-types were possible: small-stationary, small-movable, large-stationary, large-movable. We had four replicates per brooder-type. The activity level of pullets at 10 and 60 days of age was extracted from 12 consecutive hours of video recordings during the light period using ChickenMonitor software, which analysed the percentage of pixels that changed grayscale value between consecutive frames. The threshold for movement detection was set to a fixed value standard across all videos. This value was determined from analysis of random selections across several videos. The entire floor area, excluding the area covered with the drinkers, feeders and brooder, was analysed. The statistical analysis is yet to be conducted, but brooded pullets were numerically less active than non-brooded pullets at 10 days of age (μ±SD: 0.7%±0.4% vs. 1.2%±0.7%) and 60 days of age (2.0%±1.3% vs. 3.0%±2.2%). The reduced activity may result from improved synchronisation of activity, which will be analysed in the next step.

Poster N° 117

Consequences of mixed sex rearing on reproductive behavior and physiology of sexually mature drakes, and flock fertility

Maja M. Makagon[1,2*], Lindsey J. Broadus[1,2], Brian Lee[3]

[1] Department of Animal Science, University of California, Davis, CA, USA;
[2] Animal Behavior Graduate Group, University of California, Davis, CA, USA;
[3] Maple Leaf Farms, Inc., Leesburg, IN, USA
[*]Presenting author: mmakagon@ucdavis.edu

Commercial Pekin ducks (*Anas platyrhynchos*) raised for egg production are often reared by sex to support sex specific grown curves. A few female ducklings (imprinting females) may be placed into male groups with the goal of increasing flock fertility. We tested this hypothesized relationship, and potential proximate mechanisms, by investigating whether rearing males with imprinting females impacts mounting behavior and circulating testosterone levels of sexually mature drakes, and egg fertility. Eight groups of adjacent female (150 ducklings/pen) and male (30 ducklings/pen) pens were separated from one another by walkways. Rearing treatments were assigned at 12 days of age. Three ducklings from four of the all-female pens were moved into the adjacent male pens creating mixed-sex treatment groups (IMP). Ducklings in the remaining four groups continued to be reared by sex (CON). At 20-22 weeks of age (woa) ducklings from adjacent pens were mixed together and moved into a layer barn (8 pens; 180 ducks/pen). Using continuous sampling we determined the frequency of properly oriented mounts performed by 10 focal drakes per pen at 26, 32, and 45 woa. (3 days/week; 12hrs/day). Circulating testosterone was determined for focal drakes at 15 (baseline), 22, 28, 34 and 45 woa. Fertility was determined at 33-34 and 45-46 woa by candling. Data were analyzed in R using GLMM (behavior) and LMM (testosterone and fertility). None of the outcome variables were impacted by treatment or the interaction of treatment and age (all $p > 0.05$), but all were affected by age (all $p < 0.001$). Mounting frequency increased between 26 woa (estimated means [95% CI]: CON: 0.522 [0.374, 0.730] mounts/drake/day; IMP: 1.61 [1.22, 2.12]) and 32 woa (CON: 0.893 [0.666, 1.20] mounts/drake/day; IMP: 1.73 [1.32, 2.27] mounts/drake/day). Testosterone levels increased from 15 woa (estimated means ± SE: CON: 0.186 ± 0.014 ng/mL; IMP: 0.166 ± 0.013) to 28 woa (CON: 7.207 ± 0.564 ng/mL; IMP: 9.615 ± 0.752). Average fertility, by pen, increased from 73.9% to 83.6% at 33-34 and 45-46 woa. Individual variation was noted in mounting behavior (0-10 mounts per day) and testosterone concentration levels, and may have contributed to the lack of treatment effects. Overall, rearing ducklings in same-sex groups was deemed sufficient for promoting good hatchability in this strain of ducks as demonstrated by high fertility levels observed for all pens across the flock.

Poster N° 118

Increased dietary fiber, protein and tryptophan levels reduces feather pecking behavior in pen-housed intact-beaked laying hens

Catherine Hamelin*, Céline Guerini, Anaïs Roux, Panagiotis Sakkas,

Groupe CCPA, ZA du Bois de Teillay, Quartier du Haut Bois, 35150 Janzé, France
** Presenting author: chamelin@ccpa.com*

Severe feather pecking (SFP) in laying hens has been described as a redirected foraging behavior that is often displayed in stressful situations and its predisposition has been associated with a reduced serotonin metabolism. Intact beaks have been associated with more severe consequences of feather pecking in animal welfare. Crude fiber increases feeding time, satiety and may stimulate serotonin production by enterochromaffin cells in the gut. Previous research highlighted an association between SFP and dietary protein and amino acid levels especially tryptophan, an important precursor of serotonin. Our study aimed at investigating the effects of diets with either low or high levels of crude fiber (44 vs 55 g/kg), protein (164 vs 184 g/kg), and tryptophan (1.7 vs 2.7 g/kg) on laying hen behavior and feathering condition. Seventy-two intact-beaked 25-weeks-old brown laying hens were allocated into 2 groups of 36 birds and placed in 12 pens of 3 birds each, according to their SFP behavior and feathering condition. For 4 weeks, half of the hens got a low fiber, protein, and tryptophan diet (LFPT) and the other half a high concentrated diet (HFPT). Behavioral frequencies and feathering condition were recorded for all pens on a weekly basis via scan sampling, and egg production was monitored daily. Plasmatic serotonin and corticosterone were analyzed at the beginning and at the end of the trial. Layers that received the HFPT diet showed decreased frequency of SFP behavior (-36.7% ; $P<0.05$) and an increased frequency of feeding (+6.8% ; $P<0.1$). Exploratory behavior was also significantly reduced (-9.9% ; $P<0.01$), as expected due to increased satiety and feeding time. Frequency of visits to the drinker, aggressive behavior, standing and preening did not differ between the groups. Unexpectedly, feather condition did not differ between groups, probably because of the short duration of the trial. Egg-laying rate was not changed, but the egg weight was increased with the HFPT diet (+0.6g ; $P<0.01$). Serotonin and corticosterone levels were similar amongst groups ($P>0.05$). In conclusion, a diet promoting satiety and neurotransmitter modulation was efficient in promoting animal welfare by decreasing feather pecking behavior while improving egg weight in intact-beaked laying hens. This research project was approved by the French Ministry of Education, Research and Innovation Ethics Committee (APAFIS#27629-202010091204298 v2). Specific procedures were put in place for alleviation of any discomfort.

Poster N° 119

Relation of faecal lactobacilli to manipulative behaviour in pigs

Emilia König[1*], Paulina Heponiemi[2], Sanni Kivinen[2], Jaakko Räkköläinen[2], Shea Beasley[3], Vilja Hukkinen[1], Marianna Norring[4], Virpi Sali1, Seppo Salminen[2], Mari Heinonen[4], Anna Valros[4]

[1] *Department of Production Animal Medicine, University of Helsinki, Finland*
[2] *Functional Foods Forum, University of Turku, Finland*
[3] *Vetcare Ltd., Mäntsälä, Finland*
[4] *Research Centre for Animal Welfare, Department of Production Animal Medicine, University of Helsinki, Finland*
[*] *Presenting author: emilia.konig@helsinki.fi*

Tail and ear biting are multifactorial and damaging behaviours causing mild to severe injuries. They decrease animal welfare and farmer income. We aimed to recognise manipulative behaviour (MB) and compare faecal lactobacilli of case and control pigs. We expected to find less lactobacilli and decreased lactobacilli diversity in case pigs. Altogether 210 pigs (non-docked, mean age 45 days) were marked individually and housed in 10 pens. Behaviour was analysed from video recordings of 66 minutes during 3 days per pig. One-zero sampling of MB was used to define pigs as cases (at least 2 observations of performed MB on at least 2 days) or controls (no observations of performed or received MB). Altogether 15 matched case-control pairs were identified. Rectal faecal samples were taken one day before first behavioural observations and stored at -80°C until analysis. Diluted samples were cultured on BL agar and colonies were grown in gifu anaerobic medium (GAM). Colony PCR, gel electrophoresis, 16S PCR, and comparison to the National Center for Biotechnology Information's (NCBI) Basic Local Alignment Search Tool (BLAST) database with 96% accuracy were used for lactobacilli identification. All case pigs manipulated ears, 47% bit ears, 40% manipulated tails, and 13% bit tails at least once. Some case pigs were also victims: 20% had their ears and 13% their tails manipulated, and 7% were bitten in their ears. Controls tended to have a higher average of identified lactobacilli spp. compared to cases (p=0.099). *Limosilactobacillus pontis*, *Lactobacillus delbrueckii*, and *Ligilactobacillus salivarus* were identified only in some of the controls. *Lactobacillus amylovorus*, *Limosilactobacillus reuteri*, *Lactobacillus johnssonii*, and *Limosilactobacillus mucosae* were identified in both groups. A linear mixed model (SPSS) with case/control and sex as fixed factors, and size at birth (small, medium, large) as random variable, showed a higher colony count (CFU/ml) for total lactobacilli in females (p=0.045) and case pigs (p=0.016). Another linear mixed model with case/control and sex as fixed factors, and interaction case/control*sex, revealed a higher colony count for *L. amylovorus* in case pigs (p=0.046), and a tendency for a higher colony count in females (p=0.077). The interaction case/control*sex tended to be significant (p=0.063). These results indicate a potential link between lactobacilli and the development of MB in pigs. Case pigs tended to have a less diverse lactobacilli population, but contradictory to our predictions significantly more *L. amylovorus* and total lactobacilli compared to controls.

Poster N° 120

Preliminary study on link between tail biting behaviour, tail posture and enrichment manipulation

Friederike Katharina Warns*, Andrea Friggemann, Katharina Dahlhoff, Astrid Luise van Asten

Department of Animal Production, Chamber of Agriculture North Rhine-Westphalia, Haus Duesse, 59505 Bad Sassendorf, Germany
** Presenting author: friederike.warns@lwk.nrw.de*

Early detection of tail biting based on behavioural changes of affected animals is important. In this study, we investigated hanging/tucked tails, tail-in-mouth and tail biting situations, and enrichment manipulation as early indicators. 70 non-docked crossbred piglets, divided in two pens, were filmed continuously during rearing period for 42 days. Weaning took place at the age of 4 weeks with an average weight of 7.64±1.2kg. Rearing was conducted in conventional pens with three enrichment materials (cotton rope, hay basket and chain with plastic piece) and 0.5m² per pig. The tail condition was evaluated daily. Day of tail biting outbreak was defined as the first day with visible injuries at one pig. The neighbouring pen was defined as no outbreak. If tail biting occurred, a jute sack was added to the pen and pigs with severe lesions were treated with medication. Videos were analysed on day -7 to day -1 prior to tail biting outbreak (instantaneous scan sampling, 10-min- interval, 06:00 to 20:00h). Day of outbreak was excluded from analysis because of vaccination and therefore strongly affected pigs' behaviour. For analysis, seven behaviours of pigs were differentiated. Statistical analysis was performed using R Studio® (Vers. 1.2.5033). The influence of observation day, pen and interaction of observation day and pen was determined by Kruskal Wallis and Mann-Whitney-U tests. Spearman rank correlations were calculated. Between observation days, number of pigs at hay basket was significantly higher on day -2 (0.27±0.59 pigs per scan) than on day -5 and -6 (0.07±0.30 resp. 0.07±0.28 pigs per scan; $p=0.002$ resp. 0.001). Number of pigs at the chain decreased from day -6 (0.38±0.69 pigs per scan) to day -1(0.11±0.35 pigs per scan; $p=0.001$). Comparing the pens separately per day prior outbreak, proportion of hanging or tucked tails was higher in the pen with tail biting, especially on day -2 (36±21 vs. 16±18 percent per scan; $p<0.001$) and day -1 (31±23 vs. 9±12 percent per scan; $p<0.001$). The number of pigs with hanging tails was positively correlated with number of pigs at the enrichment materials ($r=0.230$, $p<0.001$ for hay basket; $r=0.401$, $p<0.001$ for rope; $r=0.361$, $p<0.001$ for chain). Thus, directly prior to outbreak pigs seemed to prefer organic enrichment material. Pigs in a pen with tail biting were standing with a higher proportion of tails hanging/tucked. Soon these behavioural changes will be analysed automatically in order to support the animal owner to detect outbreaks at an early stage.

Poster N° 121

Slow down tail biting outbreak by supplementing gilts water with essential oil of orange

Alexis Nalovic[1*], Jean-François Gabarrou[2], Aurélie Auvray[2]

[1] *Réseau Cristal, 23 Rue Olivier de Serres, 85500 Les Herbiers, France*
[2] *Phodé, 8 Avenue de la Martelle, 81150 Terssac*
[*] *Presenting author: a.nalovic@reseaucristal.fr*

Tail biting is a major welfare and economic issue, especially in gilt breeding farms where tails are docked longer for commercial reasons. The aim of this experiment was to study the effect of an antistress functional sensory feed additive mainly based on essential oil of orange (VeO®, Phodé, France) on tail biting. Six successive batches between 130 and 160 gilts each, were monitored following the routine of the farm, from 7 weeks of age to the end of the fattening period. Three of them were control groups and the three others were test groups which received the VeO® solution in the water (100 ml/1000l) for the whole duration of the trial. The severity of tail lesions has been scored every 2 weeks throughout the whole trial. The scoring system was derived from Anja Honeck & al., 2019, and each lesion was characterised according to 5 criteria. A score between 0 (low incidence) and 2 (high incidence) was attributed to each criteria. The addition of each score led to the global severity score; a total of 3 or less was considered as a light lesion whereas a total of 4 or more was considered as a severe lesion. Finally, the saliva cortisol rate was measured at 3 distinct moments; before, during and after a stressful situation represented by the transfer to fattening. Data were analysed using ANOVA (General Linear Model) or Chi-square test when appropriate. A total of 893 animals were scored over a 10-month period, 430 in the control groups and 463 in the test groups. The total number of lesions was significantly lower in the test batches (287 vs 444 in control batches; $p<0.01$). However, the number of severe lesions was not quite different according to the group. Finally, the average cortisol rate at the moment of the transfer was clearly lower in the test group (8,06 vs 82,67 mg/ml; $p<0.01$) while the difference was not significant for the 1st and 3rd measures. Indeed, it reached a peak in the control group at the moment of the transfer while it followed a nearly linear curve in the test group. These first results highlight the protective effect of VeO® against stress. By decreasing the cortisol response, resilience capacity of animals is improved and negative effects of stress are alleviated (tail lesions prevalence in this case). However, the evolution and severity of the latter seems to depend more on the batch.

Poster N° 122

Can be pale pink comb colour in laying hens an indicator of keel bone fractures detected by palpation - a case study from Albania

Sokol Duro[1*], Arben Kambo[2], Marjol Shehaj[1], Eduart Sula[1]

[1] *Department of Morphofunctional Modules, Faculty of Veterinary Medicine, Agriculture University of Tirana, Albania*
[2] *Department of Mathematics and Informatics, Faculty of Economy and Agribusiness, Agriculture University of Tirana, Albania.*
[*] *Presenting author:durosokol@ubt.edu.al*

Keel bone fractures are a serious welfare problem for the commercial laying hens in many countries with different prevalence detected and with different levels of damage. Laying hens with keel bone damage, due to pain, have difficulty in standing, movement and moreover reduce egg production. Damage of the sternum is caused by many different factors such as housing conditions, breeding, nutrition, genetics, etc. The aim of this case study was to determine the prevalence and location of keel bone fractures in commercial farms of laying hens with palpation technique and to evaluate any outer sensitive indicator such as comb colour, related to these fractures. The study was conducted on a farm in Durrësi district with more than 130 thousand laying hens Lohman LSL-White breed. During the study from October 2021 to December 2021, we randomly evaluated 320 chickens with palpation technique from three different groups of ages: 23, 46 and more than 68 weeks of age. Palpation was done by a single trained person. At the same time with palpation, we recorded the condition of pectoral muscles, comb colour and shape, lesions in pulvinus in order to use them as sensitive indicators for keel bone fractures. Related to the size of pectoral muscles and the comb colour and shape, we used binomial variable with two possible values (normal; not normal). Of 320 chickens evaluated by palpation technique, 21 chickens or 6.56% resulted with keel bone fractures and from these, 19 chickens have had fractures on the sternum tip. Referring to our results, the majority of chickens with fractures were at ages 23 and 46 weeks (10 and 9 samples, respectively). Referring to our results changing the colour comb from normal to pale the chance to have keel bone fractures is rising 74% Prob=0.019 and sig 90%. By the increase of age from the age category of 23 weeks to the age category of 42 weeks, the chances of having a fracture compared to the chances of not having a fracture increased by 9.2%. The study showed that the phenomenon of the keel bone fracture is present in Albanian poultry farms for eggs and the palpation technique is effective to detect keel bone fractures. In addition, the pale comb colour can be used as an indicator of keel bone fractures.

Poster N° 123

Development of abnormal oral repetitive behaviours in foals: the role of maternal and suckling behaviour

Aline Bouquet[1*], Christine Nicol[1], Nicola Blackie[1], Roberta Ferro De Godoy[2], María Díez- León[1]

[1] Department of Pathobiology and Population Sciences, The Royal Veterinary College, Hertfordshire, UK
[2] Centre for Equine and Animal Science, Writtle University College, Essex, UK
[*] Presenting author: abouquet@rvc.ac.uk

In horses, abnormal oral repetitive behaviours (AORBs) are a cause of concern: they are associated with poor welfare and stress, and individuals performing AORBs are less desirable and therefore of decreased monetary value, contributing to animal, resource, and economical wastage. Maternal behaviour (e.g. maternal rank) and early life experiences (e.g. weaning method) influence the development of AORBs in young horses. The suckling behaviours of foals (suckling duration/frequency, suckling terminations within bouts, bunting, nuzzling) were associated with pre-weaning AORB development in one previous study. Here, we aim to replicate and expand this study by investigating the hypotheses that foal suckling behaviour, perinatal maternal foal-directed licking, and mares' own AORBs are associated with the development of foal AORBs. Following formal power analysis, 57 mares and foals were recruited in the UK across four studs - three Thoroughbred (A,B,C), one British Sports Horse stud (D) - in the foaling seasons of 2020 and 2021. Maternal foal-directed licking within the first hour post-partum was recorded for a subsample of 26 mares (stud A, n=5; stud B, n=16; stud C, n=1; stud D, n=4) for which CCTV cameras could be installed in foaling units. All studs provided ad libitum water and hay pre- and post-partum, and human assistance during parturition. Foals' suckling-related behaviours and foal and mare AORBs (e.g. crib-biting, wood chewing, repetitive biting of fixed objects) (n=57) were live recorded for 4h – focal continuous recording for twenty 10 min intervals - over three days when foals were 3-5 months old and kept at pasture with their dams. Foals from mares with high levels of AORBs also showed high levels of AORBs pre-weaning in one Thoroughbred stud but not the rest (interaction term: $F_{1,46}$=3.165,p=0.033; stud A, $r_s(10)$=0.721,p=0.008; stud B, $r_s(27)$=0.- 0.059,p=0.761; stud C ,$r_s(6)$=-0.075,p=0.861; stud D, $r_s(3)$=0.671,p=0.215). No significant influence of foal suckling-related behaviours (nuzzling: $F_{1,44}$=0.087,p=0.769; bunting: $F_{1,44}$=0.030,p=0.863; suckling frequency: $F_{1,44}$=0.960,p=0.333; suckling terminations: $F_{1,44}$=1.094,p=0.301; suckling duration: $F_{1,44}$=0.349,p=0.558) or perinatal maternal foal-directed licking ($F_{1,16}$=0.002,p=0.963) were detected. We therefore suggest that perinatal maternal behaviour and foal suckling behaviour might not modulate AORB development in foals younger than 5 months and instead stud factors, genetics and/or individual mare predisposition towards AORB may play a bigger role, alongside other known management factors. On-going work will assess whether maternal behaviour influences AORBs in older foals.

Poster N° 124

Slow down aggressive behaviour by supplementing poultry with a sensory feed additive mainly based on essential oil of orange

Jean-François Gabarrou*, Quentin Tiqui, Aurélie Auvray

Laboratoire Phode, Z.I. ALBIPOLE, 81150 Terssac
**Presenting author: jfgabarrou@phode.fr*

Management of deviant behaviour appears crucial to preserve animal welfare and carcass quality. In the case of animals with a high added value like free range broilers, scratches represent a major welfare and economic issue. Indeed, these animals are usually more nervous and more sensitive to stress which is one of the major causes of carcass downgrading. Some antistress functional sensory feed additive (FSFA) are able to maintain serotoninergic activity in mice's brains. Through this field trial, the aim was to assess the effect of a mainly based on essential oil of orange FSFA (Phode, France) on zootechnical performances and downgrading rate of broilers. For that, data were collected among 10 poultry farms in which 2 batches of 4400 broilers were monitored from birth to the end of fattening period. One was a control batch while the second one was a test batch which received the FSFA solution for the whole duration of the trial. Dry feed and water were distributed ad libitum. Average final weight and feed conversion ratio were measured for both groups. Proportion of broilers downgraded was assessed on the basis of 2 scales; on the individual scale (percentage of broilers downgraded above a 6% threshold) and on the quantity scale (weight of downgraded meat). Data were analysed using an Anova with 2 independent factors (treatment and farm) to compare batches within each farm (n=10). At the end of fattening period, broilers supplemented with FSFA present an average weight significantly higher than control ones (2,684 kg vs 2,509 kg; $p<0,01$). In the same way, feed conversion ratio of test batches is improved (3,50 vs 3,68; $p<0,05$). Proportion of broilers downgraded due to lesions above the threshold of 6% is not quite different according to the group (0,267% in control group vs 0,213 in test group). However, the average weight of downgraded meat is significantly decreased in test group (0,741 % vs 1,987; $p<0,05$) and is more homogeneous. These results suggest a decline in severe lesions and thus in aggressive behaviour allowed by the product. This positive effect on poultry welfare is also reflected by the improvement of zootechnical performances.

Poster N° 125

Survey of professional egg producers and private bird keepers on control measures against avian influenza and their effects on animal welfare

Femke Delanglez*, Bart Ampe, Anneleen Watteyn, Frank A.M. Tuyttens

Research Institute for Agriculture, Fisheries and Food (ILVO), Animal Sciences Unit, Melle, Belgium
**Presenting author: femke.delanglez@ilvo.vlaanderen.be*

Authorities of many countries, including Belgium, impose control measures such as culling of contaminated flocks, indoor confinement of captive birds or fencing off outdoor ranges with nets to prevent the spread of avian influenza (AI) during high-risk periods. The level of protection provided by these measures, however, may be affected by poor compliance due to actual or perceived concerns about their effectiveness, feasibility and consequences on animal welfare. These concerns have led to calls for alternative AI-control measures, e.g. vaccination, reduction of bird stocking density or banning free range systems in high-risk regions. In this study, Flemish professional egg producers (FAR, n=33, 18% of all producers) and private keepers of several species of captive birds (PRI, n=263) were surveyed with an online survey tool (LimeSurvey, www.LimeSurvey.org) on their opinion about current alternatives measures against AI. The participants were recruited via e-mail and by phone (FAR), via social media, and via specific organizations of poultry and other birds (PRI). The responses were presented as percentages and were statistical analyzed using a logistic regression model. In general, FAR reported better compliance (69% vs 49%) and greater belief in the effectiveness of indoor confinement (87% vs 25%) compared with PRI. Although compliance was high (69%), FAR were less positive about the effectiveness (10% vs 73%, $P<0.05$) and feasibility (10% vs 44%, $P<0.05$) of covering the outdoor range with nets than PRI. The most adverse animal welfare consequences of confinement reported by FAR were increased feather pecking (52%), cannibalism (48%), stress and frustration (42%), and poorer condition of the feathers, wattle and body (35%). The same was seen for PRI (stress & frustration, 60%; poorer condition of the feathers, wattle and body, 55%). Of the various alternative control measures against AI, vaccination and banning free-range systems were most preferred among FAR (58% and 45%). Also vaccination was most preferred (62%) by PRI, whereas banning free-range systems and reducing bird density in high- risk regions were less preferred (3% and 14%). Limited compliance by PRI may compromise the effectiveness of current AI control measures in Belgium. Considerable impairments of bird welfare due to indoor confinement are reported by FAR and by PRI in particular. Given the huge numbers of birds that are culled each year under the current AI control policy, these findings amplify the call for alternative or complementary control measures such as vaccination.

Teaching applied ethology and animal welfare: how to build a community of practice

Beth Ventura[1*], Kathryn Proudfoot[2]

[1] *School of Life Sciences, University of Lincoln, United Kingdom*
[2] *University of Prince Edward Island, Atlantic Veterinary College, Canada*
[*] *Presenting author: bethventura2@gmail.com*

This workshop is designed for those who are involved or interested in teaching applied ethology, animal welfare science, and/or animal ethics. The aims of the workshop are two-fold: first, to introduce an existing grassroots effort to build a Community of Practice (CoP) for teaching these topics, and second to facilitate a space for ISAE attendees to network, connect and share their experiences and questions related to teaching applied ethology. In the first part of the session, we will introduce the CoP concept and share lessons learned from our efforts to create a platform for knowledge exchange, curriculum development, and networking for those teaching applied ethology to undergraduate, postgraduate, and veterinary students -- one that currently serves over 70 members from over 30 institutions globally but which continues to welcome new members. Workshop participants will then join smaller groups to discuss experiences, challenges, and successes relative to teaching applied ethology, welfare, and ethics. This portion of the workshop will be highly interactive, allowing individuals at all stages of their careers the opportunity to exchange ideas and support grounded in their own experiences. Key themes from the discussions will be captured by the facilitators and shared with the group, the purpose being to identify ideas of how to best support ISAE members in their teaching efforts in future.

Developing standards for the management and welfare of elephants in human care to facilitate positive human - elephant interactions

Jake Rendle-Worthington[1*], Marthe Kiley-Worthington[1], Christine Nicol[1], Lisa Yon[2]

[1] *'We Are All Mammals'*
[2] *University of Nottingham*
[*] *Presenting author:* jake@weareallmammals.org

Truly wild areas are few in the world today; everywhere suffers interference from humans. This is particularly clear in the KAZA Trans-Frontier Conservation Area, spanning 5 Southern African Countries, where Human - Elephant interactions happen frequently, often with disastrous consequences. Given this is the largest population of elephants left, these large mammals will become extinct unless they live in some form of coexistence with humans. To this end applied ethological studies can be performed in much greater depth with elephants that are living lives of quality under the care of humans. The intrinsic value of elephants and conservation education of humans should be emphasized. Methods of keeping elephants that are under human care must therefore be further developed, which allow both humans and elephants to have a quality of life. Ensuring freedom from pain and suffering, safety, and allowing animals choices and opportunities to fulfill their social, physical, emotional and cognitive needs. They must lead lives as pleasant, if not more so, than in the wild. The effect of the animals on the local environment and the conservation of species diversity, also being crucial. Over 4 years We Are All Mammals, (UK Charity), has been working to develop Standards for the management and welfare of elephants in human care in Southern Africa. This is a multi-stakeholder process which includes 3 relevant groups; animal welfare experts; local welfare NGOs; and owners/managers of elephants. Agreement between all parties was finally achieved and the standards were published in 2021. These standards specify husbandry, teaching and training methods necessary to avoid elephants suffering, as well as specifying health and safety and conservation justification. It is considered that alongside facility uptake to benefit elephants, these Standards could become a model for the further development of safe mutually-beneficial animal/human associations for any mammal, wild or domestic. The proposed workshop primarily aims to create debate around the validity, need and value of such standards and how to ensure human - animal interactions beneficial for the welfare and conservation of the species involved. An initial presentation about these standards - need and value, real world situation, participation, process, implementation - will be followed by questions that such standards throw up. Participants will then split into breakout groups to discuss assigned issues arising. Their findings will be brought to the whole group toward the session end with the most salient points being disseminated and extracted by breakout group representatives.

Authors Index

A

Abdallah Ahmed, A. 137, 179
Aburaya, K. 33
Acuña Ballesteros, S. 136, 226
Adam, S. 137
Adams Progar, A. 217
Adcock, S. 21
Adu, S. 228
Agbaoye, A. 177
Aggarwal, A. 74
Ahlrot, U. 198
Ahrens, L. 94
Aigueperse, N. 52, 72 ,132, 203
Akande, G. 177
Akinde, A. 216
Akintayo, T. 178
Aliyu, M. 118
Alkhtib, A. 88
Aluwé, M. 170
Amici, F. 131, 134
Ampe, B. 239
Andersen, I. 60, 68, 148
Anderson, C. 198
Andersson, M. 198
Andrewartha, S, 211
Aoki, R. 208
Arnott, G. 8, 9, 97
Arrazola, A. 209
Asher, L. 42
Atay, O. 134
Aubé, L. 172
Auvray, A. 235, 238

B

Bachmann, I. 110
Bagaria, M. 129, 184
Bagiova, B. 160
Bailly-Caumette, E. 76
Balaro, M. 134
Baqueiro Espinosa, U. 8. 9
Barnard, S. 8, 206, 209
Bartoš, L. 99
Bateson, M. 73, 75
Batista Costa, L. 159
Battaglini, L. 109
Battini, M. 109, 134, 161
Baulida, B. 129, 184
Baxter, E. 53
Beasley, S. 233
Belshaw, Z. 116
Belson, S. 30
Benjamin, M. 3
Bennett, R. 31
Berhe, T. 57
Bernardes de Oliveira, K. 136, 226
Bernardino, T. 86
Berry, M. 142
Bertelsen, M. 18, 76
Berthel, R. 149, 150
Bhadmus, A. 216
Bhuyan, A. 153
Bienboire-Frosini, C. 125
Blackie, N. 237
Bleach, E. 210
Blokhuis, H. 93
Bodova, K. 160
Boissy, A. 45
Boivin, X. 52
Bokkers, E. 38, 108, 146, 147, 169
Bolhuis, L. 43, 96
Bolton, O. 210
Bonato, M. 107
Bonnafe, G. 52
Booth, N. 53
Boumans, I. 108, 146, 147, 169
Bouquet, A. 237
Bourg, M. 81
Boyer, V. 203
Boyle, L. 98
Brand, C. 116
Brezina, C. 22
Briefer, S. 61, 110
Brims, M. 97
Broadus, L. 231
Broekmeulen, C. 248, 378
Brogan, J. 229
Brown-Brandl, T. 3
Brucks, D. 134
Bugarski, D. 55
Buijs, S. 164
Bukhari, S. 192
Burton, E. 88
Bus, J. 108
Bučková, K. 205
Byrd, C. 128

C

Caddiell, R. 10
Caicoya, A. 131
Calderón-Amor, J. 119, 128

Camerlink, I. 97
Campbell, D. 30, 70
Candelotto, L. 151, 213
Cantor, M. 156
Carroll, G. 120, 121
Carslake, C. 35
Casey, R. 13, 115
Catalano, F. 24
Cave, V. 58
Ceballos, M. 28, 79
Cellier, M. 72, 132
Celozzi, S. 161
Cerón, J. 205
Chabaud, C. 125
Chaloupková, H. 185
Charlton, G. 210
Cheon, S. 144
Chincarini, M. 225
Chiquitelli, M. 66
Chou, J. 29, 171
Choudhary, S. 74
Christensen, J. W. 59, 103
Christensen, J. P. 87
Chun, J. 143
Cincović, M. 140
Clouard, C. 67
Colell, M. 137
Coleman, G. 14
Collins, S. 49
Contalbrigo, L. 124
Cooke, R. 197
Coombs, T. 15
Coon, R. 48
Cooper, B. 115
Coppens, T. 170
Costa Garrido, L. 159, 222
Costa, J. 36, 134, 142 156, 159
Coutant, M. 19
Cox, N. 58
Cozzi, A. 125
Croney, C. 206, 209, 8
Culhari, E. 66,
Cunningham, R. 10

D

D'Alessio, R. 95
Da Costa, R. 13
Dahlhoff, K. 234
Daigle, C. 158,197,221
Dale, F. 116
Dalmau, A. 32
Daodu, O. 138
Daramola, J. 177,178
Daros, R. 24, 134, 159, 163, 222
Dauphiné-Morer, A. 45
David, S. 134
de Boyer des Roches, A. 172
de Jong, I. 44, 65
de Sousa, K. 189, 215
De Visscher, A. 170
Debeljak, N. 224
Delaby, L. 172
Delanglez, F. 239
Delàs, P. 184
Deniz, M. 189,215
Deotti Signor, P. 226,136
Dewell, G. 22
Dewell, R. 59
Diana, A. 206
Dias, G. 188
Dickson, E. 70
Dinato, B. 122
Dittrich, J. 189
Dobrik, E. 157
Dodovski, A. 155
Doeschl-Wilson, A. 97
Dogra, P. 176, 180, 181
Dohme-Meier, F. 149, 150
Dominguez, B. 221
Donadio da Silva Pereira, J. 226, 136, 190, 215
Donbavand, J. 53
Dorea, J. 3
Douls, S. 52
Dowell, F. 80
Downey, B. 21, 106
Doyle, R. 57
Duarte Gan, C. 124
Dumontier, L. 90
Dunn, M. 230
Duro, S. 236
Durosaro, S. 175, 177, 178, 228
Dwyer, C. 15, 53

E

Eburuike, A. 177
Ede, T. 139
Ehigbor, T. 175
Ekundayo, O. 207
Endres, M. 166
Engel, J. 108
Eniafe, T. 228
Erasmus, M. 91, 182

Erichsen, C. 15
Esonu, D. 118
Evans, N. 80

F

Fàbrega, E. 32, 129, 184
Fasasi, F. 178
Ferchaud, S. 67
Ferro De Godoy, R. 237
Field, L. 212,
Figueroa, J. 128
Flint, H. 206
Foldager, L. 19, 56, 167
Fonsêca, V. 56
Foris, B. 81, 111, 141
Forkman, B. 78
Forslind, S. 93
Fortney, D. 168
Fox, N. 53
Freitas de Melo, A. 187
Friggemann, A. 234
Fukuizumi, H. 201
Fukuzawa, M. 114
Fureix, C. 49
Futro, A. 97

G

Gabarrou, J. 235, 238
Gabler, N. 168
Gadri, M. 71
Gagaoua, M. 84
Galindo, F. 51
Galli, M. 98
Gallo, C. 119
Gaskill, B. 64
Gebhardt-Henrich, S. 69, 104, 229
Gelan, E. 57
Gelli DVM, D. 122
Gerrits, W. 96
Gerritsen, R. 96
Ginane, C. 52
Giragosian, K. 115
Giriboni, J. 187
Glanville, C. 14
Gobbo, E. 224
Goeller, H. 106
Goerlich, V. 105
Golledge, H. 220
Gondret, F. 84
González, C. 128
Gonçalves de Lima, C. 86
Gosch, S. 126
Goumon, S. 185
Grandgeorge, M. 17
Gray, H. 42
Green-Miller, A. 64
Grethen, K. 82, 151, 213
Gruen, M. 10
Grut, R. 71
Größbacher, V. 77
Guedes do Carmo, L. 163
GUEGUEN, L. 17
Guerrero Gutierrez, M. 187
Guittard, A. 52
Gussmann, M. 37
Guzhva, O. 43
Guérini, C. 232
Gómez, Y. 82, 151, 213, 229
Gökdal, Ö. 134

H

Haley, D. 22
Ham, N. 88
Hamelin, C. 232
Hanlon, A. 95
Hansen, I. 162
Hansen, T. 87
Harvey, K. 197
Harvey, N. 115
Hassan, S. 118
Hausberger, M. 17
Hayashi, H. 191
Heinonen, M. 233
Held, S. 20
Hemsworth, L. 14, 212
Hemsworth, P. 14
Henry, A. 164
Heponiemi, P. 233
Herborn, K. 42, 49
Herman, M. 227
Hernandez, C. 62, 93
Herrera, A. 218
Herskin, M. 19, 167
Hess, M. 84
Hessle, A. 54
Hillmann, E. 134
Hirayama, T. 191
Hlasnik, M. 160
Hockenhull, J. 20
Hogue, T. 12
Holinger, M. 204
Holland, R. 131

Holt, R. 214
Hough, D. 107
Hristov, S. 140
Huddart, F. 58
Huenul, E. 128
Hukkinen, V. 233
Hunter, L. 34
Hunter, R. 9
Hvasshovd, S. 162
Hänninen, L. 23
Häätylä, T. 23
Högberg, N. 54
Höglund, J. 54
Hötzel, M. 139, 171, 189

I
Ikkatai, Y. 208
Ilieski, V. 155
Ilić, T. 55
Illmann, G. 185
Ilori, B. 228
Inada, K. 191
Ipek, N. 196
Irazábal, J. 187
Islam, R. 153
Ito, M. 114
Ito, Z. 208
Ivarsson, E. 62
Iyasere, O. 175, 177, 178, 228
Izquierdo Garcia-Faria, T. 44, 65

J
Jack, M. 53
Jack, S. 120
Jalali M, A. 151
James, C. 88
Janczak, A. 89, 90
Janevski, A. 155
Jansman, A. 96
Jensen, E. 73
Jensen, L. 167
Jensen, M. 18, 73, 75, 76
Jeon, J. 143, 144
Johansson, T. 37
Johnson, A. 22, 168
Johnson, Jocelyn 227
Johnson, Jay 64, 182
Johny, A. 89
Jongman, E. 212
Jovanović, N. 55
Juge, A. 158, 197
Junttila, S. 193

K
Kahn, Z. 221
Kai, O. 114
Kaiser, M. 19, 167
Kaler, J. 35
Kalfopoulos, C. 173
Kalonji, G. 125
Kambo, A. 236
Kamboj, M. 50, 74, 176, 180, 181
Kappel, S. 49
Keady, T. 15
Keeling, L. 78
Keil, N. 134, 149, 150
Kemp, B. 39
Kemper, N. 63, 94
Kenyon, F. 53
Khatun, A. 153
Khatun, R. 153
Kikuchi, M. 12
Kiley-Worthington, M. 241
Kim, K. 143
Kinoshita, K. 201
Kinsman, R. 13, 115
Kirkeby, C. 37
Kis, A. 11
Kittelsen, K. 69, 87
Kivinen, S. 233
Kjosevski, M. 155, 157
Kliphuis, S. 105
Knauer, W. 134
Knight - Jones, T. 57
Knowles, T. 20
Knöll, J. 40
Kobek-Kjeldager, C. 167
Kok, A. 38
Kostal, L. 160, 194, 195
Kowalski, E. 170
Kozicki, L. 24
Krahn, J. 111, 141
Krasny, A. 94
Kraus, A. 99
Krause, A. 200
Kriengwatana, B. 5
Krunt, O. 99
Kumar, N. 74
Kyriazakis, I. 205
König von Borstel, U. 134
König, E. 233

L
Laaksonen, S. 23
Lachica, C. 24

Lacuesta, L. 134
Lagoda, M. 98
Lalander, C. 62
Lambert, W. 96
Landau, S. 134
Landvogt, R. 78
Langbein, J. 46, 200
Lanzoni, L. 225
Lascelles, B. 10
Laufer, S. 124
Launay, F. 172
Lawrence, A. 1, 77
Lay, D. 182
Lecorps, B. 26
Lee, B. (Maple Leaf Farms Inc.) 231
Lee, B. (Peacock Technology Lim.) 154
Lee, C. 70, 211
Lee, V. 97
Lerch, N. 17
Leszkowová, I. 185
Lewis, K. 100
Lichtenwalter, C. 217
Lidfors, L. 54
Llonch, P. 101
Loberg, J. 198
Logunleko, M. 177
Lopez, S. 204
Lord, M. 13
Love, E. 20
Lozada, C. 221
Ludovico, L. 161
Luke, K. 133
Luna, D. 128
Lundin, L. 198
Lürzel, S. 126

M

Maia, A. 66
Maigrot, A. 110
Makagon, M. 231
Makowska, I. 102
Malchow, J. 40
Malcolm, E. 42
Malmkvist, J. 19, 103, 183
Mambrini-Doudet, M. 45
Manet, M. 105
Manning, P. 107
Manteca, X. 101
Marcet-Rius, M. 125
Marchewka, J. 98
Marcondes, M. 188
Marcone, G. 129
Markland, L. 182
Marshall, S. 154
Martin, J. 53
Martin-Cirera, A. 230
Maselyne, J. 170
Mason, M. 47
Matković, K. 117
Matsunaga, M. 201
Mattiello, S. 109, 161
Maudanz, H. 200
Mazon, G. 142
McAdie, T. 133
McBride, S. 100
McCoard, S. 15
McDonald, P. 70
McElligott, A. 47, 192
McEvoy, V. 9
McNeill, D. 165
Meagher, R. 134
Meerhoff, P. 187
Meers, L. 122, 124
Meisingset, E. 162
Melis, S. 65
Mendl, M. 49
Mendonça, T. 125
Menuge, F. 125
Menčik, S. 117
Merlot, E. 67
Mesić, Ž. 117
Mialon, M. 172
Michelotto Jr, P. 163
Milan, H. 66
Millman, S. 22, 168
Mills, D. 6, 12
Minussi, I. 96
Mishra, A. 50
Moe, R. 87
Mokria, M. 57
Mollaret, E. 172
Moni, I. 153
Monk, J. 70
Montalcini, C. 41
Moody, C. 134
Moravcsíková, Á 99
Moreau, E. 207
Moreno-Zambrano, M. 46
Morgavi, D. 84
Morris, D. 3
Morrone, F. 122
Mott, R. 5, 80

Mounier, L. 172
Moura, G. 66
Mueller, S. 104
Muns, R. 205
Murray, J. 13, 115
Murray, P. 154
Murrell, J. 20
Mustière, C. 67
Muszik, J. 132
Muñoz-Tamayo, R. 84
Mäki, K. 193

N
Nakamichi, M. 33
Nakov, D. 140
Nalovic, A. 235
Nanto, K. 191
Nawroth, C. 84, 134
Neave, H. 36, 73, 75, 134
Nenadović, K. 55
Newberry, R. 60, 214
Nguyen, T. 152
Nicol, C. 237, 241
Nielsen, B. 71, 220
Nogues, E. 81
Nordgreen, J. 89, 90
Nordquist, R. 105
Normando, S. 122, 123, 124
Norring, M. 233
Norton, T. 3
Novak, J. 218
Ntalampiras, S. 161
Nurmi, H. 23

O
O'Driscoll, K. 95, 98
O'Malley, C. 207
O'Neill, D. 116
Occhiuto, F. 35
Ocepek, M. 68, 148
Oczak, M. 230
Odetayo, P. 178
Odetunde, P. 178
Ogel, T. 161
Ogunfuyi, S. 178
Ojelade, O. 216
Oladepo, M. 216
Olateju, M. 216
Olawoyin, T. 177
Oldham, L. 97
Olsson, A. 84
Omotayo, O. 177
Ortmeyer, H. 14
Ospina, S. 211
Ostović, M. 117
Osório-Santos, Z. 139
Otervik, S. 60
Owczarczak-Garstecka, S. 13, 115
Oyekunle, O. 175
Oyeniran, V. 175, 178, 228
Ozoje, M. 228

P
Packer, R. 116
Pageat, P. 125
Pajžlar, L. 27, 145
Pal, S. 7
Palma, C. 119
Palme, R. 25, 218, 225
Palomino, A. 163
Palomo, R. 128
Pangerl, T. 134
Parada Sarmiento, M. 86, 225
Paranhos da Costa, M. 28
Parisot, S. 52
Parker, M. 100
Parkes, R. 192
Parois, S. 43
Parsons, R. 22
Parsons, T. 29
Parés, R. 101
Paterson, E. 207
Pavičić, Ž. 117
Pedersen, L. 165, 183
Peetz Nielsen, P. 37
Pegram, C. 116
Perez, C. 187
Perić, L. 174, 186
Perttu, R. 166
Petelle, M. 41
Pečarić, L. 117
Phillips, C. 165
Pichová, K. 160, 194, 195
Pinheiro Machado Filho, L. 136, 190, 215, 226
Platto, S. 123
Poletto, R. 86
Porter, J. 221
Poulkas, I. 173
Presti, G. 161
Pretto, F. 136, 190, 215, 226
Prevolnik Povše, M. 27, 145
Pritchett, R. 64

Proops, L. 100
Proudfoot, K. 240
Prunier, A. 67
Psota, E. 3
Puolivali, J. 207

R
Raber, V. 64
Raghazli, R. 202
Rahmel, L. 197
Raimundi, T. 188
Ramirez Montes De Oca, M. 49
Range, F. 2
Rasmussen, S. 91
Ratuski, A. 102
Rault, J. 16, 25, 73, 75
Rebel, J. 44
Reeve, C. 121
Reeves, M. 53
Rendle-Worthington, J. 241
Renna, M. 109
Riber, A. 56, 91, 93, 230
Rice, E. 156
Richert, B. 182
Robbins, L. 64
Rodenburg, B. 43, 62, 105
Rodríguez, B. 79
Roig-Pons, M. 61, 110
Romaniuk, A. 8
Romero Peñuela, M. 127
Rosa, G. 3
Rosanowski, S. 192
Rose, D. 31
Rotta, P. 188
Roux, A. 232
Rowland, M. 15
Rufener, C. 204
Rutter, M. 154
Räkköläinen, J. 233
Rönnegård, L. 37
Rørvang, M. 4, 71

S
Sabei, L. 8, 225
Sabolek, I. 117
Saini, M. 50
Saito, H. 219
Saito, M. 201
Sakkas, P. 232
Sali, V. 233
Salminen, S. 233
Salvesen, N. 162
Samet, L. 115
Samuels, W. 124
Sanada, A. 191
Sanchez, J. 127
Sanchez-Davila, F. 134
Sanders, O. 40
Sano, Y. 192
Sant'Anna, A. 28
Sarder, J. 153
Sargison, N. 15
Sato, S. 159, 222
Sauvala, M. 23
Scaillierez, A. 146, 147
Schaffer, A. 131
Schild, S. 4, 71
Schillings, J. 31
Schmitt, O. 16
Scholey, D. 88
Schomburg, H. 40
Schrader, L. 40
Schutz, K. 58
Schäfers, S. 63
Scottish SPCA 80
Semple, S. 47
Serres, A. 235
Shehaj, M. 236
Sheng, K. 111, 141
Shepley, E. 72
Shimada, K. 219
Shorten, P. 34
Shreyer, T., 8, 206, 209
Siebert, K. 46
Siegford, J. 3, 92
Singh, P. 74
Sirovnik, J. 230
Skalná, Z. 160, 194, 195
Skok, J. 27, 134, 145
Skovgård, H. 59
Smith, B. 133
Sopein, C. 216
Spiridonović, S. 174
Stalder, K. 168
Stambuk, C. 168
Stanković, B. 140
Steibel, J. 3
Steinerova, K. 18
Stenfelt, J. 71
Stevens, K. 116
Stevens, V. 124
Stewart, K. 64

Stien, J. 162
Stracke, J. 94, 136
Stratmann, A. 89, 92
Streiff, C. 218
Sturlese, M. 124
Such, X. 101
Sula, E. 236
Suman, M. 180
Sundman, E. 168
Söderlind, M. 113

T
Taghipoor, M. 84
Tahamtani, F. 56, 62, 69
Tambadou, H. 207
Tanaka, A. 191
Tarazona, A. 79
Tasker, S. 132, 115
Taylor, P. 175
Tedeschi, L. 84
Teixeira, D. 129
ten Cate, C. 5
Teruel, E. 125
Thakur, A. 176, 180, 181
Thakur, R. 176
Thodberg, K. 56, 167
Thomas, F. 67
Thorup, V. 38
Tiira, K. 193
Tiqui, Q. 238
Toftaker, I. 87
Toinon, C. 25
Tonooka, J. 134
Topál, J. 11
Torjussen, A. 121
Toro, G. 227
Tortereau, F. 52
Toscano, M. 41, 82, 89, 92, 104, 151, 213, 229
Toyoizumi, S. 114
Tozawa, A. 219
Trajchev, M. 140
Truong, S. 16
Tucker, C. 21, 48, 58, 106
Turner, D. 118, 123
Turner, P. 207
Turner, S. 123
Tuyttens, F. 62, 105, 170, 196, 239

U
Uchimoto, R. 191
Uddin, J. 153, 165
Ugwu, N. 20
Ulrichsen, A. 154
Ungerfeld, R. 134, 187
Usman, A. 118

V
Valros, A. 23, 71, 193, 233
van Asten, A. 234
Van Damme, L. 196
van de Leemput, I. 43
van de Weerd, H. 130
van den Brand, H. 39
van den Oever, A. 39
van der Eijk, J. 65
van der Tol, R. 146, 147
van der Zande, L. 43
van Knegsel, A. 38
van Nieuwamerongen-de Koning, S. 46, 147
van Riel, J. 65
van Veen, L. 39
Vanderer, E. 11
Vandresen, B. 171
Vanita, B. 176, 181
Vas, J. 60, 214
Vasdal, G. 69, 87, 214
Vasseur, E. 72, 132, 203
Vatzias, G. 173
Vazquez Diosdado, J. 35
Veissier, I. 84, 172
Veldkamp, F. 44
Vena, M. 169
Ventura, B. 134, 199, 240
Verdon, M. 211, 212
Verma, N. 180
Verwaeren, J. 196
Vesque-Annear, H. 67
Vidal, R. 32
Vignola, G. 225
Vigors, B. 15
Vila, L. 184
Villagrá, A. 134
Villettaz Rochibaud, M. 72
Voelkl, B. 85, 218
von Keyserlingk, M. 26, 81, 11, 139, 141, 199
Vu Dinh T. 152
Vučinić, M. 55

W
Waiblinger, S. 25, 126,134
Wall, H. 62, 93
Wallenbeck, A. 73

Walsh, E. 122, 124
Warner, K. 88
Warns, F. 234
Warren-Smith, A. 133
Watteyn, A. 170, 239
Weary, D. 26, 81, 102, 11, 139, 141, 199
Webb, L 108
Wehrens, R. 108
Weller, J. 8, 164
Wemelsfelder, F. 97
Werner, L. 163
Whay, H. 20
Wheto, M. 177
Wiklicky, V. 62
Williams, A. 13
Williams, T. 134
Winckler, C. 77
Windschnurer, I. 126
Witjes, V. 44
Woodroffe, R. 26
Woodrum Setser, M. 36
Woudstra, S. 37
Wurtz, K. 56
Wutke, M. 112
Würbel, H. 61, 218

Y
Yamada, K. 33
Yamamoto, H. 33
Yamanaka, M. 191
Yamanashi, Y. 208, 219
Yanqing, W. 123
Yon, L. 241
Yoshida, N. 208
Yusuf, F. 118
Yusuf, M. 118

Z
Zanella, A. 83, 86, 225
Zanini, L. 104
Zapata Cardona, J. 79
Zenasni, F. 45
Zita, L. 99
Zobel, G. 134
Zonderland, J. 96
Zupan Šemrov, M. 224

Đ
Đukić Stojčić, M. 174, 186

Š
Škorjanc, D. 27, 145
Špinka, M. 77