

Science in the Service of Animal Welfare

Priorities around the world



UFAW International Animal Welfare Science Symposium

4th – 5th July 2013

Universitat Autònoma de Barcelona, Barcelona, Spain

UFAW
Established 1926

Welcome to the UFAW Symposium

The importance of science in elucidating and tackling animal welfare problems is increasingly recognised, but priorities, concerns and approaches vary between nations and cultures.

The aim of this symposium is to provide a forum for all those active or interested in animal welfare science and its application around the world, to meet and discuss current topics in this field and international variation in priorities, concerns and approaches to animal welfare science.

We aim, also, at this meeting, to discuss building international links in animal welfare science and how UFAW might further support developments as an international society for animal welfare science.

This symposium is the latest in UFAW's programme of themed international meetings that bring together leading scientists, veterinarians, policy makers and all those with an interest in animals and their welfare.

James Kirkwood, Stephen Wickens and Robert Hubrecht

Organisers, UFAW

General Information

Organisers:

UFAW (the Universities Federation for Animal Welfare), the international animal welfare science society, is a UK registered scientific and educational charity that brings together the animal welfare science community, educators, veterinarians and all concerned about animal welfare worldwide in order to achieve advances in the well-being of farm, companion, laboratory and captive wild animals, and for those animals with which we interact in the wild. UFAW works to improve animals' lives by:

- Promoting and supporting developments in the science and technology that underpin advances in animal welfare.
- Promoting and supporting education in animal care and welfare.
- Providing information, organising symposia, conferences and meetings, and publishing books, videos, technical reports and the international quarterly peer-reviewed scientific journal *Animal Welfare*.
- Providing expert advice to governments and other bodies and helping to draft and amend laws and guidelines.

UFAW is an independent organisation, and throughout its history its work has primarily been funded by donations, subscriptions and legacies.

UFAW's philosophy: The importance of science to animal welfare

Ensuring good welfare is about more than ensuring good health. Animal welfare is about the quality of animals' lives: their feelings. It is now widely accepted, although it was not always so, that many species may be sentient - that is, they have the capacity to feel pain and distress, they can suffer and, conversely, be aware of pleasant feelings - and that this matters morally. But how do we assess, from the animal's point of view, what matters to them and how much? UFAW pioneered, and promotes and supports the scientific approach to gaining insight into what matters to animals, assessing their welfare and improving the quality of their lives through practical developments in all aspects of their care. Change for the better depends on knowledge, understanding and practical solutions. UFAW believes that good science can inform, motivate and facilitate that change - whether through developments in professional best practice, education or legislation - by providing a strong evidence base for changing attitudes and practices, and by creating practical and effective solutions to welfare problems.

Symposium Timetable

Day One (4th July 2013):

8.00 – 9.10 Registration Refreshments available from 8.30		
8.00 – 9.10 Poster set up		
9.10 – 9.20 Introduction		
9.10 - 9.20	Kirkwood, JK UFAW, UK	Welcome and Introduction
9.20 – 10.40 Session 1: Chair: Professor Antonio Velarde, IRTA-Monells		
9.20- 9.45	Nicol CJ University of Bristol, UK	At what point is a chicken's welfare good enough? And is 'good enough' good enough?
9.45-10.05	Munsterhjelm C and A Valros University of Helsinki, Finland	Associations between environmental and animal-based measures of welfare in Finnish fattening pigs
10.05-10.20	Sapon M, JJ Prem, M Montufar, M Upjohn and V Fowler The Brooke, Guatemala	Evaluation of current methods used to treat back and wither wounds in equines, Guatemala
10.20-10.40	Bracke MBM, E Lambooij, D Burggraaf, HGM Reimert, B van Marlen and JW van de Vis Wageningen UR, The Netherlands	Humane slaughter of flatfish: Electrical stunning of Common dab and European plaice
10.40- 11.20 Break: Refreshments		
11.20 – 12.50 Session 2: Chair: Dr Lydia Brown, UFAW		
11.20-11.45	Braithwaite VA Pennsylvania State University, USA	The validity of parameters currently taken to be indicators of sentience
11.45-12.05	Golledge HDR, GC Laws and AL Fodder Newcastle University, UK	Conditioned aversion to the rodent euthanasia agents. Carbon dioxide, argon and isoflurane - implications for animal welfare
12.05-12.25	Shah SZA, S Nawaz, G Khan, R Eager, M Upjohn and V Fowler The Brooke, Pakistan	Methods to improve the welfare of working equines through decrease in prevalence and severity of lip lesions in Mardan, Pakistan
12.25-12.40	López-Luna J, F Torrent and M Villarroya Universidad Politécnica de Madrid, Spain	Short-term fasting and welfare prior to slaughter in Rainbow trout, <i>Oncorhynchus mykiss</i>
12.40-12.50	Kirkwood JK UFAW, UK	Announcements
12.50 – 14.10 Lunch, including Poster Session 1 (from 13.20)		
14.10-15.10 Session 3:		
	Building international links in animal welfare science. Introduced by Professor Victoria Braithwaite, Penn State University, USA	
15.10 – 15.50 Break: Refreshments		
15.50 – 17.10 Session 4: Chair: Professor Christoph Winckler, BOKU		
15.50-16.10	Mandel R, HR Whay, CJ Nicol and E Klement The Hebrew University, Israel	The effect of food location, heat load and stress on dairy cows' brushing activity
16.10-16.30	Mostafa AS and HA Mahran Beni-Suef University, Egypt	Assessment of welfare and health of dairy cows under different housing and management systems
16.30-16.50	Readman GD, TG Knowles, SF Owen and JC Murrell AstraZeneca, UK	Are the anaesthetics used for fish aversive?
16.50-17.10	Bones VC, D Weary and CFM Molento Federal University of Paraná, Brazil	Constraints for the adoption of alternative methods for rabies diagnosis
End 17.10		
19.00 – 21.30 Drinks reception, ATTIC, Barcelona		

Day Two (July 5th 2013):

9.00 – 10.30 Session 5: Chair: Dr Marc Bracke, Wageningen UR Livestock Research		
9.00-9.10	Wickens SM UFAW, UK	Introduction to the second day
9.10 - 9.30	Winckler C University of Natural Resources and Applied Life Sciences (BOKU), Austria	Progress in, the present state of, and challenges for on-farm animal welfare assessments in Europe
9.30-9.50	Herrmann K and PA Flecknell Universität Berlin, Germany	A review of German animal research applications from 2010 to assess the appropriateness of the methods being used to kill laboratory rodents
9.50-10.10	Weeks CA University of Bristol, UK	Behaviour, health and welfare issues in managing group-housed laying hens
10.10-10.30	Robinson I IFAW, USA	Can release of animals to the wild be compatible with good welfare and good conservation practice?

10.30 – 11.10 Break: Refreshments

11.10 – 12.40 Session 6 Chair: Dr Anna Olsson, IBMC - Porto		
11.10-11.30	Bonacic C, R Alvarado, E Beltrami, A Rubio and J Laker Pontificia Universidad Catolica de Chile, Chile	Feral and stray dogs are an emerging threat for wildlife conservation in Chile
11.30-11.50	Talling JC Food And Environment Research Agency, UK	Objectivity in assessment of welfare costs of wildlife management techniques
11.50-12.10	Hiltz MN and LD Roy Alberta Innovates – Technology Futures, Canada	Application of computer simulation models for rating traps against humane trapping standards
12.10-12.30	De Luna CJ Writtle College, UK	The interaction between genetic diversity and animal welfare
12.30-12.40	Kirkwood JK UFAW, UK	Announcements

12.40 – 14.00 Lunch, including Poster Session 2 (from 13.15)

14.00 – 15.15 Session 7 Chair: Professor Mike Mendl, University of Bristol		
14.00-14.20	Perera BV National Wildlife Training Centre, Sri Lanka	The welfare of free-living elephants as their habitat shrinks
14.20-14.40	Baker L University of British Columbia, Canada	Understanding the individual in wildlife conservation: How personality type affects translocation success in an endangered species of desert rodent (<i>Dipodomys stephensi</i>)
14.40-15.00	Reynolds JC and JA Talling Game & Wildlife Conservation Trust, UK	Recent research on the use of snares in fox control
15.00-15.15	Friend TH Texas A&M University, USA	Unintended consequences for slaughter horse welfare in the United States and European Union

15.15– 15.45 Break: Refreshments

15.45 – 17.05 Session 8 Chair: Professor Xavier Manteca, UAB		
15.45-16.05	Packer RMA, MS Tivers, A Hendricks and CC Burn The Royal Veterinary College, UK	Short muzzle; short of breath? An investigation of the effect of conformation on the risk of Brachycephalic Obstructive Airway Syndrome (BOAS) in domestic dogs
16.05-16.25	Hosie CA, TE Smith and R Coleman University of Chester, UK	Non-invasive stress assessment in a neglected group: The amphibia
16.25-16.45	Volodina EV, IA Volodin, AV Klenova and VA Matrosova Moscow Zoo, Russia	Distinguishing genders by voice without capture and handling
16.45-17.05	Andrews C, C McLaren, I Vinuela-Fernandez and G Goodman University of Edinburgh, UK	Pain indicators in fish: behavioural and physiological responses to fin-clipping in zebrafish

End 17.05

**SCIENTIFIC
PROGRAMME:**

Speaker Abstracts



AT WHAT POINT IS A CHICKEN'S WELFARE GOOD ENOUGH? AND IS 'GOOD ENOUGH' GOOD ENOUGH?

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The first step in addressing these questions is agreement on what welfare is, and how to measure it. Many welfare indicators are now available and comparative data on some can readily be scrutinised to compare different housing or management systems. Progress has been made in assessing the validity of these different indicators and in developing methods of combining information. With agreed measures of welfare in place, we can then debate whether the welfare of chickens is good enough. This is an ethical question and what is “good enough” in one country, at one time, or as understood by one group of stakeholders, may not be considered good enough in another country or context. A practical example from a current project on managing hens with intact beaks demonstrates the complex process involved in setting thresholds to define “good enough” within a single context.

The second part of the title wonders whether “good enough” is sufficient; and so touches on the question of positive welfare. An argument runs that traditional welfare assessment focuses (too much) on avoidance of the negative and suggests that birds should also be provided with positive experiences. This should improve their welfare beyond “good enough”. However, this well-intentioned approach sometimes makes weak inferences or simply tinkers with words. As an example, we may describe the same event either as avoidance (of A) or approach (to B): our language differs but not the end result. Identifying a real point where valence shifts from positive to negative is guesswork. As we learn more about the neurobiology of bird emotional systems it may become possible to identify indicators of positive affect but this approach is in its infancy. If we want to promote positive welfare, lessons from the growing field of human happiness suggest that attempts to adjust longer-term mood or life satisfaction (though providing options for autonomy and control) will be more successful than attempts to induce pleasure via short-term manipulations of reward.

In conclusion, there is enormous scope for further improvements in chicken welfare. Whether we depart from bad and travel towards good, or depart from good heading for better, we should focus on how we can best make the journey. In the current farming environment this will increasingly require the involvement of the breeding companies and not just a consideration of husbandry and management. The final destination (best, perfect) remains too hazy to discern clearly at this distance.



ASSOCIATIONS BETWEEN ENVIRONMENTAL AND ANIMAL-BASED MEASURES OF WELFARE IN FINNISH FATTENING PIGS

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This study aimed to establish associations between the environment and animal-based measures of welfare in growing pigs. Six certified assessors collected data from 81 representative Finnish fattening pig units according to the Welfare Quality® (WQ) protocol for growing pigs. Animal-based inputs (n=32) were subjected to a principal component analysis (PCA) with varimax rotation to produce six factors collectively explaining 59.4% of the variance in the data (Table 1.). The factors represent “problem types” (PT) or clusters of correlated signs of impaired welfare. Environmental measures were regressed on each PT. Assessor ID, month, farm size and type (fattening or integrated), slaughterhouse company and average body weight of the assessed pigs were kept in the models if significant.

The results indicate that several different dimensions of impaired welfare exist in the data with no single PT prevailing. The most important environmental factor was space allowance as a main effect or interacting with body weight. The effects of the amount of environmental enrichment were smaller than expected; however, all farms provided the animals with some kind of destructible material daily.

In conclusion, welfare problems in Finnish fattening herds are multidimensional, season-related and associated with several factors in the environment. Space allowance may become a limiting factor for pig welfare in the finishing period.

Table 1. Associations between the environment and clusters of animal-based signs of impaired welfare on Finnish fattening pig farms

"Problem type" ¹	Variation explained	Significant predictors in linear regression models								
		Assessor ID	Month	Farm size	Slaughterhouse	Body weight	Enrichment	Group size	Space allowance	Feed type
1. Skin - lameness ²	13.0 %	**	***		***	* _a	*** _b	b	* _a	
2. Bursitis - fittings ³	10.5 %	***	***			*				*
3. Dirtiness ⁴	10.1 %	**	***	**		a			a	
4. Negative social - lung ⁵	8.8 %	*	*		**		*			
5. Tail lesions	8.6 %	***	**						†	
6. Bursitis - cough - tail ⁶	8.4 %	**	**							

¹Factors derived from a FA of variables from Welfare Quality® ²Skin condition, wounds and moderately severe lameness ³Bursitis and exploration of pen fittings ⁴Soiling of the body by feces ⁵Negative social (relative to all social) behaviour and condemnations due to pneumonia or pericarditis ⁶Severe bursitis, coughing frequency and severe tail lesions † p<0.1, *p<0.05, **p<0.01, ***p<0.001; common letters indicate significant interaction



EVALUATION OF CURRENT METHODS USED TO TREAT BACK AND WITHER WOUNDS IN EQUINES, GUATEMALA

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There are an estimated 227,938 equines in Guatemala, composed of 167,687 horses, 49,096 mules and 11,155 donkeys of which the majority are used for transportation of goods by pack (TGP). Common welfare problems include malnutrition, dehydration, overloading, overworking, infectious diseases, parasite infestation and work related injuries. Wounds on the back and withers are frequently observed work related injuries on TGP equines; however, owners rarely treat these wounds either because of lack of knowledge and/or availability/affordability of veterinary resources. In the few cases where wounds are treated this usually involves applying traditional medicines made from locally available plants. The purpose of this study was to evaluate the effectiveness of traditional medicine made from local plants (*Chenopodium Ambrosioides* (Apazote), *Malvasylvestris* (malva), *Allium cepa* (onion) and *Allium sativum* (garlic)), against the licensed veterinary medicine containing 2% Nitrofurazone in their ability to heal back and wither wounds. Wounds were assessed using the Brooke Standardise Equine Behaviour and Welfare Assessment Tool (SEBWAT) wound grading scale (0-3 where 0=no wound, 1=superficial or healed lesion including hairless skin or pale pink colouring with no broken surface or dried or fresh blood, 2= skin and immediate subcutaneous layers broken and 3=lesions deep enough to show muscle, tendon or bone). Twelve horses with wounds of grade 2 severity were randomly assigned to one of three groups (Group A: Nitrofurazone 2% n=4; Group B: Medicinal plants n=4; Group C: Saline n=4). Treatment was provided every fourth day for a period of 45 days. Wound size and severity was recorded before the start of the study and every 5 days until the end of the trial. Wound severity over 45 days did not improve for horses in the control group C. In contrast, by day 45 mean wound severity in horses treated with nitrofurazone or medicinal plants improved from grade 2 severity to grade 1.25 (SE 0.08) and 1.25 (SE 0.11) respectively. Improvement in wound severity began sooner in wounds treated with nitrofurazone (day 5) when compared to medicinal plants (day 25). Mean wound size reduced to 52% and 51% of its original size by day 45 in groups A and B respectively, however a similar improvement was also seen in the control group (56%). The results of this study indicate that treatment of wounds with either nitrofurazone 2% or medicinal plants can improve their severity above that of saline if used intensively for up to 45 days. In contrast, wound size was not improved above that achieved using saline for either nitrofurazone or medicinal plants. This suggests that aiming to improve the type of back and wither wounds seen in Guatemala working horses by treatment is unrewarding and requires substantial owner time and commitment. The study provides objective evidence which can be used as the basis for initiating discussions with horse owners regarding the need for avoidance of back and wither wounds; this could support discussion of owners' perceptions of viable avoidance strategies including husbandry activities and/or tack adjustments.



HUMANE SLAUGHTER OF FLATFISH: ELECTRICAL STUNNING OF COMMON DAB AND EUROPEAN PLAICE

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Rendering animals unconscious before slaughter is necessary to reduce pain and suffering. Previous research has shown that fish landed on board may remain conscious for substantial periods of time (up to 2 hours). We studied electrical stunning to induce instantaneous loss of consciousness in dewatered common dab (*Limanda limanda*) and European plaice (*Pleuronectus platessa*). Twentyfive individual fish of each species were stunned head-first for a period of 0.5 - 1 sec. in order to show that consciousness was lost immediately (i.e. within 1 sec). In addition, 10 fish of each species were stunned for 15 sec. and then gutted or bled and chilled in ice water so as to show that stunning would be effective during that normal processing under on-board conditions, i.e. would allow killing without fish regaining consciousness. Unconsciousness and nociceptive responses were measured with EEG, ECG and behavioural parameters for 5 minutes after each stun. All fish showed an immediate epileptiform insult, and hence unconsciousness, following the application of the electrical current. Except for one fish all individuals recovered from the brief (0.5-1sec) stun. Behavioural recovery followed EEG recovery in both species, suggesting that behaviourally quiescent fish may be capable of experiencing pain.

When common dab and European plaice were subjected to a 15 sec stunning duration consciousness was lost for at least 5 minutes. This is considered sufficient to for normal on-board slaughter processing. Therefore, common dab and European plaice can be slaughtered humanely using electrical stunning.



THE VALIDITY OF PARAMETERS CURRENTLY TAKEN TO BE INDICATORS OF SENTIENCE

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Determining whether non-human animals are aware and have the capacity for sentience is a difficult task. Yet, with a greater understanding of both brain and behaviour in a growing number of animals we now appear to be closer at being able to peer inside the mind of an animal and interpret what it is experiencing. Some would argue that we can already do this; see the growing number of publications that use assays of cognitive bias, successive negative contrast and anhedonia as measures of affective state in animals. Other studies have used paradigms such as trace conditioning to infer awareness. But whether these approaches truly get at sentience in animals is still debated. Careful design of experiments is essential, as some of the cognitive bias work has already shown. Careful interpretation of results is also needed, what, for example, should we make of honey bees that have a negative cognitive bias? In this presentation, I will consider the validity of currently used indicators of sentience, and I will suggest a framework that describes key neural and behavioural components needed for animals to be aware. As with many aspects of animal behaviour, it is unlikely that there will be a single solution. Rather we should expect to take a comparative approach that will allow us to combine information on brain and behavior *and* take into account the animal's natural history. Finally, I will reflect on a central aspect that concerns us with respect to animal welfare, an animal's capacity to suffer, and will consider whether we need to demonstrate sentience in order to quantify suffering.



CONDITIONED AVERSION TO THE RODENT EUTHANASIA AGENTS CARBON DIOXIDE, ARGON AND ISOFLURANE - IMPLICATIONS FOR ANIMAL WELFARE

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There is on-going debate about whether inhalation agents used to kill laboratory rodents are humane. Carbon dioxide (CO₂), the most common agent, is often claimed to cause distress. Several alternative techniques are suggested to be more humane, including anaesthetic (Isoflurane) premedication and inert gas (argon/nitrogen) exposure. New European legislation permits the use of these alternatives, yet it remains unclear whether such techniques are more humane than CO₂. In approach-avoidance studies, where animals have a free choice to escape, rodents avoid CO₂, but also avoid Isoflurane and argon, which suggests all are aversive. Because euthanasia occurs in a situation where escape is impossible, it is often assumed that aversion translates into distress, an alternative view suggests that such studies overestimate aversiveness and may reflect, for instance, neophobia rather than true distress.

To confirm whether euthanasia agents cause negative affective responses and to assess which agents are most humane we employed conditioned place aversion (CPA). CPA is measured in the absence of the unconditioned stimulus (UCS), relying on memory, and therefore likely represents affective responses to the UCS. We measured the ability of argon, Isoflurane, and CO₂ to induce CPA in Lister-hooded rats (*Rattus norvegicus*). Animals (n=10/agent) were exposed for 90s to Isoflurane (5% in a flow of 20% of the chamber volume/minute O₂), argon (>90%) or CO₂ (20% of chamber volume/min) in one chamber and to an equivalent air-flow in a second chamber which was made distinctive with visual and tactile cues. After six conditioning exposures each to stimulus and control, animals were allowed to move between the chambers and their chamber preference measured. All agents caused significant CPA, with argon causing the greatest and CO₂ the least. To compare the relative aversiveness of the most and least aversive agents directly, in a second experiment we paired one chamber with argon and one with CO₂ for each rat (n=10). In this case there was a significant shift in preference towards the CO₂-paired chamber, confirming that argon caused stronger CPA than CO₂. Finally, argon's ability to induce CPA following a single exposure was examined. Although much weaker, even a single exposure caused CPA.

These data suggest that none of the agents are entirely humane. However, argon appears to be significantly more aversive than CO₂, suggesting that this agent causes a stronger negative affective response and should not be considered a more humane alternative for killing laboratory rats.

Supported by UFAW and NC3Rs.



**METHODS TO IMPROVE THE WELFARE OF WORKING EQUINES THROUGH
DECREASE IN PREVALENCE AND SEVERITY OF LIP LESIONS IN MARDAN,
PAKISTAN**

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There are 4.7 million equines in Pakistan the majority of which are used to transport goods (TGC) and people (TPC) by cart. In 2008, a welfare assessment survey identified work related lip lesions as a serious equine welfare concern in Pakistan. Lip lesions are open wounds at the commissure of the lip that are thought to develop due to a range of factors including human (attitude/knowledge), bit (type), animal (breed and use), cart and associated equipment (fit and construction). This study aimed to investigate whether lip lesions could be reduced by independently addressing two of the risk factors, 'human' and 'bit'. A community participation and education scheme (preventative measures, harness and cart maintenance, equine management and husbandry) was established to address the 'human' factor (study 1:S1), whilst the use of a straight bar bit for a period of 8 weeks was used to address the 'bit' factor (study 2:S2). In the case of S1 standardised welfare assessments were carried out on 18 donkeys at the start and end (6 months) of the study, and for S2 standardised welfare assessments were carried out on 25 donkeys at the start and then at two weekly intervals until 8 weeks to determine the prevalence, size (cm²) and severity of lip lesions within this area. In all cases lip lesion size was recorded for both sides of the mouth. Prevalence of superficial (skin broken) lip lesions reduced from 100% to 84% (S1) and 62% (S2). Deep lip lesions (structural damage) were no longer visible following both interventions despite being at a prevalence of between 20-30% prior to the start of both studies. Size of lip lesions were significantly reduced (mean±SD) from 2.9±0.42 to 1.5±0.41 (right hand side; p<0.0001) and from 2.7±0.4 to 1.3±0.5 (left hand side; p=0.0005) (cm) for S1 and from 3.2±0.6 to 0.9±0.5 (right hand side; p<0.0001) and from 3.2±0.5 to 0.9±0.4 (left hand side; p<0.0001) (cm²) for S2. Severity of lip lesions also decreased from 60% to 10% (S1) and 22% (S2) for 'skin broken' lesions, whereas deep lesions decreased to 0% in both cases. This study demonstrates that a measurable improvement in the prevalence, size and severity of lip lesions can be obtained via education or implementation of straight bar bits. We recommend that the results of this study are communicated to equine owners and that they are engaged in participatory approaches to determine which method they believe is likely to be sustainable over time.



SHORT-TERM FASTING AND WELFARE PRIOR TO SLAUGHTER IN RAINBOW TROUT, *ONCORHYNCHUS MYKISS*

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Fasting fish before slaughter is a common practise in aquaculture but it is not clear how long rainbow trout can be starved before suffering unnecessary stress, nor at what moment of the day slaughter is least stressful. We fasted 90 rainbow trout (*Oncorhynchus mykiss*; initial average weight 215.0 ± 22.6 g) for 24, 48 and 72 hours (19.5, 38.8 and 58.0 °C days) and slaughtered them in the morning (08h00), afternoon (14h00) and at night (20h00) to observe the effect of fasting duration and slaughter time on welfare indicators, including plasma cortisol, glucose and lactate concentrations as well as hematocrit and leucocyte count. The values of the fasted fish were compared with 90 control fish kept under similar conditions but not fasted. Body weight was not significantly different between fasted fish and controls during the trial, but body condition coefficient (live weight/length³) was higher in fed fish. The relative weight of the gut was higher in control trout after 24 of fasting, indicating that the gut had emptied after 24 h. Cortisol levels were similar between fasted and control fish but lowest in fish slaughtered at 20h00. However, glucose and lactate concentrations in plasma were similar. Hematocrit values were also normal and similar between fasted fish and controls throughout the experiment, but leucocyte count was significantly lower in fasted fish by day three. These results suggest that rainbow trout can cope with fasting up to three days (58.0 °C days) prior to slaughter and that their welfare is not seriously compromised. Slaughtering at night, when cortisol levels are lower, may help to avoid excessive stress.



THE EFFECT OF FOOD LOCATION, HEAT LOAD AND STRESS ON DAIRY COWS' BRUSHING ACTIVITY

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Animals allocate time and effort to a range of core (e.g sleeping, feeding, drinking) and 'luxury' (e.g playing, exploring) activities. As luxury activities are secondary to core activities in their importance for survival, we hypothesize that luxury activities will be inversely correlated with the effort allocated to conduct it, moreover at times of internal or external stress. One seemingly luxury activity available to cows in an increasing number of dairy farms is scrubbing against an automated scrubbing brush. Despite the increasing popularity of such brushes, there is hardly any data on factors influencing cows' brush usage nor any documentation on reduced usage of the device at time of stress and morbidity. Such knowledge may be of high importance both for proper installation of the brush and for utilizing changes in brush usage to detect morbidity or stressful events. This study was aimed at examining the correlation of brush usage with distance from food, heat load and a stressful manipulation in the form of a vaginal examination. We show that brush usage decreases when food is located distantly from the brush, at high temperature and humidity levels (THI) and after stressful manipulation. We conclude that the results of the study support the suggested hypothesis. These findings imply that changes in brush usage may be utilized to detect morbidity or stressful events. Further research should be conducted in order to assess the sensitivity and specificity of this suggested tool.



ASSESSMENT OF WELFARE AND HEALTH OF DAIRY COWS UNDER DIFFERENT HOUSING AND MANAGEMENT SYSTEMS

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The concept of animal welfare is not established in Egypt till now which may be related to level of education, culture, economic status and priorities of cattle breeders and society, so this study was conducted in six different dairy farms in Beni-Suef Governorate which are representing the most prevalent systems of housing and management adopted in Egypt to assess the welfare and health of dairy cows kept in these systems: (1) tie stall barn with daily access to an outside shaded area in tying position associated with hand milking twice daily; (2) loose housing in partially sheltered and fenced yards all the year round associated with portable machine milking twice daily; (3) loose housing in partially sheltered and fenced yards with regular access to grazing in cultivated lands during the day time associated with portable machine milking twice daily; (4) loose housing in partially sheltered and fenced yards throughout the year associated with three times daily milking in a parlour system; (5) free stall barn with daily access to partially sheltered and fenced yards during the day time associated with three times daily milking in a parlour system. Each farm was visited three times by the authors over a period of one year. All cows in the examined farms were observed for lying and standing up behaviour as indicators for cow comfort. Moreover, cows were examined for lameness, skin alterations at the knee and hock joints and rest of the body, teat injuries, cleanliness of the hind legs and udder, and body condition score. The results revealed that no restriction for lying and/or standing up behaviour was observed in all systems indicating that cow comfort was achieved. The prevalence of lameness was higher in loose housing system on earthy floor (0.9, 15.4 and 5.4 %). Tie stall system had a higher prevalence of teat injuries (15.8 %) than other systems. High degree of dirtiness of hind legs (90.5, 89 and 99.2 %) and udder (91.4, 91.6 and 100 %) was found in loose housing system associated with increased dampness of the floor and lack of cleanliness of cows. The prevalence of skin alterations at the knee and hock joints was higher in cows kept in tie (4.7 and 11.9 %) or free (7.5 and 0 %) stall barn on concrete floor.



ARE THE ANAESTHETICS USED FOR FISH AVERSIVE?

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This study addresses a fundamental question in fish welfare: are the anaesthetics we use for fish aversive? Despite years of general use of many agents, there is a paucity of information regarding the tolerance and responses to these agents by fish. Anecdotal evidence from a variety of sources would suggest that some degree of aversion is observed when fish are exposed to a range of anaesthetic agents. However this area has yet to be formally assessed. Being able to avoid clearly aversive agents would be of great benefit not only to the investigators not wishing to impose additional stresses in their laboratory studies, but also for the general welfare of fish that may be routinely anaesthetised outside of studies. Routine husbandry practice such as collection of gametes, ease of handling, and termination can all require humane anaesthesia. Often the choice of agent is based on previous habit, availability and cost. Aversion and efficacy are secondary selection criteria for many.

We have examined several known fish anaesthetic agents including those most commonly used both in academia and industry (MS222, Benzocaine, 2-Phenoxyethanol), and performed preference/aversion tests for adult zebrafish (*Danio rerio*) the most commonly held laboratory fish. Quantification of the results was via movement tracking software for the aversion of anaesthetic at 50 % of a standard anaesthetic dose compared to clean water in a flow through chemotactic choice chamber.

Aversive behaviours might typically include rapid swimming, jumping, coughing, and increased ventilation. Some or all of these have been associated with fish anaesthesia in the literature. Our study of the more soluble agents at a relatively low (sub-anaesthetic) dose have revealed a wide range of responses and chemotactic choice. Our work to assess if these observations hold is important for the recommendation of the preferred choice of agent for zebrafish. Whether this is general for all species, life stage or just adult zebrafish remains to be determined.



CONSTRAINTS FOR THE ADOPTION OF ALTERNATIVE METHODS FOR RABIES DIAGNOSIS

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The use of laboratory animals is common practice but is also a source of increasing public concern. Some types of animal use may be replaced using *in vitro* methods, such as Cell Culture (CC) instead of the Mouse Inoculation Test (MIT) for rabies diagnosis. Our objective was to describe the use of the MIT and alternative methods for rabies diagnosis in Brazil and other countries, and identify barriers to replacing *in vivo* diagnostic tests. Between 2011 and 2012, 484 people working with rabies diagnosis in different countries were invited to participate in an online forum called “Your Views on the Use of Animals for Rabies Diagnosis”. Twelve Brazilians and 43 non-Brazilians replied. Non-Brazilians were from United States (6), Canada (5), India (4), South Africa (3), Italy (3), and other 22 countries. Nine (75%) Brazilian and 14 (32%) non-Brazilian respondents indicated that they used the MIT. People were asked to explain why they used their method of choice; their comments were then classified as either for or against the use of alternative methods. Thirty-nine percent of the comments from Brazilians and 80% from non-Brazilians expressed support to the use of alternative methods. Both Brazilian and non-Brazilian respondents described barriers to the implementation of alternative methods; the perceived barriers included high cost to implement CC, lack of structure, equipment or materials in the laboratories, lack of qualified staff, resistance to change, regulatory barriers and lack of incentive by the government. The lack of constraints to replace the use of animals was mentioned by six non-Brazilian and none of the Brazilian respondents; this might indicate that the Brazilian participants perceive more difficulties in pursuing this change. This perception may be related to resistance to change, conflicting with Brazilian law and the Brazilian Health Ministry recommendations. Results suggest that most Brazilian laboratories are using the MIT, and that understanding the barriers to adopting CC may facilitate change in Brazil and elsewhere around the world.



PROGRESS IN, THE PRESENT STATE OF, AND CHALLENGES FOR ON-FARM ANIMAL WELFARE ASSESSMENTS IN EUROPE

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Animal welfare is of multi-dimensional nature, and its assessment should be based on a variety of measures. Traditionally, farm animal welfare assessment has focused on 'inputs' such as resources and management practices provided to the animals. Especially during the last decade, however, the use of animal-based 'outcome' measures has been advocated since they are considered to directly reflect the animals' state and experience. Considerable efforts have been made and are still being made to develop such mainly animal-based assessment schemes for different farm animal species (e.g. Welfare Quality®, Bristol Welfare Assurance Programme, AWIN). Comprehensive, scientifically sound (i.e. at least valid as judged by experts) assessment protocols are thus available. Ongoing experimental research will further contribute to the construct validation of current and the development of novel measures. However, the question remains, how the existing protocols may be applied in real world on-farm assessment. Potential applications include farm assurance, legislative and/or voluntary certification, use as a farm management tool or research with the different uses partially requiring different approaches. The main challenges for large scale application are: 1) Time needed for the assessment and selection of measures. Farm assurance schemes may want to target key welfare indicators which are often disease-related thus only requiring a limited amount of time. On the other hand, certification for labelling purposes in terms of 'overall welfare' will have to consider also behavioural measures which inevitably are more time consuming. Reducing the time needed for the assessment whilst fulfilling the claim of an comprehensive assessment system remains a challenge. Potential approaches include the automation of animal-based measurements, increased use of already existing data/records or self-assessment by the farmers. 2) Reliability and training issues. Sufficient reliability in terms of e.g. inter-assessor agreement is fundamental, but often requires extensive training. In a commercial setting, certification of assessors who have to achieve a pre-defined level of agreement may be a way forward. 3) Definition of thresholds and/or the aggregation of information into overall scores. Information at the single measures level may be useful for farm management or farm assurance purposes but at least the latter requires setting thresholds for acceptable levels. However, especially labelling purposes require a certain level of aggregation into an overall score. Approaches such as proposed by the Welfare Quality® protocols will have to be scrutinized e.g. with regard to sensitivity.



A REVIEW OF GERMAN ANIMAL RESEARCH APPLICATIONS FROM 2010 TO ASSESS THE APPROPRIATENESS OF THE METHODS BEING USED TO KILL LABORATORY RODENTS

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By the 1st of January 2013, Directive (2010/63/EU), the single most important new EU regulation on the protection of animals used for scientific purposes, is to become part of national law, thereby requiring all EU member states to fully implement the Principle of the 3Rs. This will mean refining the methods used in laboratory procedures, and eliminating or reducing to a minimum any possible pain, suffering, distress or lasting harm caused to animals in the course of scientific research (Article 4 of the new Directive).

In order to assess the current situation in Germany with regard to one of the 3Rs, Refinement, biomedical and animal research applications performed all over Germany in 2010 were examined in a comprehensive assessment of the refinement methods commonly used in laboratories, with special attention to the techniques and methods being employed in reducing animal pain, suffering, and lasting harm. The main foci of the analysis of these data are the anaesthetic and analgesic regimens, humane endpoints and killing methods. The study is limited to rats and mice as these are the two most frequently used species in Germany and elsewhere in the world. The findings of the analysis have been anonymised, that is, the individual research groups have not been identified. The project aims to pinpoint where further refinements can be made.

EU Member States are required to guarantee that animals are killed with minimum pain, suffering and distress (Article 6 of Directive 2010/63/EU). Consequently, current trends in the use of various killing methods of rodents will be presented and evaluated with regard to the degree of pain or distress they might cause and with regard to the researchers' justification of their use. Where more humane alternatives are available, these will be highlighted. In addition, the appropriateness of the different methods of killing mice and rats as set out in Annex IV of Directive 2010/63/EU will be discussed.

Despite potentially causing pain and distress carbon dioxide is still the most commonly used euthanasia agent for rodents in Germany. Improvements have been made by changing protocols. However, in many research settings more humane alternatives would be available and will be highlighted. Cervical dislocation and decapitation with and without prior anaesthesia as well as injectable anaesthetics (barbiturates) and inhalant anaesthetics (most commonly isoflurane) are frequently used. Less often agents such as ether, chloral hydrate or chloroform are still used to kill rodents.



BEHAVIOUR, HEALTH AND WELFARE ISSUES IN MANAGING GROUP-HOUSED LAYING HENS

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Maintaining good welfare in large flocks of commercial laying hens is a management challenge. Since the ban in 2012 within the EC of keeping hens in ‘conventional’ cages, many producers have turned to group housed (floor) systems instead of furnished cages.

This paper considers some of the behaviour and health challenges faced by egg producers and possible mitigation strategies to improve hen welfare on farm. It summarises findings from several recent projects, principally at this laboratory.

Two main behavioural problems lead to reduced performance and are principal causes of mortality. After reviewing evidence-based risk factors for injurious pecking (IP), we have trialled their application on farm, finding improvements in plumage, reduced mortality and decreased rates of pecking behaviour proportionate to the number of management strategies utilised (Lambton et al, 2013). Measures taken to improve the quality of and access to litter are of key importance. Panic flights which can result in smothering, may be localised disturbances (85% of all outbreaks) or spread to most of the flock (Richards et al, 2012). These authors attributed over a quarter of whole flock panics to unusual behaviour by stockmen and suggested spending more time with pullets to habituate them to human activity.

Mean levels of mortality in group-housed systems are more than double those reported for flocks kept in cages (e.g. Weeks et al, 2012). There is evidence correlating increased health problems with inexperience of new poultry husbandry systems (Fossum et al 2009). Our recent studies indicate that improvements to health and reductions in mortality could be achieved by greater attention to biosecurity, to managing the range and by spending more time with pullets in rear and during the first few weeks of lay to reduce levels of fear and to establish normal patterns of behaviour.

References

- Fossum O Jansson D S Etterlinm P E Vågsholm I (2009) Cause of mortality in laying hens in different housing systems in 2001 to 2004. *Acta Veterinaria Scandinavica* 51: no 3, 9pp
- Lambton, S L Nicol C J McKinstry J L Friel M Walton J Sherwin C M Main D C J Weeks C A 2013 *Veterinary Record*, 17, 423. <http://dx.doi.org/10.1136/vr.101067>
- Richards G J Brown S N Booth F Toscano M J Wilkins L J 2012 Panic in free-range laying hens. *Veterinary Record*, 171, 474. <http://dx.doi.org/10.1136/vr.100685>
- Weeks C A Brown S N Richards G J Wilkins L J Knowles T G 2012 Levels of mortality in hens by end of lay on farm and in transit to slaughter in Great Britain. *Veterinary Record*, 170, 647. <http://dx.doi.org/10.1136/vr.100728>

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CAN RELEASE OF ANIMALS TO THE WILD BE COMPATIBLE WITH GOOD WELFARE AND GOOD CONSERVATION PRACTICE?

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Wildlife rescue, rehabilitation and release are practiced all round the world, as a welfare response to individual animal casualties, and are more commonly being incorporated as a tool in the conservation of threatened populations. Yet they are not without critics:

‘There has been a greatly increased interest in, and popular support for... the rescue, treatment and rehabilitation of wild animal casualties. However, intervention can adversely affect welfare in several ways. Firstly the stresses of capture from the wild, hospitalization, treatment and release are hard to assess but may be substantial. Secondly measures aimed at preserving life may in fact result in prolonging pain and stress. Thirdly the process may adversely impact on the welfare of other animals....’ (Kirkwood and Sainsbury, 1996).

Can release of casualty animals to the wild be compatible with good welfare and good conservation practice? Our responsibility to a rescued animal does not cease until the animal is surviving successfully back in the wild. The monitoring of wildlife post release is perhaps the most neglected part of the rehabilitation process; it is difficult and expensive to do. Yet it is an essential component of the rehabilitation process and can help to answer some aspects this important question.

We present post release monitoring data from different rescue, rehabilitation and release projects around the world. Data demonstrate:

- how monitoring has demonstrated high mortality post release which has been improved by altered rehabilitation methods in Asiatic black bears in India
- the selection of natural diets and the development of denning ability in released grizzly bears in Canada
- how habitat selection techniques for release sites for star tortoises in India can maximize post release survival
- rehabilitation and translocation have been used to reintroduce Indian one horned rhinoceros following local extirpation
- how monitoring can change preconceived attitudes to survivability in common dolphins on the eastern seaboard of the US.

Although there are still questions to answer, these results support the view that animals returned to the wild can survive and exhibit normal behavior. They also demonstrate the importance of post release monitoring to maximize the welfare and conservation value of rescue and rehabilitation projects.



FERAL AND STRAY DOGS ARE AN EMERGING THREAT FOR WILDLIFE CONSERVATION IN CHILE

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Feral and free-ranging stray dogs are increasingly abundant in rural areas of Chile, and pose an emerging and ubiquitous threat to diverse natural ecosystems. As an example, outbreaks of domestic dog diseases and attacks have been detected in the three species of native foxes (*L. culpaeus*, *L. fulvipes* and *L. chilla*), which are all in decline. Policies that would protect wildlife from canid-borne diseases and their wider ecological impacts have been legally challenged in Chile, preventing by law effective practices to manage the problem of stray dogs. Protected areas are regularly visited by feral dogs and some parks are home to breeding populations. A multi-ecosystem monitoring survey and a national search of published predation events have been uploaded into our wildlife observation data platform (www.liveandes.org) allowing us better to estimate the impact and range of the problem. Our results confirm that feral and stray dogs are present in protected areas of desert, coastal, mediterranean, andean and temperate rainforests of Chile, affecting directly protected, endemic taxa, including deer, camelids, foxes, flamingoes, penguins, aquatic birds and sealions. Offshore islands are also heavily affected by feral dogs, making this truly a nationwide problem.

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OBJECTIVITY IN ASSESSMENT OF WELFARE COSTS OF WILDLIFE MANAGEMENT TECHNIQUES

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Domestic animal welfare scientists may be asked and give their opinions on wild animal welfare despite limited transferability of knowledge between domestic and wild animals. In these situations, that are often very emotive, it is important to prevent subjective feelings influencing these opinions. In this talk I will present data that have been collected during work on several welfare assessment projects that indicate different outcomes than may be predicted., Cage traps used in one context where they cause a significant proportion (80%) of escape behaviour are thought of as acceptable, but in another context where a much lower (20%) proportion of escape behaviour was observed are generally thought of as unacceptable. In another example one design of live capture device that causes more escape behaviour is generally believed to be the best option for the animal from a welfare perspective.

Another common misconception based on scientist's experience of domestic animal welfare is that in any assessment of killing techniques, the minimum duration of pain is always the best option. The example of shooting will be presented to illustrate that this approach does not always equate to the most humane choice for unrestrained animals in the wild.



APPLICATION OF COMPUTER SIMULATION MODELS FOR RATING TRAPS AGAINST HUMANE TRAPPING STANDARDS

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Worldwide population expansion and increased industrial development has led to more human-wildlife conflict in both urban and rural settings. This requires adaptive wildlife management, of which trapping can play an important role. Animal trapping is done in virtually every country in the world for conservation, wildlife management, pest control, and to obtain fur, skin, or meat. The Agreement on International Humane Trapping Standards (AIHTS) was signed in 1997 by the European Union, the Russian Federation and Canada to ensure a sufficient level of welfare for trapped animals. The mandatory Treaty came into full force in 2008. The United States signed a separate, but similar bilateral agreement with the European Union. The AIHTS applies to both killing and restraining traps for 19 listed species. Only traps certified as meeting the welfare thresholds of the AIHTS are allowed for use in Canada. The Fur Institute of Canada (FIC) is responsible for coordinating the implementation of the AIHTS on behalf of Canada. Since 1995, Alberta Innovates – Technology Futures has worked with the FIC on the development of computer simulation models for evaluating traps against the requirements of the AIHTS. These models were developed from a large database of historical information and are a scientifically valid and accurate alternative to animal-based testing. Models have been built for rating killing traps for 8 species listed on the AIHTS, including beaver (*Castor canadensis*), ermine (*Mustela ermine*), fisher (*Martes pennant*), lynx (*Lynx canadensis*), marten (*Martes americana*), muskrat (*Ondatra zibethicus*), otter (*Lutra canadensis*), and raccoon (*Procyon lotor*). To date, these models have made it unnecessary to capture, transport, house and use in tests over 1,500 animals and have resulted in a savings of over \$4.3 million.



THE INTERACTION BETWEEN GENETIC DIVERSITY AND ANIMAL WELFARE

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In this review the interaction between animal welfare and genetic diversity will be explored. Traditionally, research in conservation science, and specifically on conservation genetics, has been carried out taking into account the impending need of preserving natural resources. Although the conclusions and recommendations of these studies are clear; an aspect usually not addressed by them is the impact that the loss of genetic diversity exerts on the welfare of animal populations. Currently, both wildlife and domestic animals are experiencing declines on genetic diversity. For example, in livestock, with the increase in consumer demand of agricultural and fisheries products, many of the breeds of productive species have been artificially selected into a few highly specialised breeds. This has usually been achieved by fixing desirable characteristics over several generations, and breeding out those considered undesirable. As consequence there has been a significant loss on allelic richness, not only on those selected genes but in the whole genome. Additionally, this practice has had an impact on the prevalence of traditional breeds; many of them are in danger of becoming extinct and therefore there has been reported elsewhere a reduction on genetic resources globally. A similar situation has arisen in companion animals. Breed standards are sometimes so strict that inbreeding animals to fix desired traits has become the norm. Wildlife is no exception. Increasing demands for land to accommodate agricultural practices and other environmental issues has produced the fragmentation and decline of natural populations of wildlife. Even within captive wildlife populations the loss of genetic diversity is apparent. Genetic diversity has been described as the clay of evolution. Not only plays a central role on the adaptation and survivability of species, but also on fundamental traits, like reproduction success and resistance to diseases, that have serious consequences for animal welfare. It is therefore important to consider, as a worldwide priority, the impact on animal welfare due to the decline on genetic diversity.



THE WELFARE OF FREE-LIVING ELEPHANTS AS THEIR HABITAT SHRINKS

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Sri Lanka is considered as one of the major “biodiversity hot spots” in the world. More than 20 million people and around 6000 free ranging elephants live on this small island of 65,610 km². Sri Lanka holds an important position with regard to Asian elephant conservation. Well over 10% of the global Asian elephant population in less than 2% of elephant range makes Sri Lanka the range country with the highest density of elephants. Elephants occupy a prominent place in Lankan culture and popular religions: Buddhism and Hinduism. Elephants in Sri Lanka are protected under the Fauna and Flora Protection Ordinance and make harming the life of an elephant illegal under any circumstances.

The human/elephant conflict has a long history in Sri Lanka. However, in the past each party tolerated one another, as the human density was low, and elephants were dispersed throughout the country. Hence, there was no intense competition between the two for the resources of the land. However, with the shrinking habitat of elephants and invading of natural forest by people, the conflict is now at a critical stage. The forest cover of Sri Lanka has declined from about 80 percent to 20 percent in the past century. Currently thirteen percent of land in Sri Lanka has declared as wildlife protected areas and elephants live both in and outside the protected areas.

Every year, about 200 elephants die due to this conflict and every month around twelve animals are treated for serious injuries. The death toll to humans of this conflict exceeds fifty each year and an equal number get seriously injured. The costs of damages to homes and crops run into millions of US Dollars. Elephants are injured in many ways: from firearms, accidents while crossing railway tracks and public roads, contact with live high-voltage lines, falling into drains, gem pits, and irrigation wells, strong fire crackers, explosives, traps set for deer and wild boar as well as poisoned food. During the civil war in Sri Lanka that spanned nearly thirty years, elephants suffered badly due to gun fire and land mines. Apart from the above insults, elephants are frequently disturbed by timber merchants, hunters, cannabis cultivators, liquor producers, gem miners and sand dealers, wildlife tourists as well as domestic livestock.

All the available data and observations create a grave picture concerning the elephants, which live in fear and danger. The majority of them are restricted to fragmented forests with no freedom to roam and eat a variety of seasonal fodder. Living in fear, doubt, tension and eating an unbalanced diet makes them physically weak and vulnerable to diseases. Under these circumstances there is the possibility that thousands of elephants will die due to an epidemic within a short period of time. In the worst situation, conditions could lead to the total extinction of the species from Sri Lanka.



**UNDERSTANDING THE INDIVIDUAL IN WILDLIFE CONSERVATION:
HOW PERSONALITY TYPE AFFECTS TRANSLOCATION SUCCESS IN AN
ENDANGERED SPECIES OF DESERT RODENT (*DIPodomys STEPHENSI*)**

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Translocations, movement of wild-captured animals to other natural locations, are a key management practice for many at-risk species. Most translocation attempts, however, have been unsuccessful in establishing self-sustaining populations. Historically, post-translocation mortality is high and highest during the initial days to weeks after release as animals confront their novel environments. Such a mortality rate is likely because the stressors characteristic of typical translocations strain the coping mechanisms an animal uses to survive in the wild. Current theory suggests that these stressors differentially affect individuals in a population because of personality type; the few studies that have explored physiological and behavioral effects bear this out.

To this end, I investigated personality composition in a translocated population of the endangered kangaroo rat, *Dipodomys stephensi*. *D. stephensi* is a nocturnal, granivorous heteromyid rodent; it is a keystone species native to open grasslands of southern California. The U.S. Fish and Wildlife Service federally listed this species as endangered in 1988. Until 2008, no confirmed populations of *D. stephensi* had been successfully established via translocation.

Principal components analysis indicates a range of personality types along an axis of behavioural plasticity. These types are predictive of cortisol levels during translocation. Moreover, kangaroo rats that survived one-year post-release exhibited greater adaptive behaviours and smaller changes in cortisol during temporary holding, prior to translocation. Thus, knowledge of how certain personality types respond to potential stressors should help increase survival as we are able to anticipate and reduce the negative impact of stressors on individuals.



RECENT RESEARCH ON THE USE OF SNARES IN FOX CONTROL

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The neck snare is considered a valuable tool in the management of wild canids, but has been criticised for causing poor welfare and having low selectivity. We review the current understanding of fox snare performance and the factors that influence it, using recent studies on the use of snares from the UK, Spain and the USA.

The difficulty of gathering data in an unbiased fashion has led to divergent perceptions of snare performance, but it is clear that huge variation in performance exists, related to snare design, environmental circumstances, and operating practices. While snares can be used deliberately to kill the captured animal, they can also be used to hold the animal alive. Used as restraining devices, wildlife biologists have found them efficient to catch canids for radio-tagging, with an acceptably low risk of causing injury or death. However, in wider use, cases of evidently poor humaneness continue to fuel the controversy, suggesting that there is insufficient standardisation of hardware and operating practices.

Recent studies, with captive animals and in the field, have shown that stopped snares used as restraining devices, and according to best practice guidelines, hold captured foxes with acceptably low risk of injury, as judged by international trap testing standards.

Equivalent risks for non-target species can be expressed in a variety of ways (e.g. per fox capture, per non-target capture, or per snare-night). The risk of capturing non-targets in the first place is strongly influenced by their relative density and by operating practices, and careful snare-design can greatly reduce the risk of non-target captures being retained. Thus non-target risks are best evaluated as a property of snaring for foxes, rather than snares per se. Recent field studies have been able to identify combinations of hardware design and operating practice that carry high risks of non-target captures, and of injury or death.

Fox snares are problematical for regulatory authorities. Because snares are minimalist devices, functionally important details are difficult to define in legislation. In any case, hardware design alone is insufficient to bring performance within accepted standards: operating practice must also be addressed. A difficulty here has been correctly identifying and targeting the main user groups, and then promoting uptake of best practice through a combination of education and regulation. The recent improvement in evidence is expected to increase the persuasiveness of best practice guidelines and of training.



UNINTENDED CONSEQUENCES FOR SLAUGHTER HORSE WELFARE IN THE UNITED STATES AND EUROPEAN UNION

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The slaughter of horses for export and eventual consumption by humans was an ideal target for activists in the US because the meat was not consumed in the US, and the industry did nothing to position themselves as responsible stewards of unwanted horses. The welfare of slaughter horses was an emotional issue in the US for many years. A progressive set of US regulations that were based on research and input from a series of meetings with stakeholders went into effect in February, 2002. Upon arrival at the slaughter plants, each load of horses was inspected by three independent people, two with jurisdiction over animal welfare and one who verified animals were not stolen. This was the most highly regulated trade in livestock to exist in the US. Despite the predictions by experts that closing the US slaughter plants would make conditions worse for US horses, increasing pressure by well-intended animal activists caused the closing of the last of the slaughter plants in 2007. Comparing 2005 with 2008, the number of US horses exported to Mexico for slaughter increased 725%, while the number exported to Canada increased 318%. The total number of horses being slaughtered has gradually increased, but the horses are now being transported an additional 18 hours after crossing into Mexico without the benefit of the US regulations. The U.S. Government Accountability Office investigated and issued a report in 2011 that urged Congress to reconsider its position because of the unintended consequences on the welfare of horses. Although Congress reversed itself, no US plants have opened due to pressure from activists. Similarly, the European Union Council Regulation 1/2005 was intended to improve the welfare of European horses destined for slaughter. However, the provisions for transport in individual stalls and 24-hour long rest periods after 24 hours of transport are having unintended negative consequences for the welfare of EU horses. Although equine protection groups in the EU (World Horse Welfare in particular) have been attempting to get Council Regulation 1/2005 revised in 2008 and 2011, the EU Council recently announced it would not consider revisiting that regulation for the time being.



SHORT MUZZLE; SHORT OF BREATH? AN INVESTIGATION OF THE EFFECT OF CONFORMATION ON THE RISK OF BRACHYCEPHALIC OBSTRUCTIVE AIRWAY SYNDROME (BOAS) IN DOMESTIC DOGS

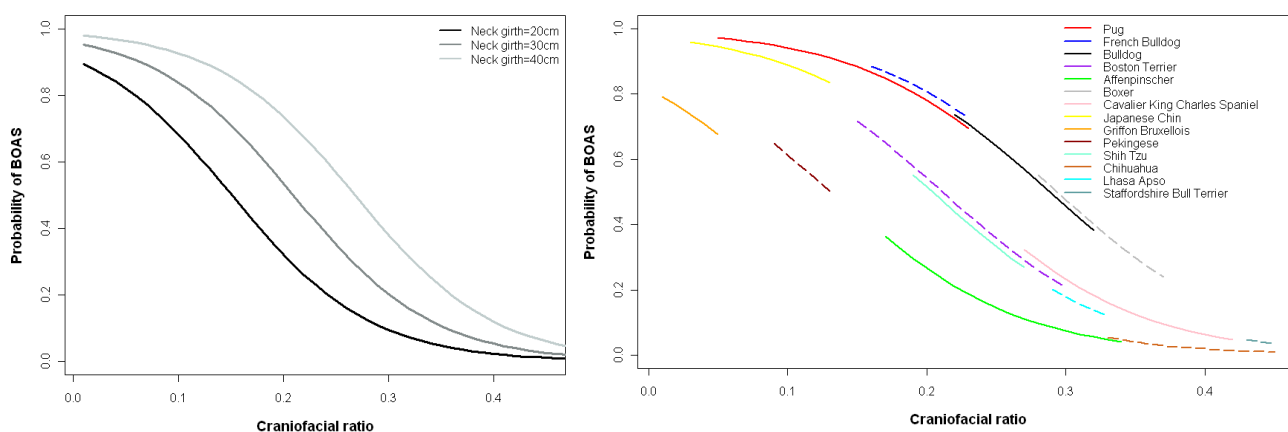
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Brachycephalic (short-muzzled) dogs are internationally popular, with the Bulldog the 6th most registered breed in the US, and the Pug 9th in the UK. Extreme brachycephalic conformations are encouraged through the qualitative breed standards of several breeds. A recent study found brachycephalic dogs to have 38-times the risk of Brachycephalic Obstructive Airway Syndrome (BOAS) than non-brachycephalic dogs. BOAS describes a disorder of the upper airway characterised by respiratory distress, abnormal respiratory noise, exercise intolerance, overheating and collapse. BOAS arises due to selection for a foreshortened facial skeleton, without reduction of the associated soft tissue structures, resulting in redundant soft tissue within the nose and throat, causing increased airway resistance and obstruction. Specific abnormalities include narrowed nostrils and an elongated soft palate. We hypothesise that exaggerated brachycephalic morphologies are at higher risk of BOAS than more moderate conformations.

To investigate the relationship between craniofacial and body conformation with BOAS, a cross-sectional study of dogs seen at the Royal Veterinary College was carried out. Using established protocols, 700 dogs were measured on 13 breed-defining bodily dimensions and their body condition score (BCS) assessed. Muzzle length and cranial length, were used to calculate the craniofacial ratio (CFR). Seventy dogs were classed as 'affected' by BOAS either by internal airway assessment, or meeting diagnostic criteria based on their nostril morphology, and an owner reported breathing score of clinical signs. Using generalised linear mixed models, including breed as a random effect, CFR (OR: 0.0000001, SE: 2.06, $P < 0.001$) and neck girth (OR: 1.05, SE: 0.02, $p < 0.05$) were identified as risk factors.

As these data were derived from a referral hospital population, and thus subject to inherent selection biases, to increase the applicability of the estimates, a second sample of brachycephalic dogs from the general canine population (including rescue centres and show breeders) were recruited. The 'at-risk' morphology limit was identified as CFR: 0.49, from the longest-muzzled affected dog in the referral population. 154 dogs with $CFR < 0.5$ were recruited, with 59 dogs considered affected by BOAS following an assessment of their respiratory health by a surgical specialist using a standardised protocol. Repeated analysis identified four risk factors for BOAS; (1) CFR (OR: 0.0000002, SE: 3.83, $P < 0.001$); (2) neck girth (OR: 1.09, SE: 0.04, $P = 0.04$); (3) BCS (OR: 2.86, SE: 0.33, $P = 0.001$) and (4) neuter status (OR: 5.66, SE: 0.70, $P = 0.01$). No effects of age, sex or other morphometric measures were found.



These results indicate that muzzle length scales with BOAS risk, with dogs exhibiting shorter muzzles at higher risk. In addition, breeding dogs for 'thick' necks as dictated in breed standards, and keeping dogs at a higher than optimal BCS puts dogs at further risk. This study provides evidence that breeding for all degrees of brachycephaly leads to an increased risk of BOAS in dogs, with risk increasing as morphology becomes more exaggerated. As such, breeders and buyers should be aware of this risk when selecting dogs, and breeding organisations should actively discourage exaggeration of this conformation in breed standards.



NON-INVASIVE STRESS ASSESSMENT IN A NEGLECTED GROUP: THE AMPHIBIA

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The African Clawed frog, *Xenopus laevis*, is an extremely widely used laboratory animal. Various husbandry guidelines have been developed towards appropriate care, but little consensus exists on the specificity of these, and virtually none are supported by adequate research data. We have developed an entirely non-invasive, no-contact method for corticosterone measurement, using the tank water surrounding amphibians. The quantification of stress steroids in the water presents an ideal welfare indicator in amphibians since it involves minimal disturbance and results are not modified by sampling stress. As a key part of this, a corticosterone assay has been recently validated, immunologically and biologically in our lab, for *Hymenochirus boettgeri* (a species related to *Xenopus laevis*). This can be valuably used to assess housing conditions and enrichment effects. Best practice husbandry guidelines for *X.laevis* recommend the use of enrichment although there is debate about its value, and very few studies have addressed this. We tested the hypothesis that corticosterone release varies with enrichment type in *H. boettgeri*. For this, 12 subjects were individually housed with one of three different types of enrichment (large inverted pot, 1/3 of tank shaded and small inverted pot) for three days, after which levels of corticosterone were quantified from the tank water. *H. boettgeri* individuals with no enrichment present released more corticosterone than those housed with enrichment, but this varied with enrichment type. Titres of corticosterone for animals with no enrichment present were significantly higher than those of animals in each of the three enrichment types [ANOVA, Tukey HSD: corticosterone values adjusted for body weight and log transformed; $F(3, 45) = 6.847$ $P < 0.001$; large inverted plastic pot $P < 0.001$; shaded $P < 0.037$; small inverted plastic pot $P < 0.006$]. Pilot behavioural data for these frogs was taken for the same period over which the corticosterone was measured. This showed that certain behaviours are exhibited significantly differently according to enrichment presence/type. For example 'resting bent' behaviour was significantly lower for all enrichments compared to control but 'swimming' behaviour was only significantly higher with the small inverted pot. This combined approach, directly collecting physiological and behavioural measures from the same animals at the same time, is novel for amphibians. We will be developing this work for *X.laevis*, with the aim of establishing consensual husbandry protocols for laboratory *X.laevis*.



DISTINGUISHING GENDERS BY VOICE WITHOUT CAPTURE AND HANDLING

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Zoo and wildlife management faces a problem of bird sexing, as many bird taxa lack any gender differences in size and coloration. The problematic groups are numerous and include geese, cranes, rallies, raptors, owls, parrots, doves, auks, shearwaters, and some passerines. Behavioural observations are unreliable, as many birds without external sex dimorphism often establish same-sex pairs, not differing by behaviour from heterosexual pairs. The widespread techniques, based on genetic, laparoscopy or cloacal inspection, need in capture followed by rather painful handling, that is at least unpleasant for birds. Moreover, in hands of inexperienced keepers these methods are unreliable and potentially traumatic for the birds, what is especially undesirable with rare species. This talk reviews own and literature data on an alternative non-invasive approach of bird sexing based on the structure of their calls. We focus mainly on species where one call per individual is already sufficient for 100% reliable sexing. In addition, we consider the cases when reliable sexing is possible by a sex-specific vocal displays or duet parties. In many cases the reliable sexing is possible just by ear (e.g. for white-faced whistling ducks *Dendrocygna viduata*, cranes *Grus japonensis* and *Grus vipio*, white-rumped munia *Lonchura striata*, yelkouan shearwaters *Puffinus yelkouan*, American coot *Fulica americana*, pukeko *Porphyrio porphyrio*). In some other cases, it would be necessary to record a call and to visualize it spectrogram using inexpensive acoustic equipment and free available software (e.g. whistling ducks *D. fulvus*, *D. autumnalis*, *D. arborea*, collared doves *Streptopelia decaocto*, orange-bellied fruit doves *Ptilinopus iozonus*, Mediterranean Cory's shearwater *Calonectris diomedea*, Leach's storm-petrels *Oceanodroma leucorhoa*, oriental white storks *Ciconia boyciana*). Of course, the bioacoustical sexing is restricted when birds are silent or call rarely. We propose a simple way to provoke vocalization using playbacks of calls available from sound libraries, what is especially actual when only a single or few birds of a given species are kept in an enclosure. We conclude that acoustic sexing may represent a feasible alternative to the classical invasive sexing techniques both in the wild and in zoo management practice.

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PAIN INDICATORS IN FISH: BEHAVIOURAL AND PHYSIOLOGICAL RESPONSES TO FIN-CLIPPING IN ZEBRAFISH

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Zebrafish (*Daniorerio*) are amenable models for developmental genetic, neurobiological, endocrinological, biomedical and pharmacological research, and their use is rapidly expanding, often being viewed as a replacement for mammalian models. Tissue samples for genetic analyses are obtained through fin clipping (surgical removal of part of the caudal fin) under anaesthesia but without the provision of analgesia. Recent studies have provided anatomical, neurophysiological and behavioural evidence for the capability of different species of fish (including zebrafish) to experience pain, and tail fin clipping has been shown to induce pain-associated responses in various fish species. Here, we examine for the first time the potential of fin clipping in zebrafish to be painful. We compare physiological parameters of respiratory rate and holding-water cortisol concentration in fin-clipped, anaesthetic-control and handling-control groups of zebrafish. We also examine swimming activity and occurrence of abnormal behaviours as potential behavioural indicators of pain, as well as anxiety-related behavioural responses in novel object and light-dark tests. Our results are important for pain monitoring in this common laboratory model and contribute to the future assessment of analgesia efficacy and refinement of fin-clipping procedures in order to improve animal welfare and scientific validity.



**SCIENTIFIC
PROGRAMME:**

Poster Abstracts



Posters:

¹ = Session 1 on 4th July from 13.20

² = Session 2 on 5th July from 13.15

- **Aguayo-Ulloa LA, GC Miranda-de la Lama, M Pascual-Alonso, JL Olleta, MM Campo, M Villarroel, M Pizarro and GA María** (Universities of Zaragoza and Polytechnic University of Madrid; Spain; Metropolitan Autonomous University, México and University of Cayetano Heredia, Perú) ¹
‘Effect of enriched housing on welfare, production performance and meat quality in finishing lambs: the use of feeder ramps’
- **Alabi OM, DO Adejumo, FA Aderemi and AO Ladokun** (Universities of Bowen and Ibadan, and Federal University of Agriculture, Nigeria) ¹
‘Alternative housing systems for egg-type chickens; factors against acceptability in developing countries’
- **Alpigiani I, LJ Keeling, MD Salman, F Brindani, C Bacci, S Pongolini and S Bonardi** (University of Parma and Istituto Zooprofilattico Sperimentale Lombardia and Emilia Romagna, Italy; University of Agricultural Sciences, Sweden and Colorado State University, USA) ¹
‘Animal-based welfare indicators and their association with food safety indicators in finishing pigs in Northern Italy: A pilot study’
- **Aragunde U and P Melendez** (Universidad del Turabo and Interamericana, Puerto Rico) ²
‘Puerto Rico comprehensive companion animal survey’
- **Arroyo L, A Marco-Ramell, M Soler, R Peña, A. Velarde, J Sabrià, M Unzeta and A Bassols** (Universitat Autònoma de Barcelona and IRTA-Monells, Spain) ¹
‘The effect of pre-slaughter handling stress on regional brain neurotransmitter levels’
- **Bond VH** (Compassion in World Farming, UK) ¹
‘Dairy cattle in the EU; Physical and physiological confinement’
- **Bones VC, JG Castilho, AH Gameiro, RX Anthony and CFM Molento** (Federal University of Paraná, Pasteur Institute of São Paulo and University of São Paulo, Brazil and University of Alaska USA) ²
‘Implementation of validated alternatives to laboratory animal use in Brazil: Rabies diagnosis as a model’
- **Buckland EL, HA Volk, C Burn and SM Abeyesinghe** (The Royal Veterinary College, UK) ²
‘Behavioural and physiological indicators of positive affective states in companion dogs’
- **Bušová M** (University of Veterinary and Pharmaceutical Sciences Brno, Czech Republic) ²
‘Assessment of the effect of stress on the biochemical changes in Common carp *Cyprinus carpio* L. after harvesting’
- **Candiani D, C Fabris, M Ferrara and F Berthe** (Animal Health and Animal Welfare Unit, European Food Safety Authority, Italy) ¹
‘EFSA’s scientific opinions on monitoring procedures at slaughterhouses’
- **Carreras R, E Mainau, R Taberner, P Rodríguez, A Dalmau, X Manteca and A Velarde** (IRTA-Monells and Universitat Autònoma de Barcelona, Spain) ²
‘The effect of sex and halothane genotype on cognitive bias in pigs’
- **Casal N, X Manteca, R Peña, A Bassols, Y Saco and E Fàbrega** (IRTA-Monells and Universitat Autònoma de Barcelona, Spain) ²
‘Analysis of cortisol in hair samples as an indicator of stress in pigs’



Posters (continued):

- **Caspar JE and L Hopegood** (Nottingham Trent University, UK) ¹
‘The effect of road transport on the production of cortisol in horses’
- **Di Martino G, E Negrato, M Vascellari, G Radaelli, K Capello, T Patregnani, D Bertotto and L Bonfanti** (Istituto Zooprofilattico Sperimentale delle Venezie and University of Padova, Italy) ²
‘HSP70 and gastric ulcers in pigs: Two welfare markers for Italian traditional livestock production’
- **Donofre AC and IJO Silva** (University of São Paulo, Brazil) ¹
‘Vibration effects on the welfare of day-old chicken during the transport’
- **Fukuzawa M and I Nakazato** (Nihon University, Japan) ²
‘Influence of luminous emittance before bedtime on sleep in dogs (*Canis familiaris*)’
- **Garrod G, C Hubbard, L Keeling, S Edwards and J Guy** (University of Newcastle upon Tyne, UK and University of Agricultural Sciences, Sweden) ¹
‘Measuring farm animal welfare: The results of a policy Delphi experiment abstract’
- **Gichure M, L Ochieng, L Mwirigi, G Kinyanjui, M Upjohn and V Fowler** (Kenya Network for Dissemination of Agricultural Technologies (KENDAT), Kenya and The Brooke, UK) ²
‘Coprological prevalence of helminths in working donkeys in three regions of Kenya’
- **Guinebretière M, D Huonnic, A Huneau-Salaün and V Michel** (Agency for Food, Environmental and Occupational Health Safety, France) ¹
‘Stress and mortality: Effect of litter provision and group size in furnished cages for laying hens’
- **Harley S, L Boyle, NE O’Connell, SJ More, TA Clegg, D Teixeira, P Whyte and A Hanlon** (University of Liverpool and Queens University Belfast, UK; Teagasc Animal & Grassland Research & Innovation Centre and University College Dublin, Republic of Ireland) ¹
‘Evaluating the potential of abattoir meat inspection as an animal welfare surveillance tool’
- **Hintze S, D Scott, S Turner, SL Meddle and RB D’Eath** (University of Edinburgh and Scotland’s Rural College, UK)
‘Mounting behaviour in entire male finishing pigs: Sexual maturity and dominance do not explain stable individual differences’
- **Honig H, J Miron, H Lehrer, M Zachut, A Shabtay, and U Moallem** (Volcani Center, Israel) ²
‘The effect of cooling management in high yielding dairy cows under hot and humid climate on performance and welfare parameters’
- **Hopkins J, DEF McKeegan, J Sparrey and V Sandilands** (Scotland’s Rural College, University of Glasgow and Livetec Systems Ltd, UK) ¹
‘Humane mechanical methods for killing poultry – designing and testing of mechanical devices’
- **Hothersall B, LK Whistance, S Mullan and D Main** (University of Bristol, UK) ²
‘Development of online training resources to facilitate compliance with EU welfare legislation requirements in pigs’
- **Huertas SM, JC Lorenzelli, JM Piaggio and AD Gil** (Universidad de la República, Ministry of Livestock and Exercise liberal, Uruguay) ²
‘Animal welfare perception of consumers in Uruguay’



Posters (continued):

- **Kareem R, N Clarke and R de Vere** (World Society for the Protection of Animals, UK) ²
‘Animal welfare – education and its effect in international contexts’
- **Kennedy M** (World Society for the Protection of Animals, UK) ²
‘Euthanasia or precautionary euthanasia?’
- **Kilbride AL, J Kaler, E Ferguson and LE Green** (Universities of Warwick and Nottingham, UK) ¹
‘Sheep farmers’ decisions in management of lameness in sheep’
- **Korff P, AS Fahrion, T Blaha, D Meemken and M Reist** (University of Bern, Switzerland and Foundation of the University of Veterinary Medicine in Hannover, Germany) ²
‘Development of animal-based welfare indicators as a surveillance tool at cattle slaughterhouses’
- **Krebsbach SB and MW Jones** (Humane Society Veterinary Medical Association, USA and Humane Society International, UK) ²
‘A behavioural assessment of the distress incurred by bulls in the bullfighting arena’
- **Lesimple C and M Hausberger** (Université de Rennes 1, France) ²
‘When reality and subjective perception highly differ: Questionnaire vs. objective observations discrepancies in horses’ welfare assessment’
- **Lin Y, S Mullan and DCJ Main** (University of Bristol, UK) ¹
‘Novel lameness detection by using hand-held infrared thermometer device’
- **Llonch P, A Villagrà, A Velarde and A Dalmau** (University of Warwick, UK; CITA-IVIA and IRTA-Monells, Spain) ¹
‘Rabbit welfare at slaughter: Current research and future challenges’
- **Magalhães-Sant’Ana M, K Millar, J Lassen, P Sandøe and IAS Olsson** (Instituto de Biologia Molecular e Celular, Portugal; University of Nottingham, UK and University of Copenhagen, Denmark) ²
‘Teaching ethics to veterinary students in Europe’
- **Mahon KJ, J Cooper, O Burman and D Mills** (University of Lincoln, UK) ²
‘Wandering cats and cat management in the UK’
- **Marquardt N, H Fink, S Dietze, B Bert** (Freie Universität Berlin, Germany) ²
‘CO₂ is still allowed for killing laboratory rodents but is it justified?’
- **Martín P, A Mateos, I Ovejero and M Villarroel** (Universidad Politécnica de Madrid, Spain) ²
‘Effect of type of flooring on pig lying behaviour and salivary cortisol levels’
- **Martínez-Macipe M, E Mainau, P Rodríguez, X Manteca and A Dalmau** (IRTA-Monells and Universitat Autònoma de Barcelona, Spain) ¹
‘Preliminary results on the behaviour of Iberian sows housed in different systems after farrowing in the south of Spain’
- **Müller BR, HA Stiegelmeier, RS de Sousa and CFM Molento** (Universidade Federal do Paraná, Brazil) ²
‘Chronic welfare restrictions and the morphology of the adrenal gland in broiler chickens’



Posters (continued):

- **Part CE, P Edwards, G Hutchinson and LM Collins** (Queen's University Belfast and London School of Hygiene and Tropical Medicine, UK) ²
'Economics of farm animal welfare in a growing population'
- **Pascual-Alonso M, GC Miranda-de la Lama, L Aguayo-Ulloa, L Ezquerro, A Cuevas, C Baila, S García-Belenguer and GA Maria** (University of Zaragoza, Spain and Metropolitan Autonomous University, Mexico) ¹
'Effect of postweaning handling strategies on welfare and productive traits in lambs'
- **Pedernera C, K de Roest, W Ouweltjes, M Marahrens, K Steinkamp, B Mounaix, M Gębska, S Messori and A Velarde** (IRTA Monells, Spain; FLI Institute for Animal Welfare and Animal Husbandry, Germany; Research Centre on Animal Production -Reggio Emilia and Istituto Zooprofilattico Sperimentale dell'Abruzzo, Italy; Wageningen UR, The Netherlands; IDELE Service Santé et Bien-être des Ruminants, France and Warsaw University of Life Sciences, Poland) ¹
'Animal welfare assessment after long transports: an animal-based approach'
- **Peña R, Y Saco, R Pato, N Casal, X Manteca, E Fàbrega and A Bassols** (Universitat Autònoma de Barcelona and IRTA- Monells, Spain) ²
'Validation of an enzyme immunoassay kit for cortisol determination in hair of domestic animals'
- **Petek M** (University of Uludag, Turkey) ¹
'Can early access to the range area be a solution to reduce injurious pecking in layer chickens?'
- **Podturkin A** (Moscow Zoo, Russia) ¹
'The influence of the "novelty" quantity on the intensity of the exploratory behaviour'
- **Pritchett-Corning KR, R Keefe, JP Garner and BN Gaskill** (Charles River and Stanford University, USA) ¹
'Possible motivation for food grinding in mice'
- **Proctor HS, G Carder and A Cornish** (World Society for the Protection of Animals, UK) ²
'Looking back to map the future: The road ahead for animal sentience research'
- **Reefmann N, LJ Keeling, J Langbein and L Gygax** (Swiss Federal Veterinary Office, Switzerland; University of Agricultural Sciences, Sweden and Leibniz Institute for Farm Animal Biology, Germany) ¹
'Comparative species-indicators of sentience'
- **Rees L** (Spain) ¹
'Equine social organization: an adaptive view with implications for welfare'
- **Reid J, EM Scott, ML Wiseman-Orr, AM Nolan, J Morris and S Fontaine** (University of Glasgow, UK) ¹
'Responsiveness of a 46 item Health-Related Quality of Life (HRQL) measurement instrument in dogs with lymphoma'
- **Rogers S and B Hart** (Learning About Animals and Ben Hart Consultant, UK) ¹
'The importance of participatory approaches for improving animal welfare'
- **Rooney NJ, S Mullan, EJ Blackwell, R Saunders and S Held** (University of Bristol, UK) ¹
'Prioritising target issues in a pet rabbit welfare campaign'



Posters (continued):

- **Roque A, M Manchado, D Hernandez, R Gines, C Berbel, E Fatsini, M Aparicio, I Gairin and N Duncan** (IRTA-SCR; IFAPA El Toruño; IMIDA-San Pedro del Pinatar and ULPGC, Spain) ²
‘Stunning of seabream-preliminary results’
- **Rowe EC, JK Murray, RA Casey and WJ Browne** (University of Bristol, UK) ²
‘A longitudinal study of early life risk factors for health and behavioural problems in the domestic cat’
- **Ruus A, A Kaasik and M Maasikmets** (Tartu College of Tallinn University of Technology and Estonian University of Life Science, Estonia) ¹
‘Ventilation rate as one basic aspect for gas emissions and animal welfare in loose housing cowshed’
- **Schwed B** (University of Natural Resources and Life Sciences (BOKU), Austria) ²
‘Intra-day variation of qualitative behaviour assessment outcomes in dairy cattle’
- **Silva S, M Magalhães-Sant’Ana, J Borlido Santos and IAS Olsson** (IBMC, Portugal) ²
‘“If they fare well, we fare well”: Portuguese dairy farmers’ view on animal welfare’
- **Sommerville RM and TA Jones** (Compassion in World Farming, UK) ²
‘Good farm animal welfare awards: Improving farm animal welfare on a large scale’
- **Statham P, N Campbell, S Hannuna, S Jones, E Paul, R Colborne, W Browne and M Mendl** (University of Bristol, UK) ²
‘Development of an automated measure of the ‘defence cascade’ in pigs’
- **Teixeira DL, G Miranda-de la Lama, M Villarrol and GA Maria** (University of Zaragoza and Polytechnic University of Madrid, Spain and Metropolitan Autonomous University, Mexico) ²
‘Effects of bedding quality on cleanliness, lying and exploratory behaviours of lambs’
- **Toscano MJ, G Richards, F Booth, L Wilkins, S Brown, and JF Tarlton** (University of Bern, Switzerland and University of Bristol, UK) ¹
‘Impact of an omega-3 ration on keel bone fractures and measures of bone health in laying hens’
- **van Tichelen S and B Slee** (International Fund for Animal Welfare, Belgium) ²
‘WTO dispute on EU seal product trade ban; Where legislation, science and public opinion meet’
- **Vergara P, M Greene and JR Haywood** (Universitat Autònoma de Barcelona, Spain and University of Michigan, USA) ²
‘2012 CIOMS ICLAS international guiding principles for biomedical research involving animals’
- **Vieira A, M Battini, I Ajuda, S Mattiello and G Stilwell** (Universidade Técnica de Lisboa, Portugal and Università degli Studi di Milano, Italy) ²
‘Is the collection of animal-based welfare indicators during milking affected by the order of goats entry into the milking parlour?’
- **Vieira FVR, ALM Pinto and IJO Silva** (University of Sao Paulo, Brazil) ¹
‘Manual of good practice for welfare of cattle milk in pasture’
- **Volodin IA and EV Volodina** (Lomonosov Moscow State University and Moscow Zoo, Russia) ¹
‘Vocal cues to discomfort in mammals: Application for estimating welfare in captivity’



Posters (continued):

- **Vosough Ahmadi B, S Thomson, S Shrestha and AW Stott** (Scotland's Rural College, UK) ²
'Sustainable intensification and animal welfare in cattle and sheep farming systems'
- **Wainwright NR, K Stoddart and D Armstrong** (BPEX – AHDB, UK) ¹
'Real welfare - prevalence of welfare indicators in the English pig industry'
- **Waters S, T Watson, S Bell and JM Setchell** (Barbary Macaque Conservation in the Rif, Morocco and Durham University, UK) ¹
'The BMC Rif dog health & welfare programme: providing a benefit to people, their domestic animals and endangered Barbary macaques in Bouhachem Forest, Northern Morocco'
- **Zaldívar JE, W Sánchez-Suárez², M Ibáñez, V Iniesta, R Luna, A I Marín, R Sáez, E Vicente and M Gallego** (Veterinary Association for the Abolition of Bullfighting, Complutense University of Madrid and University of Extremadura, Spain and University of Guelph, Canada) ¹
'Bullfighting versus animal welfare'
- **Zanella AJ, F Langford, DM Broom, AP Vieira, P Gomes, JB Vas and B Braastad** (Scotland's Rural College and University of Cambridge, UK; Universidade Positivo, Brazil and UMB, Norway) ²
'Global networks of excellence in animal welfare science'



EFFECT OF ENRICHED HOUSING ON WELFARE, PRODUCTION PERFORMANCE AND MEAT QUALITY IN FINISHING LAMBS: THE USE OF FEEDER RAMPS

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The aim of this study was to analyze the effect of enriched housing during the finishing phase of fattening on physiological welfare indicators, production and meat quality traits in lambs. Sixty *Rasa Aragonesa* lambs (male, 65 day old, live weight 17.2 ± 0.2 kg), were divided into two treatments and housed indoor for five weeks in six pens (2.9m x 3.3m, density $0.95 \text{m}^2/\text{lamb}$, 10 lambs/each, 3 replicates/treatment). The barren (control) housing system (CO) was designed to model intensive housing conditions used in cooperative feed lots (CC), without straw. The enriched environment (FE) contained multiple items; straw as forage and bedding and ramps to that led to a platform where the feed hopper was located, giving it a full enrichment approach. Lambs were fed *ad libitum* with the commercial concentrate used in CCs. Concentrate feed consumption was recorded and lambs were weighed at the beginning of experiment and before slaughter to estimate average daily gain (ADG). Blood samples and infra-red temperatures were taken before slaughter. Carcass, instrumental and sensory meat quality variables were measured. NEFA was significantly higher ($P < 0.05$) in the control group, as was the neutrophil/lymphocyte (N/L) ratio ($P < 0.05$), indicating chronic stress. No differences were observed in cortisol levels among treatments. Regarding productive performance, FE lambs had significantly higher ($P < 0.05$) ADG (+18.3%), heavier carcasses and higher fattening scores than CO lambs. The FE lambs also had significantly better ($P < 0.05$) values for pH_{ult} (meat pH at 24 h *post mortem*), meat colour (L^* , b^* , Hue) and texture as measured by Warner-Bratzler. Sensory evaluation of meat showed significant differences ($P < 0.05$) in favour of FE lambs. Lamb odour intensity and overall liking score were higher in meat from FE. A step-wise correlation analysis of sensory meat quality variables showed that overall liking was significantly related to several parameters ($P < 0.05$), but with a different order between treatments in the set of associated variables. Tenderness was a common most powerful parameter related ($P < 0.0001$) with the overall liking. Results suggest that lambs in an enriched indoor environment perform better and increase their ability to adapt to novel environments. The enhanced performance is also related with improved instrumental and sensory meat quality. Our study confirms the importance of housing enrichment as a critical aspect to improve animal welfare.



ALTERNATIVE HOUSING SYSTEMS FOR EGG-TYPE CHICKENS; FACTORS AGAINST ACCEPTABILITY IN DEVELOPING COUNTRIES

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Poultry is the commonest aspect of livestock production in most developing countries especially in Nigeria. Apart from being a good source of animal protein for humans, it serves as source of income for the investors. Meanwhile, conventional battery cage is the form of housing system widely adopted by poultry farmers for egg-type chickens in these countries and with the recent campaign for the well being of the animals globally, efforts being made to make the farmers adopt alternative housing systems for the comfort of the chickens is meeting strong rejection hence this survey.

Poultry farmers from the three major regions of Nigeria (South-west, South-east and North) were sampled through structured survey to generate primary data. Results of the analysis of data on the responses of the poultry farmers from the three major regions of Nigeria on the subject matter revealed that 79.30% of the poultry farmers in the south-western part of Nigeria (which harbors 67.60% of the Nigerian poultry farmers) are not ready to adopt alternative housing systems for chickens due to high poverty level (51.00%) , economic instability(25.00%),social insecurity (14.20%) and bad government policies (9.80%). Also,83.50% of poultry farmers from south-eastern part of Nigeria(which harbors 24.80% of the Nigerian poultry farmers) are not ready to adopt alternative housing systems due to high poverty level(56.05%),economic instability (28.35%),social insecurity(6.40%) and bad government policies(9.20%).Moreover ,87.53% of poultry farmers in the northern Nigeria(which harbors 7.60% of the Nigerian poultry farmers) will not adopt alternative systems for chickens due to high poverty level(62.12%), economic instability (23.44%),social insecurity(7.20%) and bad government policies(7.24%).On the average, Nigerian farmers are not ready to adopt alternative housing systems for their chickens now due to high poverty level in the country (56.39%), economic instability (25.60%), social insecurity (9.27%) and bad government policies (8.75%).

The above results showed a very high correlation between economic development and adoption of animal welfare specifications. Though not yet legalized in developing countries, much improvement need to be done on the state of economies, social security and standard of living of the poultry farmers and people in general to encourage and or stimulate them to adopt alternative housing systems for egg-type and other chickens.



ANIMAL-BASED WELFARE INDICATORS AND THEIR ASSOCIATION WITH FOOD SAFETY INDICATORS IN FINISHING PIGS IN NORTHERN ITALY: A PILOT STUDY

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Animal welfare is an increasingly sensitive issue for the competent authorities called to implement European legislation. Yet animal welfare, a relevant part of the requirements of the Hygiene Package, is usually dealt with on its own and only rarely connected to food safety hazards. The ultimate purpose of this study is to determine the association between specific animal-based welfare measures with the occurrence of *Salmonella* spp. and *Yersinia enterocolitica* as indicators of food safety in finishing pigs at slaughter plants in Northern Italy. Collection of animal, resource and management-based measures was carried out on farm for 30 selected slaughter batches from one to three days before slaughter, totalling 3749 pigs. Welfare assessments were according to the Welfare Quality[®] protocols, where welfare measures scores of 0 and 2 indicate higher and lower animal welfare, respectively. The batches were tested for *Salmonella* spp. and *Y. enterocolitica* by environmental faecal sampling on farm and a representative sample of five individuals (in all n=150), slaughtered at approximately 167.0 Kg, were tested for these pathogens in the mesenteric lymph nodes and tonsils, respectively. Five individuals per batch were also inspected for gross pathology at slaughter. Pigs came from intensive (n= 22), organic (n=4) and semi free range (n= 4) farms. All male pigs were castrated and all, except pigs from one semi free range farm, were tail docked. Enrichment material was only present in the organic and semi free range farms. The sum of positive batches to pen welfare measures were analysed by individual logistic regression against the sum of the *Salmonella* spp. and *Y. enterocolitica* positive batches. Panic response to humans, pleuritis, pericarditis, space allowance (0.3-0.9 m²/100 Kg), mortality (2.6-4.5%), slatted floor, absence of enrichment material and absence of outdoor access all tended to be associated to *Y. enterocolitica*. White spot liver tended to be associated to *Salmonella* spp. Although the study did not demonstrate the significant associations, the design can be considered as practical approach to explore the relationship between animal welfare issues and food safety indicators; considering the sample size of the study in fact we concluded that further research is needed to confirm that the sample population could influence the statistical analysis and could lead to significant results. The link between animal welfare and health and, by implication, food safety needs to be tested in a larger study to support stakeholders and risk managers in accurate policy-making.



PUERTO RICO COMPREHENSIVE COMPANION ANIMAL SURVEY

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One of the main reasons in starting the first comprehensive Companion Animal Survey in Puerto Rico, is to address a complex societal problem that is costly in public health, political, economic, social and human terms. The scope of abuse, negligence and abandonment of animal companions in many parts of the Puerto Rico is unimaginable by any social standards. These complex interactions are not readily accessible through current data or research in Puerto Rico.

The research proposed will provide the opportunity to understand the relationship between these factors and their influence in facilitating or hindering healthy development in human animal relationships.

The purpose of this study is to increase knowledge from the very limited existing research and measurement efforts aimed specifically at Puerto Rican general population to identify and understand the characteristics of general companion animal data, human animal interactions, and animal welfare issues. Therefore it has two goals:

- Goal 1: Gather factual and attitudinal information about animal companion ownership, stray dog population in communities or neighborhoods, human animal relationships and animal welfare issues.
- Goal 2: Describe and analyze data about animal companion ownership, stray dog population in communities or neighborhoods, human animal relationships and animal welfare issues.

The target population of this survey is the general Puerto Rican adult population. The estimated population size for the sample based on the preliminary data provided will be 1,000 respondents. The total sample will be participants who will fill out the survey via the internet or paper format.



THE EFFECT OF PRE-SLAUGHTER HANDLING STRESS ON REGIONAL BRAIN NEUROTRANSMITTER LEVELS

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The organization of the response to a stressful situation involves the activity of different types of neurotransmitter systems in several areas of the limbic system. Thereby, changes in neurotransmitter's concentrations are related to the activation and modulation of behavioral processes and autonomic response. Furthermore, the development of methods for assessing the affective (or emotional) states is a crucial step in improving animal welfare, too. The "cognitive bias", defined as a pattern of deviation in judgment in particular situations, is used as a label (optimistic or pessimistic) for the effects of affective state on cognitive processes.

The aim of this study was to determine the concentration of indoleamines (5-hydroxyindole-3-acetic acid (5-HIAA) and serotonin (5-HT)) and catecholamines (noradrenaline (NA), dopamine (DA), 3,4-dihydroxyphenylacetic acid (DOPAC) and homovanillic acid (HVA)) in the hypothalamus, amygdala, hippocampus and prefrontal cortex of a group of slaughtered pigs exposed to handling stress classified according their emotional state.

The study was carried out on 36 hybrids Large White x Landrace male pigs housed at *Institut de Recerca i Tecnologia Agroalimentàries (IRTA)-Monells* facilities. Animals were trained to learn to discriminate positive and negative spatial cues. Animals were subjected to stress handling at the slaughterhouse and classified according to their emotional state during the cognitive bias test.

Regional distribution of brain monoamines showed similar patterns to those described in the literature. However, animals defined in a positive emotional state showed higher concentrations of indoleamines and dopamine in the prefrontal cortex ($p < 0.05$) and lower concentrations of NA and 5-HT in the hippocampus ($p < 0.1$), suggesting a relation with motivation and cognition.

On the other hand, handling stress produced changes in the concentrations of catecholamines and indoleamines in the amygdala and the hippocampus. As compared to unstressed controls, catecholamines and serotonin levels in the amygdala were lower in pigs exposed to handling stress ($p < 0.05$) whereas hippocampal levels of indoleamines were increased ($p < 0.05$). This suggests that the amygdala, involved in emotion modulation and cognition, plays a role in the stress response.



DAIRY CATTLE IN THE EU; PHYSICAL AND PHYSIOLOGICAL CONFINEMENT

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Dairy farming in the EU accounts for around 25% of global milk production but it has only approximately 9% of the world's population of cows. A shift in the genetics of dairy cows has driven their increasing yield in the continent. While many traditional breeds are still used, especially in northern Europe, Holstein dairy cattle are increasingly common. High input/high output farming now accounts for 83% of all EU dairy systems with almost all having Holstein-Friesian breeds. The change in breed has shifted cows from a largely forage based diet to a total mixed ration. Their need to maintain body condition and produce milk means they spend more time eating and have less time available for other important activities, like resting, leaving them unable to fulfil their full range of species specific behaviours. This leads to the dairy cow becoming trapped in a 'physiological cage'.

The leading farm animal welfare charity, Compassion in World Farming, undertook an investigation to look into the current status of dairy farming in the EU. By reviewing the systems in different countries and visiting over 50 farms in Germany, Denmark and Spain we gathered evidence of extreme welfare issues. One of the most overarching findings of all the systems was the confinement of cattle and the lack of comfort for lying. In both free stall systems and tie stalls, the cows ability to lie comfortably was severely restricted by the space allocated and the bedding provided. Both cubicle systems and tie stalls were found to be too small, too close together and in the case of cubicles, insufficient numbers for them all to lie at the same time. The lack of bedding substrate was apparent and would restrict lying comfort and therefore the cow's ability to rest.

We concluded that the confinement of the modern dairy cow in the EU today is one of physiological and physical restraint. Much research exists to identify welfare problems such as lameness, mastitis, infertility and breeding. Our investigation suggests the mental well-being of the cow through the extremes of the environment, compounded by their physiological cage, is one that requires greater attention.



IMPLEMENTATION OF VALIDATED ALTERNATIVES TO LABORATORY ANIMAL USE IN BRAZIL: RABIES DIAGNOSIS AS A MODEL

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The use of laboratory animals is common for practices such as teaching, research and disease diagnosis, even though there are alternative methods internationally validated to replace some of them. The Animal Welfare Laboratory at UFPR is developing a study to foster the implementation of validated alternative methods, using the replacement of animal use for rabies diagnosis as a model. This study aims to contribute to the technological autonomy, staff development and qualification in the area of alternatives to animal use, as well as to contribute to the construction of the Brazilian National Network for Alternative Methods, a recent initiative of the Brazilian government. The first part of this study is the development of an economic cost comparison between two methods for rabies diagnosis, the *in vivo* Mouse Inoculation Test (MIT) and the *in vitro* Cell Culture (CC). The second part is the implementation of the alternative method for rabies diagnosis in a Brazilian laboratory. Finally, the third part is a consciousness-raising process, involving the engagement of laboratory staff with animal ethics and the need for adoption of alternative methods, and the dissemination of information regarding suitable alternative methods. This work is expected to: (a) increase knowledge regarding the economic cost of methods when comparing the MIT and the CC for rabies diagnosis; (b) implement the alternative method for rabies diagnosis in a Brazilian laboratory that currently uses MIT; (c) lead to a list of factors that hinder the use of alternatives and propose resolution of such factors; (d) generalize knowledge obtained to other testing scenarios; (e) support ethical discussions around the use of laboratory animals and alternative methods, and (f) stimulate the use of alternatives to laboratory animals in general.



BEHAVIOURAL AND PHYSIOLOGICAL INDICATORS OF POSITIVE AFFECTIVE STATES IN COMPANION DOGS

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Knowledge of non-human animal experience and expression of positive affective states (PAS) is limited. Further, objective indicators discriminating between affective valence (pleasantness-unpleasantness) and arousal (high-low) are lacking. Human interpretation of companion animal behaviours associated with PAS may be hindered by unrealistic expectations, anthropomorphism (attribution of human qualities to animals) or cognitive dissonance (whereby psychological shielding restricts/shifts interpretation to avoid negative emotions such as embarrassment or guilt). Increasing understanding of PAS in domestic dogs is critical to safeguarding canine welfare, and the human-animal bond.

In this study, we aimed to determine the reliability of potential indicators of PAS in companion-owned dogs, by studying behaviour (e.g. tail wagging, activity, ear posture, vocalisation) and physiology (salivary cortisol, heart rate variability [HRV], surface nasal planum temperature) in defined contexts of emotional valence and arousal state.

Behavioural data were obtained via video recording and later analysis with behavioural coding software. Two saliva samples (for cortisol analysis) were taken per dog; a baseline (T0) and after the first presented stimulus (T1). HRV was recorded using a Polar monitor strapped to the dog's ribcage. Temperature of the surface nose region was taken immediately after stimulus presentation. Relevant background information was obtained via owner questionnaire.

55 healthy adult companion dogs of mixed breed, age and gender provided complete data for all study indicators. Six stimuli, anticipated to alter valence and arousal states, were presented; positive: food treats (high arousal), gentle stroking (low arousal); negative: muzzling (low arousal), separation from owner (high arousal) as well as a neutral affective state (rest). The order of presentation was pseudo-randomised across subjects.



ASSESSMENT OF THE EFFECT OF STRESS ON THE BIOCHEMICAL CHANGES IN COMMON CARP *CYPRINUS CARPIO* L. AFTER HARVESTING

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Freshwater fish common carp *Cyprinus capio* L. is reared in natural conditions in fish farms in the Czech Republic. Fish in fish farm is a very sensitive organism to changes in the external environment. During the growing season the fish is exposed to many stress factors. They can be caused by sudden climatic changes, temperature extremes and changes in physico-chemical properties of water. In the fish they can initiate a stress response, which may lead to serious metabolic and osmoregulatory disorders. A major stressor is the fish harvesting at the end of the growing season. Fish are harvested from its natural environment and transferred to hatcheries where they remain until the sale.

This study is focused on monitoring the biochemical changes in the body of freshwater fish common carp *Cyprinus carpio* L. The objective of this study was to find out how the organism of fish deals with the effects of stress after harvesting and transport into the hatcheries. For the assessment of stress of fish were selected and analysed biochemical markers of stress in the fish blood.

The study included market size fish (± 2.3 kg) bred in the pond in natural conditions. The fish came from the standard breeding conditions in the pond with a natural food source and additional feeding. At the end of the growing season when the fish do not ingest, the fish were caught and transported to the hatcheries where they remain until sale.

The first fish blood collection was carried out one day after harvesting, when the fish stay in storage ponds for the first day. The second and third blood taking was carried out at regular 2-week intervals after the previous sampling. All fish for the blood collection always came from the same hatcheries and were selected at random with regard to approximately comparable size. In total, 36 samples of fish blood were collected and analysed. In all blood samples were measured concentrations of glucose and cortisol. The concentrations of ammonia in the blood and cholesterol in the blood serum were also determined as additional markers. All measured values were averaged and statistically evaluated. The results were complemented by physical-chemical parameters of the water from the hatcheries. In the first period, the average cortisol concentration in the samples was 10.68 ± 7.27 mg/dL, glucose 4.24 ± 1.85 mmol/L, cholesterol 4.39 ± 0.78 mmol/L and ammonia 104.3 ± 53.6 μ mol/L. Increased values are reflected in the second term, when the average cortisol concentration in the samples was 18.21 ± 7.15 mg/dL, glucose 4.63 ± 1.69 mmol/L, cholesterol 5.15 ± 0.63 mmol/L and ammonia 141.4 ± 30.9 μ mol/L. In the third period there were no significant changes compared to the second.

The results of the study showed, that the fish were in the time of harvest and the subsequent period of 30 days after the harvesting in good health condition without symptoms of autointoxication or other negative health changes. Elevated levels of cortisol and a slight increase in the monitored parameters after placing fish hatcheries reflects the response of fish to environmental changes and stress associated with it.

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EFSA'S SCIENTIFIC OPINIONS ON MONITORING PROCEDURES AT SLAUGHTERHOUSES

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The European Commission requested EFSA to provide an independent view, in light of the most recent scientific developments, on the indicators and elements to support monitoring procedures at slaughterhouses, as foreseen by Article 16 of the EC Regulation 1099/2009. EFSA is producing four scientific opinions on indicators of unconsciousness and death for: i) bovines stunned by penetrative captive bolt and slaughtered without stunning; ii) pigs stunned by head-only electrical method and carbon dioxide at high concentration; iii) small ruminants stunned by head-only electrical method and slaughtered without stunning; iv) chickens and turkeys stunned by electrical waterbath, gas methods and slaughtered without stunning. EFSA will provide risk factors and welfare consequences of each stunning and killing method, so to determine the different circumstances of the monitoring procedures; in addition, for each group, a set of indicators to be used to ascertain unconsciousness or death of the animals at slaughter will be given. Examples of different sampling protocols and the minimum sampling needed for indicators of unconsciousness will also be provided. The indicators will be selected based upon their specificity, sensitivity and practicability. A working group of experts in the field was set up to develop the scientific opinions and to evaluate the outcomes of various activities that were put in place to get such information. A stakeholder meeting was held in January 2013 where experts from competent authorities, industries, NGOs and universities were informed about this mandate and were questioned about the use of the indicators. EFSA is currently performing a systematic literature review with the purpose of getting robust information about the specificity and sensitivity of the indicators from relevant published papers. Moreover, an online survey was run aiming at getting more information from experts with a practical experience in animal slaughter. More than 70 experts took part to the survey. The survey questioned about the easiness of use of the indicators and about the ability of the indicators to recognise properly or improperly stunned or killed animals, thus giving information on their specificity and sensitivity. Based on the outcomes of these activities, the working group is currently drafting the scientific opinions: such drafts will be put out on EFSA's website (<http://www.efsa.europa.eu>) for public consultation during summer so to give the scientific community the possibility to comment on them before they will be finalised toward the end of 2013.



THE EFFECT OF SEX AND HALOTHANE GENOTYPE ON COGNITIVE BIAS IN PIGS

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The aim of the study was to assess the effect of sex and halothane genotype (RYR (1)) on cognitive bias and welfare in pigs.

Forty-eight pigs, 12 RYR(1) free (NN) females, 12 RYR(1) heterozygous (Nn) females, 12 NN entire males and 12 Nn entire males were used for the experiment. Pigs were individually trained during 16 sessions to discriminate between a bucket with (A) or without (NA) access to chopped apples according to its position (left or right) in a 34 m² test pen. Afterwards, each animal was subjected individually to an experimental session, where the bucket was placed on a central situation. Both training and experimental sessions finished 30 seconds after the pig ate or tried to eat apples or 10 minutes after the pig entered the pen. The time to contact the bucket, the time to eat or try to eat apples, the number of vocalizations, freezing events (defined as a pig stopped for more than 2 seconds without showing exploratory behaviour), defecation and escape attempts (defined as a pig kicked the door) were recorded. In the experimental session, the time to contact the bucket was compared with the mean time of the last four training sessions with A and NA. If the time was lower than the mean time of these four sessions, the animal was classified as positive cognitive bias (PB). If the time was higher, the animal was classified as negative cognitive bias (NB). Statistical analyses were performed with SAS using a GENMOD procedure.

During the training, the time to contact A was lower than NA from session 10 ($P=0.0006$), indicating that from this moment, pigs were already able to discriminate accessibility to the chopped apples according to the bucket position. Overall, pigs performed more number of vocalizations, freezing events, defecation and escape attempts in NA sessions than A sessions ($P<0.05$). Learning ability seemed not to be affected by genotype or sex.

During the experimental session, 79.17 % of the pigs were classified as PB, 12.50 % as NB and 8.33 % were not classified (NC). The time to contact the bucket was affected by the interaction between sex and genotype ($P=0.0478$), being higher in Nn females. Subsequently, 83.33% of the animals classified as NB were from this group. These results suggest that pig response in front of ambiguous situations is affected by halothane genotype and sex, and therefore this response might be influenced by the effective state.



ANALYSIS OF CORTISOL IN HAIR SAMPLES AS AN INDICATOR OF STRESS IN PIGS

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Detection of cortisol is one of the most widely used methods to assess stress in animals because it provides information of the hypothalamic–pituitary–adrenal axis activity. The most common biological samples are plasma, saliva, urine, faeces, milk and hair. Hair cortisol analysis could be a good non-invasive procedure to detect chronic stress since cortisol is incorporated and stored inside growing hair. The aim of this study was to determine whether cortisol could be detected in pig hair and could serve as a proper chronic stress indicator, which has not been attempted before. Saliva and hair samples from two regions (cranio-dorsal (D) and dorso-lumbar (L)) of twenty crossbred entire male pigs were taken at 9, 15 and 22 weeks of age. The pigs were subjected to a weekly remixing procedure as part of a larger study to determine the adequate group size for a new precision feeding technology. The mean cortisol level for the hair samples was 16.80 ± 0.75 pg/mg (range 6.4-40.00). Hair from L region had higher cortisol values than D region at every age measurement ($p=0.03$). No significant correlations were detected between saliva and different hair samples, or between different hair regions. Only a weak correlation was found between D hair regions over the time ($r=0.49$, $p=0.03$). Thus, cortisol could be detected in pig hair. However, further studies with a higher number of individuals are required before recommending its use as a chronic stress indicator.



THE EFFECT OF ROAD TRANSPORT ON THE PRODUCTION OF CORTISOL IN HORSES

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Introduction

Sports horses are transported by road, rail, sea or air, for reasons including change of ownership, competition, breeding and veterinary care. Transport associated stress response is a focus of current equine research and health and welfare concern, and may also affect athletic performance. Cortisol is one of the most widely accepted measures of an animal's stress response. Long-term or frequent transportation may elevate cortisol levels over an extended period, resulting in increased susceptibility to disease, inflammation, immune response and other forms of stress. A meta-analysis was conducted to evaluate the effect of road transport and the impact of journey time on the production of cortisol in horses.

Materials and Methods

Following a literature search (>30 articles), only five studies, with a mean sample size (n=16, SD3, overall n=81), could be selected for final analysis owing to specific terms chosen: a timed road journey; blood samples for cortisol analysis collected via jugular venepuncture; pre and post-transport cortisol measurements; sample horses were breeds typically used for sports or competition and transport experienced. A paired samples *t*-test was used to test for significant differences in cortisol levels pre and post-transport. Correlation analysis was used to test for strength of association between an increase in journey time and cortisol production. The level of significance was set at $p < 0.05$.

Results

There was a significant difference between pre and post-transport cortisol values $\text{ng/mL} \pm \text{S.E.}$ (paired *t*-test, $p < 0.05$). Mean cortisol values increased by 36.07 ng/mL . There was no correlation ($R^2 = 0.1891$) between an increase in journey time and mean cortisol values (ng/mL) pre and post-transport.

Discussion

The results of this meta-analysis suggest, in agreement with previous research, that a) horses may experience road transport stress; b) the impact of journey time (short or long) on the production of cortisol remains inconclusive; c) causes of road transport stress are varied and multifaceted. However, this study may be limited by the available sample size, and potential outliers.

Conclusion

Sports horses may undergo stress associated with road transport, which if experienced long-term, might compromise health and welfare and impact negatively on performance. To date, research in this field has focused mainly on transport for commercial purposes such as slaughter. This study suggests that sports horse transportation warrants comparable attention. A standardised research protocol is advised to inform future legislation, and address the health and welfare requirements of sports horses during transport.



HSP70 AND GASTRIC ULCERS IN PIGS: TWO WELFARE MARKERS FOR ITALIAN TRADITIONAL LIVESTOCK PRODUCTION

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The need for higher welfare standards is a priority in Europe. As the current financial climate may discourage investments for improvement, the traditional livestock production can represent an economic resource, but also a “welfare-friendly” reality to investigate and promote. In Italy, in particular, it also means safeguarding gastronomic heritage, such as delicacies like *Soppressa* and *Culatello*. In conventional pig production several factors are stressful for animals (limited freedom of movement, lack of stimuli, low lighting levels, atmospheric ammonia, etc.) and major efforts have been made to find reliable biochemical markers. Acute-phase-proteins, serum antioxidants, immunoglobins and cortisol react to stress, but are more likely to produce acute than chronic response. Thus, at the cellular level, the stress responses include the synthesis of particular proteins, called Heat Shock Proteins (HSP), which play an important chaperoning role, especially HSP70. Among the health indicators, on the other hand, the prevalence of oesophago-gastric ulcer (OGU), a widespread pig disease, is reported to be related not only to nutrition, but also to pathogens and stress. Therefore, this study aims to investigate the effects of rearing system and gender and on the OGU prevalence (by visual scoring) and on the expression of HSP70 in the liver (by Western Blot). Group A (156 gilts vs. 156 barrows) was equally distributed into 12 single-sex indoor pens (1.02 m²/pig); Group B (9 gilts vs. 11 barrows) was kept in one outdoor area of 6,000m² (Fig.1). Animals were fed with liquid diet and were slaughtered at about 160-180kg. At slaughter, all the stomachs were scored for OGU: 0-1=normal/hyperkeratosis; 2-3=eroded/ulcer. All liver samples from group B and 16 samples randomly collected from group A (8 gilts vs. 8 barrows) were tested for HSP70. Logistic regression was performed for gastric scores, while HSP70 distribution was evaluated with GLM. In Group A the overall scores 2-3 were recorded in 63% of pigs; furthermore barrows had higher scores than gilts (OR=1.51, IC95%:1.09-2.11). All pigs of Group B had score 0-1. Livers from Group A stratified by gender showed significantly higher HSP70 values compared to Group B for both barrows and gilts (P<0.001). Stratifying by group, Barrows showed higher HSP70 values than gilts in Group A (P<0.001), while no statistical differences were observed for Group B (P=0.653) (Fig.2). To conclude, HSP70 and OGU seemed in connection and able to record stress events perceived during life.



Fig.1: Outdoor system for traditional livestock production in the Veneto Region (Project: DGRV 3594/10).

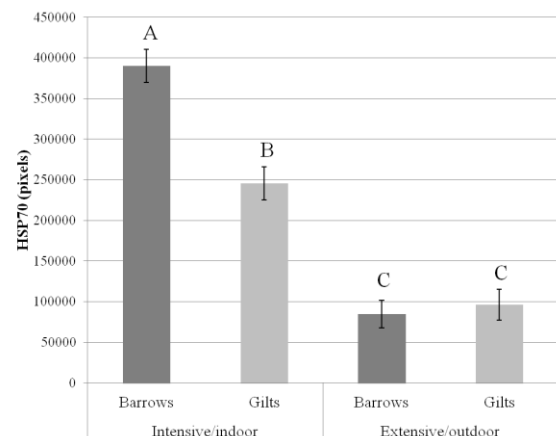


Fig.2: Effect of gender and rearing system on the expression of HSP70 in pig liver (mean±s.e.). A, B and C refer to P<0.001.



VIBRATION EFFECTS ON THE WELFARE OF DAY-OLD CHICKEN DURING THE TRANSPORT

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During transport, the chicks are affected by many stressors that can compromise their welfare conditions. Among these factors the vibrations of the truck on the road cause discomfort and stress in animals. The aim of this study was to evaluate the effects of different vibration levels in broiler chicks. Newborn chicks ($n = 400$) were divided equally into four boxes. Vibration levels studied were V1 (16 m / s^2) and V2 (10 m / s^2), obtained in previous research conducted in the field, on dirt roads and asphalt, respectively. The chicks were exposed to a vibration period of 2 hours in the laboratory (mean time in the field). Each level of vibration was applied to a box while the remaining two were used as control for comparison. A sample of 12 birds in each box was chosen at random for measurement of body weight before and after exposure to the effects of vibration. Furthermore, the respiratory rate after stress was measured in movements per minute. Vibrations have no significant influence ($p < 0,05$) on the weight difference between the beginning and end of exposure to stress. However, chicks undergoing treatment V1 (higher vibration) had a significant increase in their respiratory rate (44, 3) compared to the control group (30,7) and the group submitted the lowest vibration (37). It can be concluded that there was a change in respiratory rate in function of vibrations of the transport, a clear indication that vibrations can compromise the welfare of the birds when they are transported.



INFLUENCE OF LUMINOUS EMITTANCE BEFORE BEDTIME ON SLEEP IN DOGS (*CANIS FAMILIARIS*)

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Sleep is important for animals to stay healthy and recover from exhaustion. We investigated the influence of luminous emittance before lights out on sleeping behaviour in dogs. Six healthy dogs (aged 15 to 51 months; three female, three male) were exposed initially to control lighting conditions (luminous emittance 600 lx) before lights out (16:00-21:00) for 2 days. They were then randomly allocated in turn to exposure to poorly lit conditions (50 lx) or brightly lit conditions (1600 lx) from 16:00-21:00 for 2 days. Eyes (opened/ closed), head position (contact/ non-contact with the floor), posture (six categories), and behaviour (eight categories) were recorded every 15 s. For the period from 21:00-07:00, there were no differences among the three conditions in terms of the number of periods spent in each posture or in each behavioural category, but the most frequently recorded sleeping posture was lateral recumbency. After exposure of the dogs to poorly lit conditions, the number of periods spent in lateral recumbency was significantly greater than in the controls between 05:00 and 07:00 (Tukey, $p < 0.05$). The proportion of time spent with eyes closed between 05:00 and 07:00 was significantly greater than that with eyes open after exposure to either poorly lit or brightly lit conditions (t-test $p < 0.05$), but neither differed significantly from the control. Changes in luminous emittance before bedtime might influence sleep quality in dogs.



MEASURING FARM ANIMAL WELFARE: THE RESULTS OF A POLICY DELPHI EXPERIMENT ABSTRACT

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The major objective of the Community Action Plan on Animal Welfare is to promote high(er) standards of animal welfare across the European Union (EU). In order to evaluate policy instruments aimed at achieving this goal it is important to identify reliable indicators that can be used to assess their effectiveness. This study addresses this issue by applying the Delphi technique. It aims to explore the opinions of a sample of European stakeholders about the appropriateness and effectiveness of five broad categories of indicator (i.e. animal-based indicators; farm-level indicators; supply-chain indicators; consumer/citizen-based indicators and institutional indicators) for evaluating changes in the level of farm animal welfare. Data analysis is based on the responses of almost 200 individuals, classified into five different broad categories of experts from eight European countries (Germany, Italy, Macedonia, The Netherlands, Poland, Sweden, Spain and the UK). Policy Delphi is applied widely in the social sciences, however, it is rarely used in the field of animal welfare. The results show that animal-based and farm-level indicators were rated as the most effective categories of indicator and there was strong agreement on this among respondents in all countries and from all expert groups. Moreover, animal-based indicators related to health and behaviour were rated as being the most effective in their category. For farm-level indicators, those related to space and ventilation, health care, pain management, and housing design and bedding were judged most effective. The collection of both animal-based and farm-level data may be considered as problematic, since it is most likely to involve visiting the farm and third party inspection. Therefore, other less-effective indicators based on the supply chain, consumer behaviour and institutional factors may have some usefulness in practice. Supply chain indicators were rated as moderately effective by all countries and experts, whereas there was significant disagreement about the effectiveness of consumer and institutional-based indicators. However, before any widespread adoption of non-animal-based indicators, more research is required to provide evidence of their reliability.



COPROLOGICAL PREVALENCE OF HELMINTHS IN WORKING DONKEYS IN THREE REGIONS OF KENYA

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There are 1.8 million donkeys in Kenya the majority of which are used for transportation of goods by cart (TGC) and/or by pack (TGP). Common welfare problems include overloading, malnutrition, poor handling, foot problems and parasite infestation. Although great improvements are being made within these areas of concern, essential information with regards to gastro-intestinal parasites (helminths) is lacking. Information regarding which species are most prevalent is not available and therefore informed design of an intelligent parasite control strategy is impossible. The aim of this study was to identify the common helminths in working donkeys, their regional distribution and seasonal fluctuations in three of KENDAT's operational areas (Lari, Limuru and Mwea). Based on a 5% level of precision and an assumed prevalence of 50%, a total of 768 donkeys, split equally (384 donkeys), between the dry (Feb) and wet (June) seasons were sampled in this study. Stratified sampling based on examining a randomised proportion of the population within these regions was employed. This corresponded to 150, 252 and 368 donkeys from Mwea, Limuru and Lari respectively, split equally (75, 126, 184) between the dry and wet season. The donkeys sampled were not the same between seasons. Fresh donkey faeces were collected and analysed by McMaster and Baermann techniques at the Faculty of Veterinary Medicine, University of Nairobi to determine faecal egg count (FEC) measured in eggs per gram (epg) and larval identification respectively. Large strongyle species were the most commonly found helminth (87%) followed by small strongyles (11%). Regardless of season, Limuru had the highest prevalence (92%) of large strongyles whilst Lari had the highest prevalence (31%) of small strongyles. Season did not affect the prevalence of large strongyles, however small strongyles were only observed within the wet season. Other parasites recorded were roundworms, threadworms, tapeworms, coccidial, flukes and pin worms however their prevalence never exceeded 2% in any region/season. Limuru had the highest average FEC of 1458 ± 633 epg (mean \pm SD) followed by Lari ($1258 \text{ epg} \pm \text{SD} 612$) and Mwea ($759 \text{ epg} \pm \text{SD} 501$). The average FEC was significantly higher ($p=0.045$ Mann Whitney Test) in the wet season ($1363 \text{ epg} \pm 692$) when compared to the dry ($1089 \text{ epg} \pm 508$). Based on the assumption that a FEC of greater than 500 epg is clinically significant, the results indicate that helminths are a problem in working donkeys and suggests that an approach using anthelmintics which target large and small strongyles and administered particularly in the wet season may help to reduce helminth infestations in working donkeys in Kenya.



STRESS AND MORTALITY: EFFECT OF LITTER PROVISION AND GROUP SIZE IN FURNISHED CAGES FOR LAYING HENS

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In the context of the EU Directive aiming to improve housing conditions of laying hens, we compared several furnished cages in term of laying hens welfare in two experiments. Furnished cages must provide larger area per hen than conventional cages, friable litter and several others enrichments (perches, nest...). In the first experiment, six treatments were compared in a 3x2 experimental trial: 3 group sizes of furnished cages (20, 40 and 60 hens) with the same space per hen (768 cm²/hen including nest and litter area); with or without litter (feed) distributed automatically on a mat. In the second experiment, 2 treatments were compared: 60-hens cages with or without litter (wheat bran) distribution. In order to assess animals' stress, blood samples of 30 animals per treatment (3 hens from 10 cages) in first experiment and 21 animals per treatment (3 hens from 7 cages) in second experiment were analysed for measuring heterophil:lymphocit ratio (H:L). Hens were 72 wk old in 1st experiment and 78 wk old in the second one when sampled. Mortality and morbidity were also recorded during all the laying period, on 18 and 16 cages in 1st and 2nd experiments respectively. Mortality was much lower than standard commercial values of 6 % (3.1 and 2.4 % in first and second experiments respectively), and low number of dead animals presented lesions due to pecking (less than 1% in both experiments), maybe thanks to beak trimming limiting cannibalism. Litter distribution (wheat bran or feed) did not affect mortality. Moreover, mortality was not different between group sizes (2.4, 3.6 and 2.6 % in cages of 20, 40 and 60 hens respectively; P= 0.17), contrary of what could be supposed (higher mortality in larger group sizes). Increasing of H:L could mean higher stress. Our results showed that H:L increased with group size (0.61 in 20, 0.73 in 40, 0.99 in 60-hens cages without litter, in first experiment, P = 0.011), and was significantly lower for hens in cages with litter compared to the ones without litter distribution (2 experiments confounded, 0.77 vs. 0.59 with litter; P = 0.004). Providing litter in furnished cages is a requirement of the EU Directive in order to promote behavioural needs of laying hens such as pecking and scratching. This study showed that this could also decrease level of stress, expressed here in term of H:L, especially in large group sizes.



EVALUATING THE POTENTIAL OF ABATTOIR MEAT INSPECTION AS AN ANIMAL WELFARE SURVEILLANCE TOOL

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As public concern about animal welfare continues to develop there is a growing need for better surveillance of animal welfare across the EU. Meat inspection findings are currently under-utilised, but have the potential to make a valuable contribution to such surveillance. This is an important consideration in the current debate over the future of abattoir meat inspection in the EU. Building on the findings of a preliminary investigation conducted in 2010, this study aimed to use the current observations of the meat inspection process to determine the prevalence of animal based welfare measures independently and in relation to other conditions, as well as their financial implications.

To achieve these objectives 3537 pigs were studied over a seven day period in one abattoir in the Republic of Ireland during April 2012. Since freedom from injury and disease is considered an essential element of animal welfare, indicators of these problems were included in the measurements taken, along with more conventional welfare lesions. The prevalence of lung disease was found to be 23.2%, pericarditis 2.8% and chronic interstitial hepatitis (caused by migration of *Ascaris suum*) 6.0%. Following meat inspection 2.5% of study carcasses were condemned and a further 3.0% were trimmed. Infectious conditions were responsible for 85.0% of condemnations, the primary cause being abscessation; a lesion often associated with tail-biting.

Overall 72.6% of pigs had detectable tail-lesions, whilst 16.0% and 44.0% were affected by severe loin-bruising and hind limb bursitis, respectively. In contrast to other welfare lesions, those arising from tail-biting significantly increased the risk of carcass condemnation. This supports the findings of previous studies. Costs to producers from carcass condemnations and trimmings were estimated at €0.82 per study pig. These findings highlight significant levels of welfare-related lesions in slaughter pigs, and also illustrate the link between these lesions and financial loss through carcass condemnation. It therefore provides further evidence to support the potential of meat inspection to make an extremely valuable contribution to animal welfare surveillance, with subsequent improvements in animal welfare and production efficiency in commercial rearing of pigs.



MOUNTING BEHAVIOUR IN ENTIRE MALE FINISHING PIGS: SEXUAL MATURITY AND DOMINANCE DO NOT EXPLAIN STABLE INDIVIDUAL DIFFERENCES

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Every year around 100 million male piglets are castrated in the EU, usually without anaesthesia or post-operative analgesia making the procedure both painful and stressful for the piglets. Due to the animal welfare implications of this surgical intervention, several main players in the pig industry have voluntarily agreed to end the practice in the EU by 2018. One alternative to castration is entire male pig production. However, entire males behave differently than castrates, for example, by performing more mounting behaviour, which is suggested to be a welfare problem.

The aim of our study was to develop a comprehensive ethogram of different types of mounting behaviour and to investigate properties, causes and consequences of mounting in different treatment groups.

80 entire male and 80 female pigs from two farrowing batches born six weeks apart were included in the study. The 160 pigs were assigned to social groups of 20 in three treatments: entire male pigs only (MM, 2 groups, n=40), females only (FF, 2 groups, n=40) and entire males and females mixed together (MF, 4 groups, n=80). Measurements took place during the final six weeks before slaughter.

Observations of mounting behaviour on 12 days per batch suggested that: i) males mounted more than females, ii) within sex, there was no effect of treatment on the amount of mounting, iii) there were individual differences in mounting that were stable over time (within sex). Classification of mounting into different categories revealed that sexual mounting was most common overall and in males but only rare in females. Sexual mounts lasted longer and provoked more screaming by the recipient compared to other types of mounting (e.g. caused by crowding or during a fight). There were no relationships between mounting behaviour on the one hand and dominance rank in food competition tests, circulating levels of sex hormones (oestradiol, testosterone and progesterone) at the end of the study, health scores (lameness and scratches) or weight gain on the other hand.

The stable individual differences of mounting over time suggest that mounting behaviour is an individual trait rather than the appearance of random outbreaks. However, these differences in mounting cannot be explained by dominance behaviour or puberty.

Mounting behaviour and in particular sexual mounting provoked high pitched screaming of the recipients indicating that mounting is a welfare problem. For welfare assessment of entire male pig production the performance of mounting behaviour should be considered.



THE EFFECT OF COOLING MANAGEMENT IN HIGH YIELDING DAIRY COWS UNDER HOT AND HUMID CLIMATE ON PERFORMANCE AND WELFARE PARAMETERS

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The objectives were to determine the effects of cooling management of high-yielding dairy cows on intake, milk yield, and welfare parameters as rumination and lying time and oxidative stress in plasma. Forty-two multiparous dairy cows were assigned into 2 treatment groups and were housed in an open barn divided into 2 pens. The groups were subjected to different cooling schedules, in a crossover design as follows: both groups were exposed to 8 cooling sessions per day in the holding area of the milking parlor, but differed in duration: (1) each cooling session continued 25 min (**25M**) or; (2) each cooling session continued 45 min (**45M**). Cooling sessions comprised cycles of 30s of showering and 4.5 min of ventilation. Each period lasted 4 wk, and then treatments were switched for another 4-wk period with 7 d break in-between. Rectal temperature (**RT**) and respiration rates (**RR**) were recorded twice per week at 0630 and 1600. Rumination and lying times were recorded automatically. Since under heat stress animals may experience oxidative stress, blood samples were taken 3 times in each round to determine oxidative stress level in plasma. The afternoon RT of the 45M was 0.5°C lower than in the 25M ($P<0.001$), with no differences in the morning RT. The RR was lower in the 45M than in the 25M at the morning and afternoon records (46.4 and 40.9, and 51.9 and 47.5 breaths/min, respectively; $P<0.002$). No differences were observed in feed intake, milk yield, and milk solids. Daily rumination time tended to be higher in the 45M than in the 25M (461 and 451 min/d, respectively; $P<0.1$), with no differences in daily lying time. Moreover, no differences were observed in oxidative stress levels in plasma between groups. In conclusion, although the 45M group had in total 360 min daily of cooling time compared to 200 min in the 25M group, no advantage was found in feed intake and production. Moreover, except minor differences in RR and RT, no differences were observed in all other animal welfare parameters, including oxidative stress in plasma. It seems that cooling frequency is more important than cooling duration in attenuating heat stress in high yielding dairy cows.



HUMANE MECHANICAL METHODS FOR KILLING POULTRY– DESIGNING AND TESTING OF MECHANICAL DEVICES

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The killing of poultry on farm has traditionally been performed with manual cervical dislocation. Poultry may need to be killed on-farm for three reasons: 1) to prevent further suffering, 2) for disease control purposes, or 3) for 'farm-gate' type sales. However, in light of research suggesting that some birds may be conscious for a significant period of time post application and the restrictions being applied to its use (e.g. <70birds/person/day and a <3kg bird weight limit) as of 2013 by the European Union (EC1099/2009), a mechanical alternative method is required. This study is the first part of a four stage project to design alternative mechanical methods for killing poultry on farm, which conform to the new legislation. Four mechanical devices were designed: 1) Modified Armadillo (MARM), 2) Modified Rabbit Zinger (MZIN), 3) Modified Pliers (MPLI) and 4) a novel mechanical cervical dislocation device (NMCD). The devices were tested on two bird types (laying hens and broilers) at two stages of rearing (juvenile and adult/slaughter age) in order to determine the efficacy of the killing devices, irrespective of bird age and weight. Each device was tested on 10 cadavers per bird type and age group, in four batches. A Graeco Latin Square design was used to systematically randomise the device treatment across the batches, blocks, bird types and treatment sequence order. The killing efficacy of the devices was determined by post mortem analysis of their effect on the anatomy of the head and neck. The efficacy of the devices was assigned to two categories: killing success (where sufficient damage to the anatomy was produced which would have resulted in death) and device success (the specific hypothesised anatomical damage for each device was produced and would have resulted in death). GLMM analysis showed that device success was significantly affected by device ($F=7.90_{(3,157)}$, $P<0.001$) and bird age ($F=5.47_{(1,157)}$, $P=0.021$), but not bird type ($F=0.27_{(1,157)}$, $P=0.604$), with the NMCD device performing best (90.0% mean device success) and the MPLI performing the worst (27.5% mean device success). For all devices the mean percentage for kill success was higher than that of device success ($T=-5.56_{(1,157)}$, $p<0.001$). The results showed that that three out of the four designed devices (MARM, MZIN, and NMCD) consistently cause the required anatomical damage to kill laying hens and broilers.



DEVELOPMENT OF ONLINE TRAINING RESOURCES TO FACILITATE COMPLIANCE WITH EU WELFARE LEGISLATION REQUIREMENTS IN PIGS

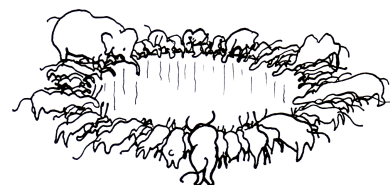
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Legislation and inspection provide powerful tools for the improvement of animal welfare. EU-wide rules should serve to harmonise standards across member states, but this depends on consistent interpretation and enforcement of legislation. Guidance and training available to official inspectors can vary amongst member states and may contribute to discrepancies in professional judgements of compliance. Food and Veterinary Office (FVO) missions monitor the quality of official inspections and provide examples of such disagreement. Examples relating to legislation on foraging enrichment and tail docking in pigs include the quantity of straw and characteristics of other enrichment materials needed to meet pigs' needs. Legally, tail docking should occur only following attempts to alleviate the problem by making environmental and management changes, yet numerous mission reports also indicate that inspectors accept tail docking as routine practice without further investigation.

The University of Bristol is working with a number of partner organisations to develop e-learning resources to facilitate compliance with EU welfare legislation requirements for enrichment and tail docking in pigs. Part 1 of this project is currently underway and involves the development of an online tool that will examine baseline variability in professional judgements of compliance. It will also explore common sources of disagreement amongst inspectors and help identify additional training needs. In Part 2, a training package will be constructed, incorporating expertise from a wide range of academic, governmental and industrial partners, to assist inspectors in interpreting legislation and assessing compliance. Finally, in Part 3, the training package will be evaluated: if it is effective, then professional judgements of selected case studies should be less variable in inspectors that have used the training tool than in a matched control group.



ANIMAL WELFARE PERCEPTION OF CONSUMERS IN URUGUAY

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The use of animals in production systems, mainly intensive, has important ethical implications and economic issues from the point of view of animal welfare (AW) and its impact at the consumer level. The objective was to obtain the consumers point of view of animal products in Uruguay. We used the methodology of the European Project Welfare Quality ® (telephone survey) questionnaires adapted to our environment. A randomly selected 200 phone numbers of three of the main Uruguayan cities (Montevideo, Salto and Maldonado) were recorded, whereas households with people 18 to 80 years. The data were entered into spreadsheets performing descriptive statistics. The main topics asked were: beef consumption and purchasing practices; labeling; knowledge and experience with animals; concerns about AW; customer service.

A total of 600 surveys were carried out. From these, 82% consume red meat several times, 89% think that AW is a very important issue, but 83% would not be willing to pay premium prices for products animal welfare friendly, unlike European consumers. It is perceived by Uruguayan consumers that the beef and dairy cows have better welfare than chicken and pigs as well as in Brazil and Chile. There are no information in the country of origin, animal feeding and breeding at labels. 98% believe that the AW would increase the volume of milk produced by cows. Moreover, consumers think that AW will improve the reputation of the country. High consumer awareness on AW and care of the environment is perceived between Uruguayan consumers as well as a desire to be more informed. Consumers consider the transport and slaughter of animals are the most critical factors.



ANIMAL WELFARE – EDUCATION AND ITS EFFECT IN INTERNATIONAL CONTEXTS

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Within academia and the charity sector, education is commonly regarded as a central and sustainable mechanism through which peoples' knowledge, understanding, attitudes and skills can be developed in order to improve animal welfare. However the extent to which animal welfare is incorporated within primary, secondary, tertiary and vocational education varies on both the national and international levels. Furthermore, the outcomes of animal welfare education at various levels are increasingly being evaluated and monitored.

The World Society for the Protection of Animals (WSPA) promotes and integrates animal welfare into curricula and teaching at all levels through two formal programmes delivered in four continents: First Concepts in Animal Welfare (FCAW), aimed at 5-16 year olds, and Advanced Concepts in Animal Welfare (ACAW) aimed at tertiary level, with a particular focus on veterinary education. The FCAW programme is based on anecdotal and scientific evidence indicating positive attitudes towards animals formed during childhood predict concern for animal welfare in later life. FCAW aims to integrate Animal Welfare Education into target classrooms by training class teachers in the delivery of FCAW by a series of two workshops combined with assignments carried out over the course of an academic year. The ACAW programme seeks to ensure that veterinary students receive the necessary training in order to recognise and fulfil the vital role they play in animal welfare as practitioners, educators, researchers and policy makers. ACAW trains lecturers in veterinary institutions and agricultural training centres in best practice delivery and integration of animal welfare education into their teaching programmes.

The outcomes of both programmes have been measured through a pilot monitoring and evaluation programme. In one Mexican school, attitudinal questionnaires were used to collect baseline and follow-up data from two groups of students within two age ranges (6-10 and 11-14 year olds): A treatment group whose teachers had completed the FCAW training programme during the academic year ($n = 132$ and $n = 103$) and a control group ($n = 32$ and $n = 32$) whose teacher who had not completed the FCAW training. For the ACAW programme in Mexico, attitudinal data were collected for veterinary lecturers and professors ($n=100$) and veterinary school directors ($n=100$) pre and post attendance of train the trainer workshops.

It is hypothesised that, relative to the control group, students who are taught by class teachers who have undergone our FCAW training programme will have improved attitudes towards animals and animal welfare and that veterinary school professors, lecturers and directors who partake in our ACAW training programme will show a more positive relationship to animal welfare issues after their attendance in comparison with before. Data analysis is currently underway.



EUTHANASIA OR PRECAUTIONARY EUTHANASIA?

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The current global economic situation is placing huge demands on animal shelters and other animal welfare organisations. For example, the 'Left on the Verge' report produced by a consortium of UK equine welfare charities states that equine rehoming centres in the UK are running close to maximum capacity; there is little space to take in any more animals. RSPCA are currently appealing for funds to combat a situation of increased animal abandonments they refer to as 'animal welfare crisis'. In the light of these circumstances, some animal welfare organisations have reluctantly begun considering the possibility of having to destroy abandoned healthy animals due to a lack of resources to rehabilitate them. The term euthanasia is often used in such discussions, the justification being that if animals are facing an uncertain future with possibility of neglect it may be better for the animals to be destroyed to avoid the risk of such an eventuality. There is debate over the definition of euthanasia, but it is often proposed as being humane killing in the animal's interest. This is where the difficulty lies, for in some cases it is difficult to predict the animal's future interest with any certainty. One can imagine the scenario where animals at risk of poor welfare are seized by an animal welfare organisation for fear that they may suffer; yet the organisation lacks the resources to house them, or the animals are unlikely to be able to rehabilitated to a state suitable for rehoming. In such a case it may be decided to euthanise the animals. In this scenario, an attempt is being made to predict the animals' future interest, yet this knowledge is imperfect. Would the animals, in fact, fall into a poor welfare situation if they were not seized? Might there be a chance of rehoming after all? In order to distinguish true euthanasia, where we can be reasonably certain that an animal is experiencing poor welfare and will continue to do so if the action is not taken, from the scenario discussed above, the term 'precautionary euthanasia' may be more appropriate. Precautionary euthanasia can then be subject to ethical scrutiny and debate as a concept in its own right.



SHEEP FARMERS' DECISIONS IN MANAGEMENT OF LAMENESS IN SHEEP

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Lameness is one of the most important diseases causing poor welfare in sheep in the UK. The most common cause of lameness is footrot caused by the bacteria *Dichelobacter nodosus*. The aim of this study is to investigate UK sheep farmers' decisions regarding management of lameness to identify the key barriers and motivators to promote best practice to reduce the prevalence of lameness. Evidence from research is that best practise is to treat all lame sheep rapidly with antibiotic injection without trimming affected feet and to cull ewes that are repeatedly lame. This approach reduces the prevalence of lameness to 1-2%. Reducing lameness from an average 6- 8% to 1 – 2% reduces the duration and severity of lameness events and increases lambs born, lamb survival and lamb growth rate.

Seven focus groups with a total of 45 farmers were conducted. The discussion was guided by questions to address farmers' disease representation, perceived behavioural control, subjective norms and attitudes towards the target behaviour. The discussions were transcribed and a thematic analysis was conducted using the analytical program Nvivo.

Overall farmers considered themselves well informed about the causes of footrot and stated that the consequences of footrot were reduced lamb growth rates and poorer ewe performance. Most farmers expressed empathy or sympathy for lame sheep but a minority did not. Farmers considered themselves expert at their job and as a consequence were less concerned about what the public or other farmers thought about seeing lame sheep on their farm. They did not consider legislation a driver to treat lame sheep. The majority of farmers expressed interest in learning new ways to manage lameness but also reported that they had been managing lameness in their flock the same way their whole working lives.

A telephone questionnaire was designed around the themes identified from the focus groups. Forty eight farmers were interviewed. None were following the best practice protocol to manage footrot; 34% of farmers said they might be willing to use it in the future. The most frequently reported barrier to change was unwillingness to stop trimming feet diseased with footrot.



DEVELOPMENT OF ANIMAL-BASED WELFARE INDICATORS AS A SURVEILLANCE TOOL AT CATTLE SLAUGHTERHOUSES

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Conventionally, the assessment of compliance with animal welfare requirements and legislation is based on resource-based indicators such as cage sizes, light intensity and flooring quality. However, this assessment does not include individual animal response to environment and management. Animal-based welfare indicators aim to directly determine the actual welfare status of the individual animal or herd. Some of these indicators are applicable for ante-mortem or post-mortem inspection and thus can be recorded at the slaughterhouse. Little work in this area has been dedicated to cattle so far. Thus our study aimed to develop reliable, practical indicators for calves, fattening cattle and dairy cows that are easily recordable at the slaughterhouse and that mirror the welfare situation on the farm of origin. In a first step, we carried out a questionnaire based survey among Swiss official veterinarians working in slaughter animal inspection and meat control to integrate their opinion on prevalence and feasibility on a list of indicators derived from literature review and expert opinion. In a second step, we carried out a continuous data collection over 10 months in two of the largest Swiss cattle slaughterhouses and developed a simple, rapid, repeatable scoring system for the assessment of the potential indicators. In a third step, we currently validate the significance of the indicators by comparing our slaughterhouse findings with the animal welfare situation on the farms of origin in the frame of a double blind field trial. The recording and evaluation of objective animal-based welfare indicators – which are easy to gather on a nationwide basis in slaughterhouses – enable risk-based planning of official veterinary animal welfare controls on animal holdings: If successfully implemented, it would allow the grouping of animal holdings into separate categories in which low or elevated control frequencies would be adequate, or immediate action might be required. The study design, current results, and a repertory of indicators will be presented.



A BEHAVIOURAL ASSESSMENT OF THE DISTRESS INCURRED BY BULLS IN THE BULLFIGHTING ARENA

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Although we have come a long way from questioning whether or not animals can experience distress, including pain, we continue to knowingly inflict unnecessary distress on animals for a variety of debatable reasons; all which are of no benefit to the individual animal. Examples of this are abundantly present all around us and include beak trimming in baby chicks, tail docking and castration of piglets, tail docking of puppies, dehorning of cows and goats, and branding, ear notching, teeth clipping and comb and wattle removal of farm animals. Sadly, some people will even pay money to watch a so-called “sport” where animals are purposely harmed and/or killed, and the victors of pain are applauded for their “skill” and reap immense awards in money and adulation. Such is the case with bullfighting.

Causing distress is an ethically serious matter. The assessment of distress in animals can be challenging. Recognizing distress in animals is not intuitive, particularly by individuals unfamiliar with normal behavior for a species. In recent years, there has been an increased focus on determining and measuring species-specific pain behaviors (“pain scales”), which should improve recognition and treatment of pain in animals.

In the past couple of decades, many countries, including the United States, have adopted pain scales as a means of assessing pain. Pain scales attempt to classify the severity of pain inflicted on animals from little or none up to severe. This report applies a distress scale, which includes pain, to review procedures which are of concern from an animal welfare standpoint. Specifically, the distress scale is used as a way to quantify the distress incurred by bulls in the bullfighting arena through behavioral observation from twenty eight bullfights in six different locations in Spain.

Using scientific data, this report establishes that fighting bulls, like other bovines, feel pain and distress—they suffer in the bull ring. This opinion is based on the irrefutable science of anatomy, physiology and neurology governing pain receptors in the skin and muscle of the bovine. Based on this knowledge, it can no longer be considered acceptable to intentionally inflict harm onto animals—and certainly not for the “pleasure” of spectators. The manner and length in which the animals suffer in bullfighting (both the bulls and the horses) cannot be deemed humane in any shape or form.



**WHEN REALITY AND SUBJECTIVE PERCEPTION HIGHLY DIFFER:
QUESTIONNAIRE VS OBJECTIVE OBSERVATIONS DISCREPANCIES IN
HORSES' WELFARE ASSESSMENT**

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As stereotypic behaviours may reflect suboptimal life condition, evaluating their prevalence in different environments is crucial in order to identify the problems and favour better management practices. In horses questionnaires surveys identified 1 to 10% of individuals in the tested populations performing stereotypic behaviours. However, a few observational studies converge towards much higher prevalence (22 to 96%). Different factors may explain this discrepancy: type of studied horses, definition of stereotypy or the methodology used. In order to disentangle these factors we conducted on study on 373 horses of various ages and breeds, distributed amongst 26 riding schools. Questionnaires were given to caretakers, asking about potential chronic health disorders, including the presence of stereotypies as well as their type for each horse. In parallel, each horse was observed using Instantaneous Sampling method (3 sessions of 30mn). Horses were also observed continuously during 3 sessions of 6h, to build an exhaustive list of stereotypic behaviours for each horse. The results showed a high discrepancy between the 2 evaluations both in the percentage of stereotypic horses detected (5.56% (questionnaires) vs. 37.53% (observations) χ^2 test $P < 0.001$) and in the type of stereotypies detected (e.g. head nodding vs. weaving, χ^2 test, $P < 0.001$). These results show that some stereotypies, even in "classical" ones seem to be difficult to detect and abnormal repetitive behaviours (e.g. repetitive licking) may also not be identified as such. Thus, the under evaluation by caretakers, due to a lack of attention or recognition of stereotypies may be the primary factors in the differences observed between studies in the literature, but other aspects (unwillingness to admit the "problem", horses having being punished when performing stereotypic behaviours and performing less when in presence of caretakers...) remain to be tested. This study is raising the general question of using questionnaires in the assessment of behavioural traits and of their use for welfare assessment.



NOVEL LAMENESS DETECTION BY USING HAND-HELD INFRARED THERMOMETER DEVICE

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Lameness is one of the most serious economic and welfare issues in the dairy industry, reducing locomotion and causing suffering to an animal. Detecting early lameness can be difficult for farmers but providing treatment at early stage is important. The infrared thermograph camera is a non-invasive diagnostic tool to detect foot lesions. It indirectly measures blood flow changes by detecting minor changes in skin temperature. However, a thermo-camera is costly; a cheaper, portable infrared thermometer may be an effective alternative. In this preliminary study, the objective was to examine the relationship between mobility score, foot temperature and ambient temperature.

The study was carried out on one farm (herd size=990 cows) and visits to the farm were carried out once every two weeks for 6 months. The temperatures of both hind feet of all milking cows were measured by infrared thermometer during afternoon milking in the parlour. Additionally, the mobility of each cow was scored by a professional from a veterinary clinic using the DairyCo 4-point scale (0, 1, 2, and 3) as the cows exited the parlour. Ambient temperature was recorded once at the start of each milking session. Foot temperature ranged from 7°C-32°C (Mean±SEM=23.83±0.03°C) and ambient temperature ranged between 6°C-23°C (Mean±SEM=13.99±1.60°C). Over 12 visits 62%, 33% and 5% of the 11891 assessments of the cows recorded mobility scores of 0 (not lame), 1 (mildly lame) and 2 (moderately lame) respectively. No cows were recorded as score 3 (severely lame). For assessments where cows had mobility scores of 0, 1 and 2 the mean foot temperature was 23.77±0.15°C, 24.06±0.16°C and 24.93±0.36°C respectively and the mean differential between right and left foot temperature was 1.35±0.02°C, 1.25±0.02°C and 1.65±0.08°C respectively. A one-way ANOVA test showed that there was a significant difference between the foot temperature of cows with each mobility score ($P<.001$) and a significant difference between the differential between both feet temperature ($P<.001$) for cows with each mobility score. Furthermore, a positive correlation was demonstrated between foot temperature ($R^2=0.151$, $P<.001$) and ambient temperature and a negative correlation between the temperature differential between both feet of a cow ($R^2=0.049$, $P<.001$) and ambient temperature.

The infrared thermometer was able to demonstrate increasing foot temperature with increasing lameness. Work is ongoing to validate this method as an on-farm lameness detection tool to account for the confounding effect of ambient temperature, which may be reduced if the temperature differential between right and left feet is used.



RABBIT WELFARE AT SLAUGHTER: CURRENT RESEARCH AND FUTURE CHALLENGES

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Although rabbits are the second specie in number of animals slaughtered per year in Europe (FAOSTAT), little research on animal welfare at slaughter has been carried out. Dennis et al. (1988), Holtzmann and Loeffler (1991) and Schuett-Abraham et al. (1992) concluded that the penetrative bolt stunning is an effective method to induce unconsciousness in rabbits since it provoked an instantaneous loss of posture and cessation of all the brain stem reflexes. However, the EFSA report (2006) concluded that the effectiveness of this method varies depending on the shot position. Croft (1952) initiated the study on electronarcosis in rabbits and based into the Electroencephalography assessment stated that a minimum current of 30mA was required for effective stunning in rabbits. Anil et al. (1996) increased this threshold to 140 mA according to some physiological reflexes (rhythmic breathing, corneal reflex, response to painful stimuli and posture recovery). Dal Bosco (1997), Anil et al. (1998, 2000) and Maria et al. (2001) assessed electrical stunning effectiveness among different frequencies (50–1667 Hz) and voltages (19-130 V). However, none of the experiments achieved a 100% of stunning success and the times to recover consciousness greatly varied possibly due to variations in the current among animals due to individual impedance. Rota Nodari (2008) stunned 1020 rabbits with 1.1 A of constant current and found that the main factor affecting stunning effectiveness was the electrodes placement on the head. Thus, parameters at which rabbits should be electrically slaughtered can vary and should be accurately studied. In addition, both mechanical and electrical stunning methods, the only methods allowed by the current legislation in the EU (Regulation 1099/2009 EC), require the previous restraining of the animals, that may cause acute stress. An alternative and non-invasive stunning method is gas stunning. Llonch et al. (2012) exposed rabbits to nitrogen and carbon dioxide gas mixtures, and reported a rapid loss of consciousness with mild aversion. Consequently, the future challenges in rabbit welfare at stunning are, firstly, the identification of the electrical parameters that guarantee the instantaneous and permanent loss of consciousness, and secondly the exploration of non-invasive stunning methods that could reduce the stress produced by restraining before slaughter, such as use of gases.



TEACHING ETHICS TO VETERINARY STUDENTS IN EUROPE

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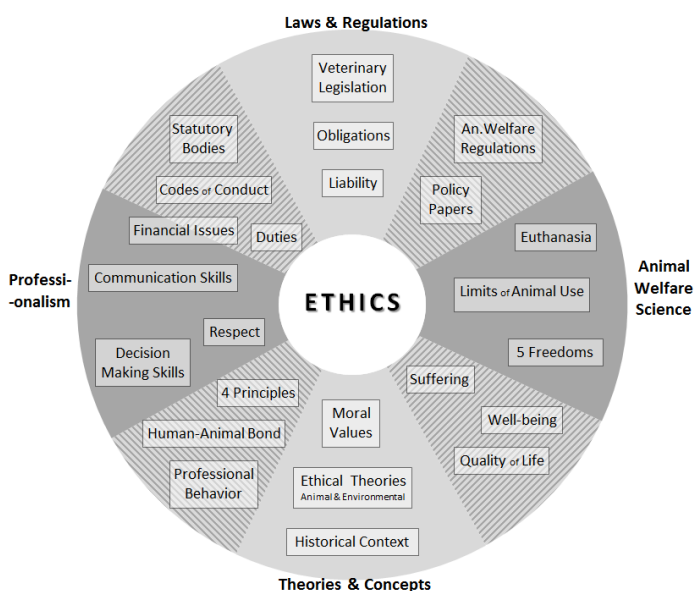
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It is now widely recognized that ethics needs to be part of undergraduate veterinary education, but there is little discussion of how the topic is best incorporated. This paper reports an analysis of ethics teaching in European veterinary schools combining extensive web mapping with in-depth analysis of 3 cases selected to reflect the European diversity in location, history and organization of veterinary education.

The web search included data from 55 faculties listed at the website of the Federation of Veterinarians of Europe. Ethics or ethics-related topics were identified together with descriptions of teaching methods and context. For the in-depth study, three cases were selected: Copenhagen (established 1773, northern European country, horizontally integrated curriculum), Lisbon (est. 1830, southern country, traditional horizontal curriculum) and Nottingham (est. 2006, first vet school in the UK for over 50 years, clinically integrated curriculum). Semi-structured interviews were carried out with educators involved in teaching ethics to veterinary undergraduate students at the three schools. In addition, one focus group discussion with students was held at each school.

The web mapping showed great diversity, but four approaches to ethics teaching clearly emerged: animal welfare, laws/regulations, professionalism and theories/concepts. The in-depth case analysis reinforced this perception. The figure illustrates the combination of ethics related topics found at the three schools. Further details on how these approaches are being combined and conceptualized at each school will be presented.



The differences in approach are also reflected in how teachers in each institution formulate the relevance of ethics within the veterinary curriculum. Teachers in Copenhagen focus on the need for students to be aware of different values and prepared to deal with situations where these values conflict. In Lisbon, in addition to helping students meet ethical challenges, there is a concern to present them with the correct professional behaviour. This view is also partly present in Nottingham, where, together with decision-making and communication skills, good professional behaviour contributing to a positive

image of the veterinary profession are also major motives for teaching ethics.

In the presentation, we will reflect on these findings and further discuss how the different approaches are reflected by the students in the focus groups, in particular in how they address a hypothetical ethical-clinical dilemma.



WANDERING CATS AND CAT MANAGEMENT IN THE UK

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Despite the popularity of cats as pets and approximately 300,000 road deaths annually, the perception of risks and benefits of cat wandering is understudied. ‘The Cats in the Community National Survey’ was distributed online (www.surveymonkey.com/UOLCats) in the summer of 2012. The survey, with versions for owners and non-owners, asked respondents to provide details about their perceptions of the impact of cats in the local environment and cat containment strategies. Data were also gathered from owners, concerning their cats and methods used to limit it from wandering. Social media were used for recruiting respondents. Among the 3619 UK respondents (2,963 owners, 656 non owners), completion rates averaged 80%. Continuous data were recorded on a 5 point Likert scale and analysed with Mann-Whitney U Tests. Data are presented as median scores for owners and non-owners. Owners and non-owners differed in their perception of risks, with owners showing more concern about risks than non-owners (e.g. Injury on the road: Owner = 5, Non-owner = 3, $Z = -17.77$, $p < 0.001$). Among the possible issues relating to cats entering other people’s gardens, owners gave more weight to those that could cause harm to their cats, (e.g. Conflict with pets: Owner = 3, Non-owner = 2, $Z = -9.22$, $p < 0.001$) whereas non-owners emphasised problems for humans (e.g. Toileting: Owner = 2, Non-owner = 4, $Z = -8.44$, $p < 0.001$). These groups did not differ significantly in their rating of the risk to wildlife from cats. In relation to cat containment, owners most often reported having no specific method in place to prevent them from roaming freely ($n=827$, 35.7%), or limiting unrestricted access to the daytime only ($n= 758$, 32.7%). 314 owners (13.6%) reported keeping their cats indoors at all times. There was no difference between owners and non-owners in approval of cats having access outside only in the daytime or unrestricted access, but non-owners showed greater approval for the use of specific containment systems (e.g. cat-proof fencing: Owner = 1, Non-owner = 3, $Z = -9.033$, $p < 0.001$). Comparisons within the owner group revealed that those who opt for some method of containment put greater emphasis on risks and less emphasis on benefits to wandering, compared to those using no method. The findings highlight differences in attitudes that will inform future research into how best to minimise the risks from outdoor access to domestic cats.



CO₂ IS STILL ALLOWED FOR KILLING LABORATORY RODENTS BUT IS IT JUSTIFIED?

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According to the new Directive on the Protection of Animals used for Scientific Purposes (2010/63/EU) carbon dioxide (CO₂) can be still used for killing laboratory rodents, but the method is strongly criticised. Inhalant anaesthetics like isoflurane and sevoflurane have been recommended as an alternative, but their application has not been sufficiently validated.

In this study we investigate distress induced by the exposure to 100% CO₂ with different filling rates (20% (CO₂20), 60% (CO₂60), CO₂ 100% (CO₂100) of chamber volume/min) or isoflurane and sevoflurane in different concentrations (Iso2%, Iso5%, Sevo4.8%, Sevo8%) in NMRI and C57Bl/6 mice. We evaluated the effectiveness and reliability of all gases to induce general anaesthesia within 300s. Additionally, we observed the behaviour of the animals including vocalisation during the induction of narcosis and measured the plasma concentrations of adrenaline and noradrenaline immediately after surgical tolerance was reached (tested by the loss of pedal reflex).

Only CO₂60 and CO₂100 as well as Iso5% induced general anaesthesia in all animals of both strains within the given time. Surgical tolerance was reached faster by CO₂60 and CO₂100 in comparison to Iso5%. All NMRI mice but not all C57Bl/6 mice exposed to Sevo8% were anaesthetised within 300s. Behavioural analysis revealed no distinct signs for stress and pain during the induction of narcosis. Neither audible nor ultrasound vocalisations were detected. Adrenaline and noradrenaline plasma concentrations were significantly higher in animals exposed to CO₂ treated compared to animals treated with isoflurane or sevoflurane.

CO₂60, CO₂100, and Iso5% effectively and reliably induced general anaesthesia in mice. However, the raise in adrenaline and noradrenaline concentrations after CO₂ exposure points to much distress in the animals. Therefore, CO₂ alone cannot be recommended as the first choice for killing laboratory mice. Isoflurane should be used with the maximum concentration to provide a save stage of surgical tolerance. Accordant studies are conducted in laboratory rats in order to evaluate the use of CO₂ in this species.

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EFFECT OF TYPE OF FLOORING ON PIG LYING BEHAVIOUR AND SALIVARY CORTISOL LEVELS

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Indoor flooring for pig housing is generally slatted in warmer climates in southern Europe since it provides greater thermal comfort, but it is unclear what type of partial slatting or continuous solid flooring pigs prefer, nor whether type of flooring has significant effects on welfare. In this study, the behaviour and stress levels of fattening pigs were compared using two types of partly-slatted housing, one with concrete flooring and concrete slats and the other with epoxy resin flooring with metal slats. The behaviour of 112 pigs housed in 16 pens was described using scan sampling (8 hours per pig). Salivary cortisol was measured in 1 pig per pen on three different days during fattening (morning and afternoon) for a total of 96 samples, and another salivary cortisol sample was taken after weighing each pig, 0h, 1h and 2h after weighing (stressful situation) near the end of fattening in 3 pigs per pen, for a total of 144 samples. Significant differences were found in the behaviour of pigs depending on the floor type. Pigs spent more time in a recumbent lateral position on the epoxy resin flooring, especially on metal slats, than on the concrete flooring or concrete slats (temperature during the study averaged 22°C, range 19-30°C). There were no differences in baseline cortisol levels for pigs on either flooring but, after the weighing, the cortisol level of the animals housed in the resin flooring showed a normal decreasing tendency whereas the level of cortisol of animals housed in the concrete flooring showed a rising tendency (Figure 1).

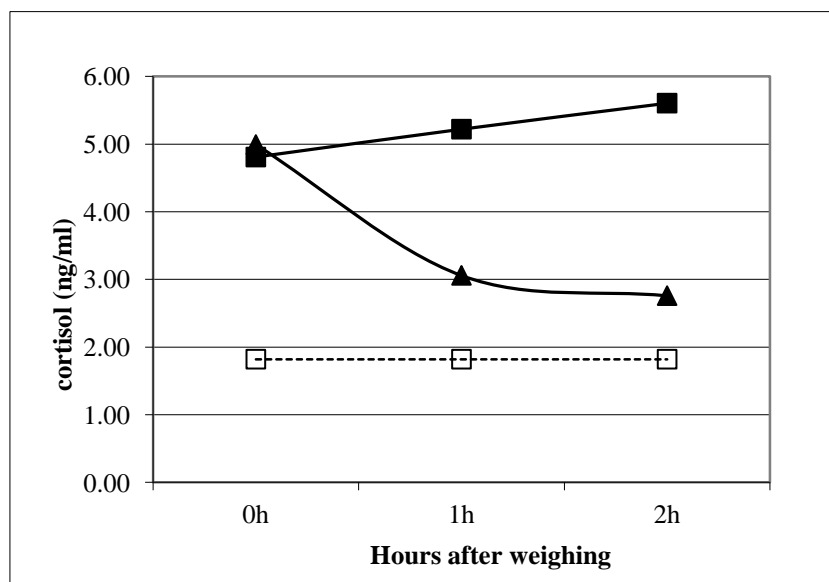


Figure 1. Salivary cortisol concentrations in pigs kept on cement flooring with partial cement slats (■), pigs on resin flooring with metal slats (▲) and control pigs on cement and resin flooring (□, not weighed).



PRELIMINARY RESULTS ON THE BEHAVIOUR OF IBERIAN SOWS HOUSED IN DIFFERENT SYSTEMS AFTER FARROWING IN THE SOUTH OF SPAIN

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Most Iberian pigs are reared in Spain following a traditional system. However, due mainly to productivity and management reasons, on some farms the human intervention is increasing and farrowing crates are being introduced.

The aim of the present work was to study the postpartum behavior of 28 Iberian sows at three different farrowing systems: crate system (CS) (n=12); fence system (FS) (n=8), where sows were individually kept in a fenced paddock with a “camping house” in the middle for nesting and an individual feeder; and group system (GS) (n=8), where all sows were kept in the same field with “camping houses” available for all individuals and a common feeding area. We recorded the sow posture and activity with a scan sampling every 10 minutes during 1 hour per day from day 0 to 15 postpartum.

In the FS, sows were out of the nesting area (absence) in a 46% of the scans and a 21% in GS. In the case of GS, the percentage of absence increased from 0% on days 0-1 to 43% on days 10-12. In FS the percentage ranged from 34% to 88%, without a clear pattern along the days. Regarding posture on days 0-1, it was observed that standing was the preferred position for sows in the CS, with a 55% of the scans. However, during the time that sows were in the nesting area, it represented only a 14% in FS and a 6% in GS. What is more, after 10 days postpartum, no sows were observed in this posture in systems FS or GS but it accounted for around the 70% of the scans in CS. On the other hand, sows in CS showed bar biting behaviour in a 5% of the scans from days 0 to 5 postpartum, and this percentage increased up to 27% on days 10 to 15. Therefore, it is concluded that sows prefer to leave the nesting area to avoid contact with their litters at specific moments even on the first day after birth if a fence that protects the litter is provided. When the sow cannot escape from the piglets, the standing position increases and after some days, behaviours such as bar biting become very evident.



CHRONIC WELFARE RESTRICTIONS AND THE MORPHOLOGY OF THE ADRENAL GLAND IN BROILER CHICKENS

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Gait problems constitute an important and chronic welfare restriction for broiler chickens. The objective of the present study was to verify whether the morphology of the adrenal gland indicates chronic welfare restrictions in broiler chickens, using gait problems as the stressor. Sixty six birds raised on a Brazilian industrial unit were selected at 40 days of age according to their gait score and separated into two groups. One group was formed by apparently healthy birds (AH), with gait scores of 0-2, and the other group was formed by birds with gait problems (GP), showing gait scores of 4-5. Birds were slaughtered and weighed and their adrenal glands were measured and weighed; the proportion of each medullary, adrenocortical, lymphatic and blood tissue was studied. Results are presented in the order AH and GP. Birds weighed 2.614 ± 0.030 kg and 2.003 ± 0.038 kg ($p < 0.05$), adrenal glands measured 7.80 ± 0.17 mm and 8.10 ± 0.15 mm in length ($p = 0.28$), weighed 67 ± 2 mg and 70 ± 2 mg ($p = 0.36$), and their weights relative to body weight were $0.25 \pm 0.01\%$ and $0.35 \pm 0.01\%$ ($p < 0.05$). The proportion of adrenocortical tissue was 55% and 56% ($p = 0.32$), and the proportion of medullary tissue was 39% and 35% ($p < 0.05$). The index medullary:adrenocortical tissues was 0.80 ± 0.05 and 0.70 ± 0.05 ($p = 0.20$). Blood tissue proportion was 2% and 3% ($p < 0.05$), and lymphatic tissue proportion was 1% e 0% ($p = 0.46$). Birds from group GP presented lower weights when compared to birds from group AH, and when adrenal gland weight values were adjusted to bird weight, a greater value was observed for the GP group. These results indicate an augmentation of the adrenal gland, as well as a lower proportion of medullary tissue and a higher proportion of blood tissue for the GP group. Results showed that gait problems caused significant changes in the adrenal gland, suggesting a possible role for the study of adrenal gland morphology as an indicator of chronic welfare problems in broiler chickens.



ECONOMICS OF FARM ANIMAL WELFARE IN A GROWING POPULATION

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With the global human population estimated to rise from 7.1 billion in mid-2012 to 9.6 billion in mid-2050, and with continued economic development and urbanisation accompanied by changes in consumption towards animal-sourced foods, the future sustainability of the livestock industry will be vital for food security in the coming decades. Until now, increasing intensification of livestock production practices in developed countries has enabled the industry to meet growing consumer demand for animal products, and developing countries are now rapidly following suit. However, intensive livestock production has resulted in numerous welfare issues with the animals raised for human consumption, and concern for farm animal welfare is growing. Further, the sustainability of the livestock industry as it currently stands is threatened by depleting natural resources, climate change and environmental concerns for which recent intensification of livestock production is, at least, partially responsible.

An aggregated model is being developed that aims to integrate the numerous and competing pressures facing the livestock sector. This model will highlight the relationships between demand for animal products, livestock production and associated animal welfare, environmental impacts and various economic factors. The model seeks to estimate the potential impacts that external pressures will have on: (1) livestock production, and consequent farm animal welfare; and (2) the future economic sustainability of the livestock sector. Differences between developed countries and those currently under transition will be highlighted.



EFFECT OF POSTWEANING HANDLING STRATEGIES ON WELFARE AND PRODUCTIVE TRAITS IN LAMBS

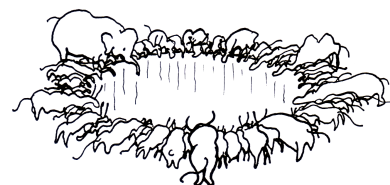
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Artificial weaning can induce an important stress for both ewes and lambs with negative effects on animal health, welfare and performance. Lambs prematurely separated from their dams try to compensate the absence of maternal stimuli by higher levels of interaction with other social stimuli represented by either con-specifics or members of other species. We hypothesize that the establishment of different post-weaning management strategies that include an element of social enrichment may reduce weaning stress, thereby improving productive performance. Thus, the aim of this study was to analyze the effect of post-weaning handling strategies on welfare and productive traits in lambs. A total of 36 *Chamarito* lambs (an endangered native breed of *La Rioja*, Spain) were used. After weaning (30th day), lambs were separated from their mothers and assigned to 3 experimental groups: C: control, H: weaned and fattened with daily gentle human contact, and E: weaned and fattened with the presence of two adult ewes as a social enrichment. Lambs were weighed at birth, at weaning and at the end of the fattening period (60th day). Blood samples were taken to evaluate the physiological stress response, and each lamb was subjected to reactivity to handling test, measuring eye temperature by IR thermography. The data were analysed by least square methodology using the GLM procedure of SAS. Lambs from treatments H and E showed significantly ($P \leq 0.05$) higher slaughter live weights and better average daily gain than control lambs during the fattening period. Problem lambs had a better modulate physiological stress response suggesting a more effective adaptation to the challenging environment after weaning. The gentle human contact is more efficient strategy than ewe nurse group. In conclusion, the use of social enrichment at weaning, especially the establishment of a positive human-animal bond, is a good strategy to alleviate weaning stress and its undesirable effects on welfare and productive performance. The study confirmed the importance of human contacts as indicators of a stockperson's positive attitude towards animal welfare, critical aspect during selection and training programs.



ANIMAL WELFARE ASSESSMENT AFTER LONG TRANSPORTS: AN ANIMAL-BASED APPROACH

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The present study is part of the DGSANCO funded project 'Renovation and promoting high quality control posts in the European Union', and investigated the effect of long transport on cattle welfare. Road transport of live animals over a long journey it is affected by transport organization, environment and handling and is associated with a wide variety of potential stressors, including heat and cold, hunger, thirst, humidity, overcrowding, mixing with unfamiliar animals, fatigue, motion sickness, noise and vibration, and inadequate ventilation. Such stressors often result in poor welfare. The objective of the protocol, based on the four Welfare Quality principles, was to assess animals upon arrival at a Control Post (CP), during unloading, at the resting pens (twice, one hour after arrival and one hour before loading), and during loading to continue travelling to final destination. Twenty trucks transporting a mean number of 35.1 heifers and 8 trucks transporting a mean number of 54.5 steers were assessed in four control posts located in Germany France, Poland and Spain. Lorries came from Ireland, France and the Netherlands going to Kazakhstan, Morocco, Romania, Hungary and Italy. Preliminary results of the animal-based welfare assessments are presented in this abstract.

The percentage of animals that slipped on the ramp was higher during unloading (11.65%) than during loading (7.32 %). The percentage of animals that fell down 1.08% was similar during unloading and loading; 7.99% of the animals vocalized during unloading and 9.91 % during loading.

The following table describes the general activity and social behaviour of the animals in the resting pens: one hour after unloading (arrival) and 22 hours later, one hour before departure.

Observations (% of animals)	1 hour after arrival	1 hour before departure
Lying	7.46	52.47
Standing	81.59	43.44
Walking	10.95	4.08
*Feeding	45.87	15.98
*Ruminating	5.24	25.56
Animals using water points	12.57	2.83
Agonistic events	28.8	5.07
Cohesive events	11.74	9.82

*Can occur while lying or standing

These results indicate that after 24 hours in the control post, cattle show resting behaviours and less agonistic interactions. It shows the need of animals to eat and drink after travelling long distances.

These preliminary results illustrate an animal based approach in evaluating cattle welfare during long transport and allow highlighting some benefits of the stop at control post during long transports.



VALIDATION OF AN ENZYME IMMUNOASSAY KIT FOR CORTISOL DETERMINATION IN HAIR OF DOMESTIC ANIMALS

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Introduction: In the last years increasing attention to animal welfare has promoted the development of non-invasive techniques for monitoring stress. The hair is an storage area of cortisol and provides a long-term hormone level assessment. In addition the hair can be stored and transported under ambient non-stringent conditions and steroid hormones are relatively stable in the hair matrix for a long period time. For these reasons, cortisol determination in hair has been proposed as an approach to monitor chronic stress.

Objective: The aim of this study was to validate the technique for cortisol determination in hair samples of domestic animals with a salivary enzyme immunoassay (High Sensitivity Salivary Cortisol EIA, Salimetrics, USA). Metrological parameters as linearity, quantitative recovery (efficiency of extraction) and assay precision were determined for pig and dog specimens.

Materials and methods: Hair samples were collected using a shave and were stored in plastic bags at 4°C. Before extraction hair was washed with 99.5% 2-propanol to eliminate contaminants that can interfere the determination, and dried at room temperature. Once the hair was dried, samples were finely minced with surgical scissors. Cortisol was extracted from the hair by treating the samples with 99.5% methanol overnight. At the end of extraction, the eppendorfs were centrifuged and the supernatants were finally dried using a vacuum centrifuge and stored at -20°C. The dry extract was reconstituted in phosphate buffer solution from the assay kit. EIA immunoanalysis was performed following the manufacturer instructions.

Results: Linearity was evaluated with a sample of hair extract which was serially diluted and the linear slope had a $r^2 = 0.9976$. Recovery was determined by spiking a hair sample with a known amount of commercial cortisol (3 µg/dL) before extraction, and it was calculated as 80 % in pigs and 103.1% in dogs. Assay precision was assessed by calculating intra-assay coefficient of variation in extracts at two ranges of concentration. Intra-assay variation ranged from 8.45% (low concentration, 0.28 µg/dL) to 3.75% (high concentration, 0.99 µg/dL).

Conclusion: The metrological characteristics of this methodology make it suitable for the analytical determination of cortisol in hair from pigs and dogs.



CAN EARLY ACCESS TO THE RANGE AREA BE A SOLUTION TO REDUCE INJURIOUS PECKING IN LAYER CHICKENS?

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Alternative housing systems for layer chickens such as free-range and aviary systems show much higher incidences of injurious pecking than with those birds housed in conventional caged systems. The egg industry uses both beak trimming, with hot blade or infra-red techniques, of the birds and dim lighting methods to help reduce injurious pecking or cannibalism. But the act of beak trimming itself may cause pain, suffering and distress to the birds. Injurious pecking is a multi-factorial problem, which can be caused by environmental, genetic, health or nutritional factors and can be largely prevented by the use of a combination of environmental and husbandry management programs without the use of beak trimming. Early access to the range area in free range systems could be an important management factor to reduce injurious pecking and improve hen welfare. This study was made to investigate the effects of early access to the range area on feather score and pecking behavior of laying hens in free-range layer system in Turkey.

This study was supported with a grant from the Scientific Research Project Directorship of Uludag University (Project No: UAP(V)-2011/56)



THE INFLUENCE OF THE “NOVELTY” QUANTITY ON THE INTENSITY OF THE EXPLORATORY BEHAVIOR

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Traditionally environmental enrichment is connected with bringing into animals' environment of new stimuli, and the natural response to such bringing is their exploratory behavior, good welfare indicator. However, during the planning of enrichment the situation of over-stimulation (such a number of new stimuli which can lead to the decrease of the animals' welfare), is not considered. It is obviously that any novelty leads to the increase of the uncertainty, and the novelty is stressors. Moreover, the high level of stress depresses the exploratory behavior. So the new stimuli, exciting some stress of the animal, stimulate the exploratory behavior, however the high level of stress results in its suppression. We supposed the existence of such a level of stimulation by “novelty”, the exceeding of which should lead to the suppression of the animals' exploratory activity.

Three experiments of the influence of the “novelty” amount on the exploratory behavior were conducted.

The first experiment showed lesser exploratory activity of midday gerbils which were kept in a highly changeable environment in comparison with animals living in stable conditions. According to the experiment the gerbils which were kept in a stable environment with the one-time “enrichment”, came in contact with the new object faster and investigated it longer.

The second experiment showed that providing the enrichment to the male Pallas' cat originally increased the animal's exploratory activity, however further strengthening of the intensity decreased the exploratory behavior of the animal.

The third work is dedicated to the analysis of fruit-bats' exploratory behavior. We admitted that the social partner can be regarded as a permanent “novelty” source. We supposed that sensitivity to stressors would be high either with high or low social density. It was shown that the animals kept in the group consisting of larger number of individuals, explore new objects more intensively. But there is a limit of the group size the exceeding of which leads to the decreasing of the exploratory activity.

So there is the limit of the changes made in the animal's environment which essentially influences the intensity of the exploratory behavior and animal's welfare.



POSSIBLE MOTIVATION FOR FOOD GRINDING IN MICE

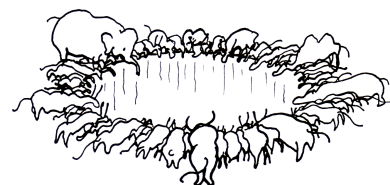
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Food grinding or food wasting is a behavior seen in laboratory mice in which they chew food pellets without ingesting much of the chewed material, resulting in the production of waste material known as orts. This behavior is undesirable as it both seems to indicate unmet animal needs and results in increased husbandry needs to replace feed and soiled cages. Outbred Crl:CD1(Icr) mice exhibiting this behavior were randomly assigned to one of three treatments, a chewing device, sunflower seeds, or control; treatments were placed in the feeding apparatus for four weeks. Both treatment groups had a significant decrease ($p < 0.05$) in food wastage as measured by ort production when compared to baseline measurements and controls ($p < 0.05$), but only mice provided with sunflower seeds maintained the decreased rate of food wastage after the treatment was withdrawn ($p < 0.05$). A relationship between body weight and ort production was also found ($p < 0.05$), in that cages with greater average body weights had lower levels of ort production. This suggests a complex motivation for food grinding behavior. Further work to determine specifically which nutritional or behavioral needs are not being met will reduce the amount of food wasted by mice and increase welfare by meeting the frustrated need behind this gnawing drive.



LOOKING BACK TO MAP THE FUTURE: THE ROAD AHEAD FOR ANIMAL SENTIENCE RESEARCH

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The science of animal sentience is rapidly expanding. Demonstrating objectively what animals are capable of is key to achieving positive change for animals. WSPA has undertaken a systematic review of the scientific literature in order to identify gaps in our knowledge and to assess the acceptance of animal sentience within the scientific community.

Two journal databases (Science Direct and Ingenta Connect) were searched using a peer-reviewed list of 174 keywords, comprised of three lists: human emotions, human behaviours, and terms specific to animal sentience. The list of keywords provided a broad representation of the subjective states of animals, but not a definitive list of sentience criteria. The returned data were screened for suitability, removing any review papers and incorrect uses of the word. Chi-square analyses were performed in order to address the following questions:

- Why was the research performed?
As expected the majority of studies were performed for human benefit (e.g. pharmaceutical development) ($\chi^2 = 1462.344$, $df = 2$; $P < 0.001$) as opposed to studies performed for animal welfare or ethological reasons.
- Which species?
The majority of research was performed on vertebrates ($\chi^2(1, N=2552)=2425.61$, $p<.0001$), mammals (92%), rodents (69%), and rats (52%).
- What do we know?
There were significantly more articles ‘assuming’ the presence of the keywords than those exploring its existence ($\chi^2(1, N=2561)=2497.4$, $p<.0001$). The majority of the articles reviewed were referring to negative keywords such as ‘pain’, rather than positive ones like ‘pleasure’ (2,366 vs. 165 respectively).

The implications of this in reference to animal sentience will be discussed in the full paper.

The results of this systematic review will help animal welfare scientists and animal protection organisations understand what is already known and where gaps exist in our understanding of animal sentience. This knowledge is essential if we are to improve the lives of animals.



COMPARATIVE SPECIES-INDICATORS OF SENTIENCE

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Excellent standards of animal welfare depend on specific and valid scientific indicators of an individual's emotional and physical state. Seeing a broiler chicken with hock burns in the supermarket is as good an indicator of poor physical and likely emotional welfare as is a high frequency of ear posture changes of an individual sheep. Given that wounds can heal and not cause pain after a number of days, the physical changes of pain also have to be assessed (e.g. by changes in heart rate and heart rate variability). Likewise, behavioural changes that are closely linked to sympathetic and parasympathetic reactions to pain & suffering, can be assessed with observing individuals, i.e. changes in pupil size, eye white, eye opening or general changes in activity (higher or lower). On the other hand, positive emotional states in e.g. sheep have been described by passive ear postures and high heart rate variability. These indicators can be used for a large number of different species, such as living chickens, dogs, horses, sheep, (dwarf) goats, horses, pigs or cattle. Even the eyes of mice and rats can be observed to judge their current emotional state. In addition, recent technological developments have rendered the possibility to assess brain area reactions in alive, conscious and freely moving animal species, which can support us in assessing emotional and cognitive reactions to draw conclusions on the individual's state and change in welfare. Given that most animal species have eye white despite different pupil shapes, it only remains to be found out if they can cry from positive and/ or negative emotional reactions when experiencing such feelings. Such an assessment of emotions can support the judgement of different housing and management system of individual animals.



EQUINE SOCIAL ORGANIZATION: AN ADAPTIVE VIEW WITH IMPLICATIONS FOR WELFARE

L Rees

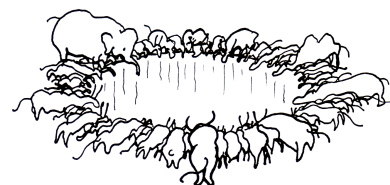
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The welfare of horses in training and riding is compromised by the use of force, painful devices, and punishment incapable of achieving the desired results. Popular misunderstanding of the current ethological view that “horses have strict dominance hierarchies” facilitates the apparent justification of aggressive measures to enforce submission. Part of this misunderstanding derives from the ethological use of the word dominance, which does not imply authority. In Standard English, it does: misinterpretation is inevitable. Similarly, in Standard English submission implies obedience; in equine ethology it signifies avoidance. A clear explanation of what equine dominance and submission mean and what they imply for human-horse relations and training methods seems called for.

However a critical examination of the evidence for equine dominance hierarchies reveals contradictory results, unfounded assumptions and methodological flaws that preclude any clear conclusions or explanation. Unjustified parallels have been drawn between feral horse bands and enclosed domestic groups with focal food sources, where different social dynamics apply. In domestic groups context-specific winner-loser hierarchies, enhanced by learning, do not comply with the properties claimed for dominance hierarchies. Competitive aggression does not diminish, but increases. High aggression rates in domestic groups are seen as status-related, not welfare-related.

A new paradigm for feral horse social organization, based on self-organizing collective behaviour during grouped flight from predators, offers a coherent, adaptive view. Using recent research on herd, flock and shoal behaviour, it shows the three-factor algorithm of cohesion, synchrony of movement and velocity, and non-collision (respect for individual space) to operate not only in flight but in maintenance activities too. Reinterpretation of evidence shows that the final cause of in-band aggression is not status gain but the necessity of respecting individual space in massed flight; proximate causes are various.

The paradigm also allows a reinterpretation of aggressive behaviour related to social stress and learning in domestic horses. It emphasizes the need for educating trainers and riders in equine social relations and in learning theory. A similar revolution is already taking place in the dog world, where a revised view of social relationships is helping combat the deleterious effects of the previous emphasis on dominance relations.



RESPONSIVENESS OF A 46 ITEM HEALTH-RELATED QUALITY OF LIFE (HRQL) MEASUREMENT INSTRUMENT IN DOGS WITH LYMPHOMA

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Introduction

Initial validation and reliability of the instrument, which generates a profile of scores in 4 domains of HRQL, vitality, pain, distress and anxiety, have been reported in dogs with a variety of clinical conditions. Responsiveness is that property that ensures that a clinical instrument is sensitive enough to detect differences in health status that are important to the clinician or patient as well as being statistically important. Accordingly, the responsiveness of an instrument is central to the determination of clinically important change. Lymphoma can cause depression, lethargy, weight loss and weakness and while chemotherapy increases life expectancy, owners often report side-effects that might affect HRQL. Data from a longitudinal study of dogs with lymphoma were used to investigate responsiveness of the instrument.

Methods

Thirty two owners of dogs with lymphoma attending Glasgow University Small Animal Hospital completed 3 or more questionnaires (median 7, range 3 – 19), each questionnaire coinciding with a hospital visit. Simultaneously owners reported whether they considered their dog's health status to be better, unchanged or worse since the last visit. Score difference between questionnaires was calculated for each dog and for each domain and these were related to owner reported change. Level of change was assessed using 95% confidence intervals for the population mean, indicated in bold below. If the interval does not include 0, this reflects that there is evidence of a statistically significant change in the mean domain score.

Results

Dogs were classed as better, unchanged or worse on 65, 149 and 41 occasions respectively. Mean and 95% confidence intervals for change in vitality, pain, distress and anxiety for dogs assessed as 'better' were 0.64 (**0.28,0.99**); -0.46 (**-0.78,-0.15**); -0.52 (**-0.83, -0.22**); -0.45 (**-0.70,-0.19**); for dogs assessed as 'unchanged' were 0.01 (**-0.12,0.14**); -0.05 (**-0.15,0.05**); -0.03 (**-0.17, 0.11**); 0.00 (**-0.11, 0.12**); and for dogs assessed as worse were -1.16 (**-1.61, -0.72**); 0.98 (**0.52,1.43**); 0.96 (**0.47,1.45**); 0.81 (**0.40,1.21**) respectively. For dogs identified as better, there was a statistically significant improvement in vitality, pain, distress and anxiety scores. For dogs identified as worse, there was a statistically significant deterioration in the domain scores.

Conclusions

The instrument was shown to be responsive to clinical change as determined by the owners of dogs suffering from lymphoma. This relatively small study will form the basis of further studies to determine clinically important change on a larger scale for dogs with cancer.



THE IMPORTANCE OF PARTICIPATORY APPROACHES FOR IMPROVING ANIMAL WELFARE

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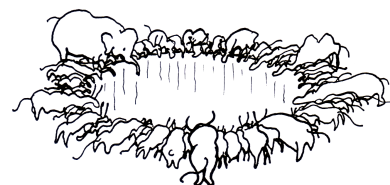
Providing accessible veterinary care to communities that would otherwise not have access to such services has traditionally been the main focus of animal welfare projects alongside activities such as, raising awareness of an issue through education campaigns, and lobbying decision-makers for change. However, providing services is resource intensive and only reaches a limited number of animals, raising awareness does not always lead to behaviour change, and lobbying is often ineffective if the decision makers are not bought into the process. Thus, the use of traditional approaches could be limiting their own effectiveness by targeting the symptoms of a problem rather than the causes, while simultaneously failing to bring about long term sustainable changes in animal welfare practices.

Participatory approaches to improving animal welfare provide an alternative to traditional veterinary intervention and could provide long term sustainable changes in animal welfare. Participatory research is also a little explored approach to gaining data for the preliminary research and assessment needed before a project commences and could serve as an alternative to surveys, opinions and anecdotes.

People learn most effectively by ‘doing’ and by being involved. To change their behaviour people must have ownership of the problem and solution, feel responsibility to change and ultimately want to change. Whether we aim to reach vets, animal owners, consumers, or decision makers, telling people what to do, or giving them information does not automatically lead them to change their behaviour.

This presentation will review the authors’ experiences in applying participatory tools first developed in the humanitarian/development sector to the animal welfare context through their work in partnership with several animal welfare NGOs working around the world. The concepts that form the basis of participatory work can thread through animal welfare work from initial research, to making educational materials more memorable, to changing the way vets run consultations, to education outreach strategies, to engaging with communities to tackle animal welfare concerns such as roaming dog issues or the welfare of working equines.

Monitoring and evaluating the impact of a participatory approach can be challenging and for this too lessons can be learnt from the development sector. Community-based participatory monitoring of animal welfare projects is an emerging theme and will also be covered in this presentation.



PRIORITISING TARGET ISSUES IN A PET RABBIT WELFARE CAMPAIGN

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Animal welfare organisations are often faced with decisions of how best to target limited resources within specific campaigns. Campaigns cannot simultaneously target infinite welfare issues hence need to prioritise. Furthermore it is known from education theory that campaigns are most effective when targeting a small number of critical issues. As a consequence, welfare issues have already been prioritised in several species using a variety of approaches. However, while all approaches are aimed at optimising animal welfare, many lack transparency, and are ultimately based on limited subjective opinion. We here present quantitative methods, based on prevalence data as well as consensus expert opinion, for prioritising welfare issues to effectively target an animal welfare campaign. We use this approach to prioritise issues for pet rabbits.

Pet rabbits represent a relatively new area of welfare attention, with many potential issues on which to focus and we explored how best to prioritise these. In interviews with 23 key stakeholders, we first identified 46 potential welfare issues. We then asked the stakeholders to rate the severity of each, i.e. the extent to which they believed each issue would impact upon a single rabbit's welfare at a given point in time. Based on this, we ranked the issues in two ways: (a) those likely to cause the greatest suffering to a given rabbit at a given time; and (b) taking into account relative duration as well severity of suffering, those likely to cause the greatest net suffering to a given animal throughout its life.

In addition, we used a questionnaire survey of 1254 rabbit owners to estimate the prevalence of each of the 46 issues in the pet rabbit population. From this we derived a third ranking order of welfare issues according to those likely to cause the greatest net suffering to the rabbit population in general.

This method of combining the different rankings identified the following five most important welfare issues in rabbits:

- i. Solitary living without company of other rabbits,
- ii. Unpredictable daily routines e.g. access to run varying according to weather,
- iii. Lack of daily human contact for a friendly rabbit,
- iv. Lack of opportunity to dig,
- v. Lack opportunity to graze.

We suggest that by undertaking welfare initiatives to target these top ranking issues, maximal improvements in rabbit welfare can be achieved. We also discuss the value of this methodology for prioritising a wide range of animal welfare issues.



STUNNING OF SEABREAM-PRELIMINARY RESULTS

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The aim of the present study is to investigate acceptable stunning methodologies for cultured seabream (*Sparus aurata*) in accordance with the pending regulation (COUNCIL REGULATION (EC) No 1099/2009). Tests were made to anaesthetise bream with a range of concentrations of Aqui-S and mixes of carbon dioxide with nitrogen in different proportions. Once the animals were perceived to be under deep anaesthesia, they were slaughtered in ice slurry and samples were taken for stress indicators. For all experiments fish were processed in groups of five specimens. Fish were deeply sedated (upside down and no movement) after a maximum of 5 minutes in a 40 litre solution of 200 ppm of Aqui-S and after 2 min and 24 sec in a 300 ppm Aqui-S solution. Though Aqui-S is authorised in some countries to sedate fish in order to improve the harvest welfare, not only it is not authorised in the EU as with the concentrations used it left a strong smell of clove which may discourage potential consumers. Nitrogen was selected to be used in conjunction with CO₂, because although CO₂ is a very strong anaesthetic it also causes a very intense aversion behaviour in fish, which is thought to be due to the lack of oxygen in the water and to the acidification of the water. N₂, on the other hand, is not a very strong anaesthetic and it does not induce aversion reactions as observed with the use of CO₂. Therefore, in volumes of 40L several proportions of the 2 gases were tried starting at 20 ppm of CO₂ with 80% N₂ (estimated from O₂ displacement) and increasing the CO₂ until 148 ppm but maintaining the concentration of N₂ in the water. In this last combination (80% N₂ and 148ppm CO₂) the fish were anaesthetised in 88 secs. As a control for all the treatments, five fish were slaughtered directly in ice slurry. For the different parameters analysed significant differences were found for the following: lactate, glucose, sodium and chloride. Although this is only a preliminary study, results are promising, can be improved with a larger robust data sets and have the potential to be applied under production conditions to improve fish welfare during slaughter in agreement with pending EU directives.



A LONGITUDINAL STUDY OF EARLY LIFE RISK FACTORS FOR HEALTH AND BEHAVIOURAL PROBLEMS IN THE DOMESTIC CAT

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The domestic cat *Felissilvestriscatusis* an increasingly popular pet, with an estimated 10.3 million owned cats in the UK. However, the number of cats relinquished to rescue organisations has also risen in recent years; Cats Protection, the UK's largest feline welfare charity, currently has over 6000 unwanted cats in their care. In the UK, an estimated 7 to 11% of cats are relinquished due to behavioural problems. These problems directly affect the welfare of cats. Another feline welfare issue is obesity. The prevalence of feline obesity in the UK has increased from an estimated 9% in the 1970s to approximately 39% in 2008. Feline obesity is a serious health problem as it is linked to many diseases such as diabetes mellitus and cardiovascular disease, and may ultimately decrease lifespan.

Kittens aged 8 – 24 weeks homed from UK rehoming organisations are being recruited (01/5/12 – 01/05/13) to a two year longitudinal study, the 'Cat Longitudinal Analysis of Welfare Study' ('C.L.A.W.S.', www.bristol.ac.uk/vetscience/claws). The aim of the study is to use prospectively collected data, via owner-completed questionnaires, to identify early-life risk factors for behavioural problems and health issues such as obesity, with more certainty than previous cross-sectional studies, which are unable to rule out reverse causality. Initial analysis of questionnaires completed by owners of 300 kittens (aged 8-24 weeks) was conducted to provide background information on the kitten and owner cohort after six months of recruitment, and to describe two putative risk factors for feline obesity, feeding regimen and owner perception of feline body condition (FBC).

Analysis revealed that 20.2% of owners feed their kitten treats several times a week, 34.6% feed their kitten *ad libitum* and 31.5% by free choice feeding, all of which have previously been found to increase the risk of feline obesity, as has incorrect owner perception of FBC. The percentage of owners correctly scoring (as true or false) statements about healthy FBC, taken from Purina's Body Condition System chart, ranged from 63.7% to 98.9%, and 91.3% of owners were able to correctly identify the image of a healthy FBC from a selection. This suggests that the majority of owners are able to identify a healthy FBC when they acquire their kitten(s). Risk factors identified through the longitudinal study will enable preventative strategies for behavioural and health problems to be designed, in order to reduce relinquishment of cats and improve feline welfare.



VENTILATION RATE AS ONE BASIC ASPECT FOR GAS EMISSIONS AND ANIMAL WELFARE IN LOOSE HOUSING COWSHED

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There must be three items under supervision at the same time in cattle management: animal welfare, air quality in the cowshed and gas emissions from the cowshed. Measuring system was established to evaluate all three together and next parameters have been monitored: air temperature (4 places), RH (4), carbon dioxide (4) and air speed (10). For monitoring air speed loggers with two dimensional ultrasound anemometers were used. Monitored parameters enable to evaluate both - air quality and conditions for animal welfare. For estimation of gas emission ventilation rate must be calculated as a basis. Airflow patterns were studied and visualised randomly for evaluating acting of ventilation and air distribution. Investigation was carried out in the loose housing cowshed with 138 milking cows in Estonia.



INTRA-DAY VARIATION OF QUALITATIVE BEHAVIOUR ASSESSMENT OUTCOMES IN DAIRY CATTLE

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On-farm welfare assessment protocols such as the Welfare Quality® protocol aim at providing the consumers with information on the welfare state of the animals they buy products from and at providing information for farmers in order to improve welfare. One of the challenges is the reliability of the measures used in on-farm assessment. Consistency of the results over time is crucial, especially if farms are to be certified. Qualitative Behaviour Assessment (QBA) forms part of the Welfare Quality® assessment protocol (WQ) for dairy cattle. Since cattle behaviour is known to show a circadian rhythm with activity peaking at sunrise and sunset whereas the late morning and the afternoon are predominately used for resting and ruminating, also the behavioural expression of the animals may vary with the time of the day. This has not yet been researched with regard to QBA. This study investigated the effect of three different observation times on the QBA results using video clips. A total of 30 video-clips from 10 medium-sized dairy farms in Austria were assessed by 13 observers using the so called Fixed Term Assessment as used in the Welfare Quality® protocol. The Welfare Quality® QBA score was calculated for all three observation times and a repeated measures analysis of variance (ANOVA) was conducted to test the effect of time. In addition to the WQ approach, a Principal Component Analysis was carried out to describe the main dimensions of expressive quality of behaviour. Dimension one was associated with the term 'mood' thus describing similar properties of behaviour as the Welfare Quality® QBA score, while Dimension two was characterized with 'activity'. A significant effect of the time depending on the farm was found for the Welfare Quality® QBA score and for Dimension one and two of the Principal Component Analysis. With regard to the reliability of assessments in dairy cattle it should be considered that the observation time can affect the QBA results and that assessments in the early morning as proposed by the WQ protocol do not necessarily reflect the average situation across the day.



“IF THEY FARE WELL, WE FARE WELL”: PORTUGUESE DAIRY FARMERS’ VIEW ON ANIMAL WELFARE

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Farm animal welfare has increasingly become a concern and a subject of public debate within Europe. In Portugal, the discussion of animal welfare issues is relatively recent and the available data about how different stakeholder groups conceptualize animal welfare is very scarce.

With this study, integrated in the Biosense project¹, we intend to explore Portuguese dairy farmers’ representations of animal welfare, its significance and how farmers perceive other stakeholders’ roles in the welfare of dairy cattle. The sample population was chosen considering that farmers, in their role as caregivers, are central actors in the promotion of animal welfare, and considering the importance of dairy farming within agricultural activity in the region.

During the period between October 30th 2012 and January 4th 2013 we carried out semi-structured interviews with dairy farmers (n=22) from the north-west region of Portugal, randomly selected from the public records made available by local cooperatives.

The interview guide was outlined to prompt an open discussion about animal welfare. It starts by exploring the general requirements of dairy farming and the farmer’s personal history. Targeted questions include what is considered important for success in dairy farming, the current welfare status of their cows, how animal welfare is defined and how to assess it, its importance within daily routine and how they perceive their own role in promoting animal welfare. The interviewees were further presented with three visual stimuli: the Five Freedoms; a list of other actors for dairy

Biological functioning	Subjective experiences	Natural behaviour
Possibility to keep cows separate after calving Good ventilation, light Comfortable cubicle flooring (mats)	Provide cows with comfort	Space to move around freely
Milk yield at milking	Enough space for each cow to	•Eat when she wants •Lie down when she wants
Food consumption Udder/teat temperature	Cows feeling well Cows not being unhappy Healthy cows get up to eat, ruminate normally, walk normally without a limp	

cow welfare and a picture of the Compassion in World Farming poll “Where do you want our milk to come from”.

All farmers considered animal welfare centrally important for their activity and referred to achieving good production as the main reason.

The farmers’ overall perspective on welfare was, however, broader and more complex. As illustrated in the matrix, it encompasses concerns with subjective experiences, biological functioning and to

some extent also natural behaviour, within both engineering-based and animal-based approaches. Several tensions became evident in the discussion of the CiWF poll, i.e. between (i) own current conditions and practices versus representation of an optimal production system, (ii) consumers’ opinion versus willingness to pay and (iii) different aspects of animal welfare.

¹ “Biosense - Science engaging society: Life sciences, social sciences and publics” (PTDC/CS-ECS/108011/2008-FCOMP-01-0124 -FEDER-009237) is a project financed by FEDER Funds through “COMPETE – Programa Operacional de Factores de Competitividade” and by national funds through FCT (Fundação para a Ciência e Tecnologia).



GOOD FARM ANIMAL WELFARE AWARDS: IMPROVING FARM ANIMAL WELFARE ON A LARGE SCALE

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Implementing the findings of farm animal welfare science into commercial practice can be a slow process, typically led by legislation, assurance schemes and voluntary codes of practice; or collaboration between industry and academic institutions. More rapid and widespread uptake is required, however to raise the baseline for the masses; there also needs to be a business incentive for change.

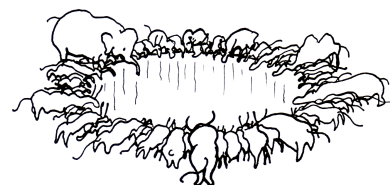
The Food Business programme at Compassion in World Farming uses positive engagement to forge strong business-to-business relationships with leading influential food companies; to drive change for farm animal welfare by directly shaping corporate policies. We aim to place animal welfare at the heart of the food industry, and one tool for success is the Good Farm Animal Welfare Awards.

Our awards consist of evidence-based criteria for each species, designed to raise baseline standards for farm animals. Animal welfare is defined holistically, and encompasses both the physical and mental wellbeing of the animal and its ability to perform species-specific behaviours.

The Good Egg Award addresses confinement in laying hens, and delivers information from current research and best practice for operating without the need to beak trim. The Good Chicken Award address the issues of stocking density, growth rate and access to natural light and an enriched environment. The Good Dairy Award ensures access to pasture grazing and the reduction of poor welfare outcome measures for dairy cows. It also ensures calves are reared in groups with access to bedding, quality colostrum and fibre. The Good Pig Award addresses confinement and lack of manipulable materials and bedding for sows; and mutilations and lack of manipulable materials and bedding for meat pigs.

The more recent evidence behind the awards criteria is explored, and the need for further research on the impact of low activity on the welfare of broiler chickens and the ability to operate with no tail docking and no tail biting for pigs, is described.

Our work is focused on delivering real, measurable impact by recording i. the number of animals benefitting from our award winners policies, ii. identifying market shift created by competitive advantage and iii. delivering consumer awareness. To date more than 311 million animals are set to benefit from our award winners policies and more than 350 million consumers have potentially been reached, through the marketing communications of our winners and press activity around their awards.



DEVELOPMENT OF AN AUTOMATED MEASURE OF THE ‘DEFENCE CASCADE’ IN PIGS

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Concerns for animal welfare are often based on the assumption that animals can experience negative subjective affective states and hence suffer. Although we cannot measure such states directly, to get a truly accurate assessment of on-farm welfare, we require validated proxy indicators of animal affect. ‘Defence cascade’ (DC) responses occur in reaction to sudden, unexpected stimuli and typically involve an initial ‘startle’, a monitoring phase (freeze), then either resumption of ongoing behaviour or fleeing. Startle has been shown to be potentiated by negative affective states and attenuated by positive states in both humans and rodents. This study investigated whether force plates can be used to measure startle magnitude in pigs (as in rodents) and whether computational image analysis (IA) is a suitable alternative measure of the whole DC response. Using IA would enable the test to be a quick, non-invasive measure of on-farm welfare.

A test room contained a force plate with high-frequency video cameras positioned around and above the pen. The data from the cameras and force platform were sampled simultaneously at 50Hz and stored to disk. Twelve pigs were habituated to spending time on the force plate, then tests were carried out at two time points: when the pigs were relatively young and light (20-40kg) and approaching slaughter weight (50-80kg). During each test session the pig was settled on the force plate, a startling stimulus was applied, and the pig’s response recorded. A total of 286 tests were recorded, comprising 4 sessions per pig at each time point and a maximum of 5 tests per session (mean =3). Magnitude of startle and duration of freeze were measured in three ways: using the force plate, IA techniques and scored by an observer.

Pigs gave clear DC responses to a variety of stimuli. Initial analyses showed that the force plate ($\chi^2 = 148.324$, $p < 0.001$) and IA measures ($\chi^2 = 136.859$, $p < 0.001$) increased in line with the observer’s score of startle magnitude. Magnitudes measured by force plate and IA were significantly positively correlated ($r_s = 0.714$, $p < 0.01$). IA measures demonstrated high specificity (0.754) and sensitivity (0.711) in detecting freezes. Observer’ scores of duration of freeze were more highly correlated with the IA ($r_s = 0.781$, $p < 0.001$) than the force plate measures ($r_s = 0.671$, $p < 0.001$). The IA measures are practical for use on farms and were as successful as the force plate at quantifying DC responses in pigs, thus have potential for on-farm welfare assessment.



EFFECTS OF BEDDING QUALITY ON CLEANLINESS, LYING AND EXPLORATORY BEHAVIOURS OF LAMBS

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The study compared the effect of four types of bedding (sawdust, cellulose, straw and rice husk) on the cleanliness and lying and exploratory behaviour of lambs (n=96 entire males, 19.11 ±1.07 kg live weight, approximately 80 days old) during the finishing phase of fattening (14 days). Lambs from each of the four treatments were provided with only one type of bedding, fed with concentrate and water *ad libitum*, and the whole trial was repeated twice. Live weight and concentrate consumption were recorded to calculate average daily gain and the conversion index. The data were analysed using GLM, PROC MIXED, Kruskal-Wallis and Mann-Whitney-U. The sawdust substrate was more absorbent ($P \leq 0.001$) and less variable dry matter, but more variable pH. Straw bedding was the cheapest but lambs explored less throughout the study, probably since it had more moisture (lower dry matter) and, consequently, seemed wetter and dirtier than other beddings ($p \leq 0.05$). Since lambs with straw bedding spent more time lying ($p \leq 0.05$) on a dirtier bed, their dirtiness score was also higher ($P \leq 0.05$). Lambs housed on cellulose bedding showed more consistent interest to explore the substrate ($P \leq 0.05$), which had the highest dry matter at the end of the study ($P \leq 0.05$), the lowest wetness and dirtiness bedding scores ($P \leq 0.05$) and lower lamb dirtiness score ($P \leq 0.05$). Treatment did not affect productivity or carcass quality. In conclusion, chemical and microbiological characteristics of bedding materials are associated with changes in lamb behaviour but all the substrates evaluated could be efficiently used in the system as they did not affect lamb performance.



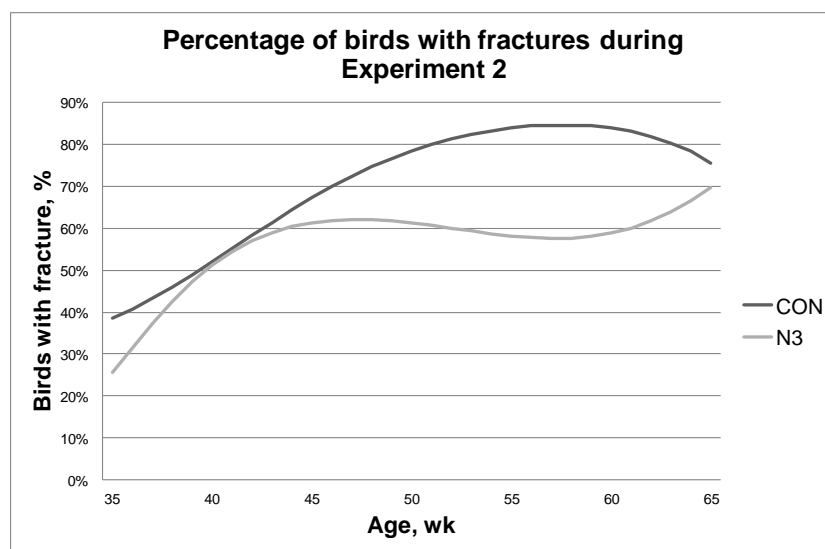
IMPACT OF AN OMEGA-3 RATION ON KEEL BONE FRACTURES AND MEASURES OF BONE HEALTH IN LAYING HENS

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Keel fracture in the laying hen is the most critical animal welfare issue facing the egg production industry and will likely worsen as extensive systems are employed in response to the 2012 EU directive banning traditional battery cages. Given the gravity of the situation, an effective solution to reduce the frequency and severity of keel fractures is urgently needed. The current effort sought to develop a solution utilizing dietary omega-3 polyunsaturated fatty acids (PUFA) as a means to improve bone health and reduce mineral loss from bones of laying hens. Our study utilized a standard commercial unit within a single shed comprised of two barns located side by side. Each barn was divided into two sections by a middle barrier that contained next boxes for that section and then further divided by wooden barriers resulting in each barn containing eight individual pens (N=24,000; n=1,500 hens/pen; n=8 pens/barn). Birds were provided ranging area through barn specific popholes that led to outside areas separated by electrical wire. Pens of one shed received a ration enriched with omega-3 (N3) and the other a standard control (CON). Data was collected over two experiments where the N3 flocks received rations differing in the short:long chain omega-3 content (E1 -0.67; E2 -1.5). Collected data included the occurrence of fractures, bird mass, bone biomechanics and mineral density, and production endpoints at multiple time points. Statistical analysis indicated that during Experiment 1 birds, receiving the N3 saw little benefit to bone health and an unexpected increased in the occurrence of fractures compared to CON birds. Most critically, production variables including poor quality eggs and mortality increased dramatically. In contrast, during Experiment 2, N3 birds manifested decreased fractures and reduced fracture severity, with minor differences in production endpoints. Potential mechanisms to explain the reduced fractures observed in N3 flocks during Experiment 2 include greater bone strength and flexibility as well as increased bone turnover. In conclusion, our data indicate omega-3 rations offer an immediate solution to reduce the occurrence and severity of fractures, though further work is needed to investigate the optimum dietary omega-3 profile including overall omega-3: omega-6, as well as chain length.



**WTO DISPUTE ON EU SEAL PRODUCT TRADE BAN;
WHERE LEGISLATION, SCIENCE AND PUBLIC OPINION MEET**

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July 2009 the EU Council of Ministers adopted the EU Regulation 1007/2009 which bans the import and placing on the market of seal products in the European Union, with an exemption for seal products resulting from subsistence hunts traditionally conducted by Inuit and other indigenous communities. This legislation came into force on 17 August 2010.

The Regulation was a result of years of protest and public outcry about the cruelty of the commercial seal hunt and the rejection by EU citizens of products coming from such cruelty.

Canada and Norway have launched an appeal at the World Trade Organisation claiming that the Regulation does not comply with the rules of the WTO and that the hunt is humane and effectively monitored.

Whereas the legal technicalities and jurisprudence will play an important role in the panel outcome and dispute settlement ruling, scientific evidence on the extent of animal suffering and the ethical stance against the commercial seal hunt are important arguments to bring to the table.

IFAW is of the view that the EU seal ban is a justified measure based on science and consistent with EU societal values. As such, the Regulation complies with GATT rules, which specifically allow parties to introduce import restrictions which are “necessary to protect public morals” (art. XX(a) GATT).

The opinion of the EU’s Scientific Committee ‘European Food Safety Authority’ (EFSA) adopted on 6 December 2007, clearly states that “seals are sentient mammals that can experience pain, distress, fear and other forms of suffering”. The EFSA report concluded that “there is strong evidence that, in practice, effective killing does not always occur.”

A recently published veterinary report by A. Butterworth and M. Richardson (2012) signalled that “the potential for suffering during the hunt continues, and may, in fact, be increasing” and that “the review of available data indicates that generally accepted principles of humane slaughter cannot be carried out effectively or consistently in the commercial seal hunt”.

The report concluded that “Canada’s commercial seal hunt adopts procedures, and has measurable outcomes that do not meet internationally recognized standards of humane slaughter. There are unacceptable (and unlawful) things being done to animals for profit in this hunt. The evidence clearly shows that the actions of governments in prohibiting seal product trade are, and will continue to be, justified.”

It is reassuring to be able to conclude that the public views and animal welfare science are aligned.



2012 CIOMS ICLAS INTERNATIONAL GUIDING PRINCIPLES FOR BIOMEDICAL RESEARCH INVOLVING ANIMALS

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The 1985 International Guiding Principles for Biomedical Research Involving Animals have been revised by an ad hoc committee appointed by the Council for International Organizations for Medical Science (CIOMS) and the International Council for Laboratory Animal Science (ICLAS). The working group had an international and interdisciplinary membership representing several pivotal stakeholder professional organizations. The revised document is the result of an international collaboration of scientists, veterinarians, and other experts whose ideas and suggestions were gathered from more than 10 different meetings held in conjunction with several scientific conferences around the world over a period of more than 3 years. Discussions were based on the statements of principles for the use of animals from over 30 professional societies, organizations, and countries. The revised International Guiding Principles for Biomedical Research Involving Animals reflect current best practices and standards of care in laboratory animal medicine and science and provide a touchstone or framework of responsibility and oversight to ensure the appropriate use of animals. They also may serve as a benchmark for advancing international collaboration in biomedical sciences.

The 2012 International Guiding Principles for Biomedical Research Involving Animals address contemporary issues facing scientists when animals are used for research and education and reflect congruence with the more specific guidance offered by other national and international agencies. Topics addressed include the vital role of and the health and welfare of the animals involved to include adequate veterinary care; the importance of a culture of care and conscience in which individuals working with animals willingly, deliberately, and consistently act in an ethical, humane and compliant way; incorporation of the 3Rs into the design and conduct of scientific and/or educational activities that involve animals; minimization of pain and distress by refinement of experimental techniques and/or appropriate sedation, analgesia, anesthesia, non-pharmacological interventions, and/or other palliative measures; establishment of humane endpoints and timely interventions; qualifications, competencies, and supervision of individuals responsible for the humane and responsible use of animals; and a system of oversight that includes ethical review of animal use as well as considerations related to animal welfare and care.

It is hoped that international organizations and governmental agencies will adopt these revised International Guiding Principles for Biomedical Research Involving Animals and that they will encourage use by the scientific community worldwide.



IS THE COLLECTION OF ANIMAL-BASED WELFARE INDICATORS DURING MILKING AFFECTED BY THE ORDER OF GOATS ENTRY INTO THE MILKING PARLOR?

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When assessing animal welfare within a herd, there are a number of indicators that need to be evaluated, some of which are animal-based. Our hypothesis is that milking is the ideal location/time to assess them. Observing all the animals during milking is time consuming, thus it is necessary to develop a sampling strategy.

Several studies have reported the existence of a well defined order in dairy cows, ewes and goats, when they enter the milking parlor. In this study, conducted in four commercial goat dairy farms, we tried to determine if the indicators assessed during milking were correlated with the order of entry. We collected data on body condition score (BCS), cleanliness, teat and udder abnormality, claw overgrowth, presence of abscesses, lesions or swellings, diarrhea and vulvar discharge, from 30% of the animals randomly selected. In total, we observed 657 adult lactating goats. Lameness information was collected in two farms (155 goats). It was only possible to collect information on age, number of labors, days in milking and milk yield for 516 goats. First, we standardized the milking order variable across all farms. Secondly, we calculated the within correlation of all variables collected. Thirdly, we performed a separate linear regression of each welfare indicator on milking order. We found significant positive correlations for BCS4/5, teat and udder abnormality and lameness, and a negative correlation for "lesions and swellings". Age, days in milking and parity were positively correlated with the order of entry, while milk production seemed to be negatively correlated.

As shown by these correlations, the welfare indicators collected are not independent. Hence we used a multiple regression analysis that included all the welfare indicators collected, except lameness, and regressed them on milking order to partial out the potential cross correlations identified. We also included a dummy variable for each farm. Our conclusions are that only BCS4/5 and cleanliness were positively correlated with the order of entry, while "lesions and swellings" were negatively correlated. Controlling for goat related characteristics, we found that BCS4/5, teat and udder abnormality and age were positively correlated with the order of entry; lesions and swellings were negatively correlated.

Finally, including lameness in the model, lameness, BCS4/5, BCS1/2 and presence of abscesses were positively correlated with the order of entry.

A sampling strategy that can be used during milking should be identified in order to get a representative figure of welfare problems in the whole farm.

The authors thank the EU VII Framework program (FP7-KBBE-2010-4) for financing the Animal Welfare Indicators (AWIN) project.



MANUAL OF GOOD PRACTICE FOR WELFARE OF CATTLE MILK IN PASTURE

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In the 60s, was opened up the debate on ethics in animal production. Since that time, the discussion on the topic animal welfare has taken large proportions, such as the creation of laws and specific rules in some countries. Besides being a subject discussed in different spheres - academic, business and social. However, although there is a lot of information and best- practices manuals for livestock production, there is still limited information to effectively implement animal welfare practices on farms. Currently, the development of protocols that can assess the level of animal welfare in properties is a reality. For dairy cattle in intensive systems, the Welfare Quality protocol evaluates and addresses the key critical points so that the improvements might be implemented. However, a little information exists for dairy cattle in extensive systems. Thus, covering actions directed by the animal welfare management, behavior, nutrition, health, facilities, transportation, and human resource management, the Animal Environment Research Nucleus - NUPEA / ESALQ / USP - with the goal of providing and disseminating good animal welfare practices to all who work with dairy cattle on pasture created the Best- Practices Manual for Welfare- Dairy Cattle on Pasture -, describing the actions and strategies to best promote the animal welfare in this livestock production.



VOCAL CUES TO DISCOMFORT IN MAMMALS: APPLICATION FOR ESTIMATING WELFARE IN CAPTIVITY

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Negative emotional arousal impairs animal welfare. Many mammals respond vocally to discomfort, so the acoustic variables can be measured in automated mode to create systems for real time estimating the degree of discomfort. This is an important problem for farms, shelters and zoos, as control of discomfort leads to decreased traumatism and improves welfare in captive animals. Creating of automated systems for welfare estimation needs in revealing integral acoustic variables, appropriate for measuring emotional arousal in calls of any structure. The acoustic variables for estimation of discomfort can be recommended based on meta-analysis of our own and literature data about discomfort-related shifts in the acoustics across species. Among these variables, the peak frequency and the power quartiles are most universal, as the indicative of discomfort energy shifts toward higher frequencies can be measured in calls of any structure, tonal or noisy. Another universal indicator of discomfort is time spent vocalizing. Modulation of fundamental frequency that can be measured only in tonal calls, represents a particular case of energy shift to higher frequencies. The increase in proportion of time spent vocalizing and the shift of call energy towards higher frequencies may be integral vocal characteristics of short-term welfare problems in captive mammals. For farm pigs, *Sus scrofa*, call-based automated monitoring of emotional arousal STREMODO has already proved to be useful. We have developed and tested a method for estimating discomfort *via* creating and measuring «joint» calls, that can be obtained by removal all silent spaces between calls within a time fragment and are equally appropriate for analysis of all calls independently on their structure, either tonal or noisy. We propose a vocal-based algorithm of automated discomfort estimating, that is applicable for all species of mammals, responding vocally to discomfort. 1. Splitting continuous recording to fragments. 2. Checking the start and end of each call. 3. Preparing a joint call by removal of silent spaces and strikes. 4. Measuring the duration of the joint call. 5. Measuring peak frequency and quartiles of the joint call. 6. Comparison with previous and following joint calls. All these procedures can be made automatically using already existing software.

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SUSTAINABLE INTENSIFICATION AND ANIMAL WELFARE IN CATTLE AND SHEEP FARMING SYSTEMS

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In response to a ‘perfect storm’ of a growing population, climate change and diminishing resources; food production systems including cattle and sheep farming systems need to change to produce more food in a sustainable manner. Sustainable intensification of agriculture has been suggested as a response to these challenges. However, our previous work suggested that profits of hill sheep farms might be improved by expansion, extensification and decreased labour input per ewe. Animal welfare was better served by greater intensification. This paper extends the search for such trade-offs in other sheep and cattle farming systems. To explore these trade-offs and investigate the potential impacts of intensification on profit and animal welfare in cattle and sheep farming systems, the bio-economic linear programming (LP) model developed for our previous study was modified and used in this study. Feed energy supply and demand as well as the supply and demand of labour were matched in the model to maximise farm gross margin. Bio-physical and financial data (2011) from 40 specialised breeding suckler cattle, breeding sheep and mixed enterprises were analysed and used in the model.

An example of results from 15 farms (including both breeding suckler cattle and breeding sheep enterprises) is presented in Figure 1. The results show that in most cases the optimum stocking rates predicted by the model were lower than actual figures, hence lower predicted farm gross margins. Despite the lower predicted stocking rates, in most of the farms the total farm labour costs were estimated to be higher than the actual farm labour costs. Results reveal the potential conflicts between intensification (expanding flock size) for greater profit and higher food security on the one hand and, diminishing scarce resources such as high quality land, feed and labour, which are essential in providing the five freedoms, on the other hand.

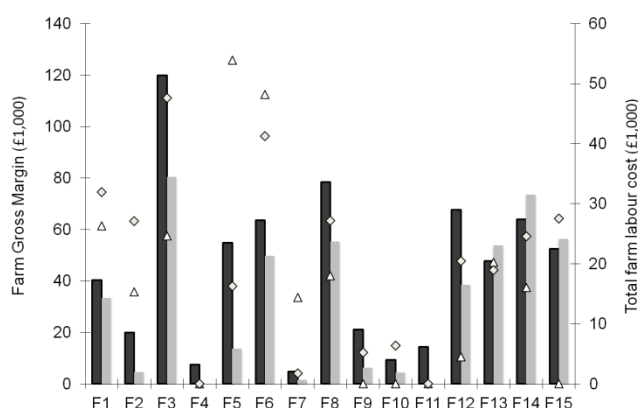


Figure 1. Graphical illustration of actual farm gross margin (dark bars), predicted farm gross margin by the LP (light bars), total actual farm labour cost (triangle dots) and, predicted farm labour cost by the LP (square dots) for 15 Scottish farms consisting of breeding suckler cattle and breeding sheep enterprises.



REAL WELFARE - PREVALENCE OF WELFARE INDICATORS IN THE ENGLISH PIG INDUSTRY

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The Real Welfare project has developed and tested a set of practical and useable protocols that will be used in the English pig industry to measure and compare the welfare standards under which pigs are kept.

Ahead of the EU and EFSA recommendations, England has been developing outcome-based welfare measures i.e. how pigs cope with their environment, rather than measuring components of the housing provided. From a wide range of potential welfare indicators, work from 2006 at Bristol University (in collaboration with Newcastle University and BPEX) identified five finisher* (>50kg) and seven sow measures which are scientifically validated and practical comparators of welfare and production in pigs. Working with the English pig industry, BPEX then concentrated on establishing an initial network of assessors, and refining the methods in a wider commercial setting.

22 veterinarians from 14 practices with regular involvement with pigs attended standardisation days to become familiar with the protocols and definitions needed for objective, accurate data recording. These vets completed extended pilot trials of the protocols across 2011, assessing 157 farms, and resulting in the first large scale measures of body marks, tail lesions, lameness, “hospital” pigs, and enrichment use across the UK finisher population, with similar measures including shoulder and vulva lesions and low body condition also scored in dry sows.

These initial prevalences give us a set of benchmarks to use within industry, and are interesting in themselves, showing what is achievable commercially, as well as providing useful baseline data against which to assess unit changes and industry trends. The value of this approach has been recognised by the Red Tractor assurance scheme, which incorporates 92% of British pigs; a consultation exercise is underway on the proposal to include Real Welfare assessment of finisher pigs as a requirement for this assurance scheme for inclusion in Spring 2013.



**THE BMCRIF DOG HEALTH & WELFARE PROGRAMME: PROVIDING A
BENEFIT TO PEOPLE, THEIR DOMESTIC ANIMALS AND ENDANGERED
BARBARY MACAQUES IN BOUHACHEM FOREST, NORTHERN
MOROCCO**

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The endangered Barbary macaque has associations with people in the Mediterranean going back thousands of years. Conservation of this species is inextricably entwined with people using the forest of Bouhachem in northern Morocco to graze their livestock accompanied by their dogs. Dog predation on the macaques and domestic livestock in the forest is common. Dogs are viewed as unclean in Islam but are used by agropastoralists to guard their herds against wild predators. There are serious issues with dog health and welfare in the study area along with regular human and livestock mortalities from rabies in the villages on the periphery of the forest. Local people referred to these dogs as feral but after photographing each dog observed in the forest and noting whether or not they were accompanied by people we found that all but three dogs were owned, free-ranging dogs from the villages. These dogs were preying on both the macaques and local livestock. In order to communicate this potentially unwelcome information to local people so we could work with them to manage the dog population, we developed a dog health and welfare programme (DHWP). This programme vaccinates dogs against rabies, administers internal parasite medication and provides each dog with a collar (colour coded for each village). After observing packs of collared dogs hunting in the forest, villagers now acknowledge the dogs are owned and not feral. This strategy thus avoided a potential conflict between scientists and villagers. Villagers also know there are too many dogs and all owners of female dogs want their dogs neutered. This programme has provided a direct, positive link between Barbary macaque conservation and villagers by inoculating 300 dogs in three villages. The DHWP obtained 70-80% dog vaccination coverage, substantially lowering the risk of disease transmission to villagers. The programme precipitated a behaviour change among young men and boys who stopped preying on macaques using their dogs. Thus the DHWP achieved decreased human-induced mortalities amongst macaques and has lessened rabies risk to people and their livestock in the study area. In the anthropocentric world view of Bouhachem villagers, it is understood that the BMCRif project team does not value Barbary macaques more than people and wants to work for the benefit of both. The DHWP is ongoing and (funding permitting), will commence neutering programmes in 2013 to ultimately decrease dog numbers, risk of disease transmission and macaque and livestock fatalities due to predation.



BULLFIGHTING *VERSUS* ANIMAL WELFARE

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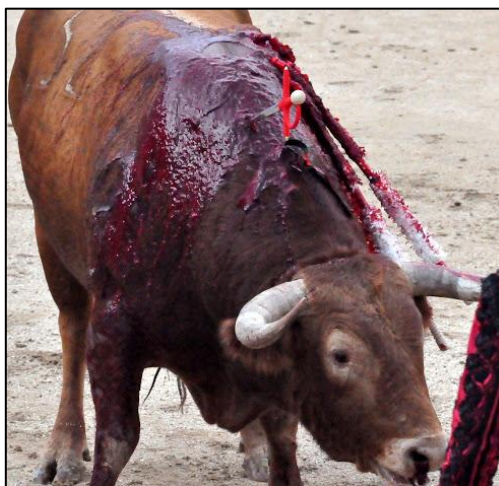
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Bullfighting is a public traditional spectacle in Spain, Portugal, southern France, some Latin American countries, and the Philippines that involves intense animal suffering. Its Spanish version typically finishes once the bull dies in the bullring after a long agony. Bullfighting is divided into three parts: *tercio de varas* (the “third of lancing”), *tercio de banderillas* (the “third of banderillas”) and *tercio de muerte* (the “third of death”). In the “third of lancing”, the neck of the bull – close to the withers area – is punctured several times with a very sharpened metallic weapon, producing damages in muscles, tendons, ligaments, veins, arteries, nerves and bone structures. At this point, animals lose around 8-18% of their blood volume. In the “third of banderillas” six harpoons are planted into the shoulders of the bull, increasing the pain already inflicted, sectioning the muscles and causing more loss of blood. In “the third of death”, bulls are killed after some passes with a small red cape or “muleta”. The bullfighter introduces then an 80-88 cm length sword in the chest of the bull in order to destroy all anatomical structures that it finds in its pathway: bronchi, lungs and large blood vessels, causing profuse bleeding in the thoracic cavity and, therefore, a slow asphyxia. Sometimes the sword even pierces the diaphragm and cuts the liver and stomach. Afterwards, if the animal's death is delayed the bullfighter uses another sword called “verdugillo”, which is introduced between the 1st and 2nd cervical vertebrae with the aim of severing the spinal cord and / or part of the brainstem. As a consequence, the bull suffers from quadriplegia and, therefore, is unable to move. Next, the bullfighter's assistant stabs a 10 cm knife blade into the occipitoatlantal space, slicing the medulla oblongata and producing a slow stop of cardiac and breathing functions, and brain disconnection. Besides the anatomical damages described, postmortem studies show over 32 altered blood parameters and a serious metabolic acidosis. These pathological states are caused by the considerable amount of lactate deposited in the bulls' organs and cells, as a consequence of these herbivores' inability to cope with the strenuous exercise they are forced to undergo. As veterinarians we consider that this type of shows clearly violate the minimum animal welfare standards, and represent one of the most terrible expressions of animal abuse.



“Third of death” in a
bullfighting.

Image taken in *Las
Ventas* bullring
(Madrid, Spain)



GLOBAL NETWORKS OF EXCELLENCE IN ANIMAL WELFARE SCIENCE

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Animal welfare issues are relevant to wide range of stakeholders and interested parties. Effective communication strategies to optimize the use of good animal welfare practices are needed. Some existing assurance and certification programmes can provide benchmarks for animal welfare assessment that reflects validated science based approaches. There is a need to build on earlier excellent work, but the rapidly expanding expertise in animal welfare science is unevenly distributed. The Animal Welfare Indicators – AWIN project (www.animal-welfare-indicators.net), sponsored under the EU VII Framework programme, with 10 institutions in 8 countries, has created the internet-based portal: the Animal Welfare Science Hub (www.animalwelfarehub.com). The Animal Welfare Science Hub should further our mission to promote transparency, stimulate discussions and provide easy-to-access information amongst all in animal welfare science worldwide. The Animal Welfare Science Hub is a repository of information on global opportunities in education, training and capacity building in animal welfare and related topics. It is also is a dynamic platform to develop and host ‘learning objects’. At present these are focussed on the main objectives of the AWIN project: a) to develop and validate welfare assessment protocols, including pain; b) to promote understanding on the relationship between diseases and animal welfare; c) to share research information on the impact of prenatal and early neonatal experiences on welfare and health outcomes and d) to promote global networks of excellence in animal welfare science. Examples of education resources already available in the Animal Welfare Science Hub are 3D simulations and informative videos on sow housing, to allow in-depth analysis of the different viewpoints on this important animal welfare issue. Over the coming months the Animal Welfare Science Hub users will also have access to 3D interactive scenarios as well as a wealth of information on the Council Regulation (EC) No 1099/2009. We aim to foster long-term partnerships with well-established organisations, which have the scientific credentials and representativeness to host this resource after the lifetime of the AWIN project. The Animal Welfare Science Hub has the ultimate goal to foster discussions on all areas of animal welfare science among stakeholders and interested parties in order to facilitate the implementation of science based policy in animal welfare across the globe.

