

BOOK OF ABSTRACTS



EDIBLE INSECTS

VALUE CHAIN

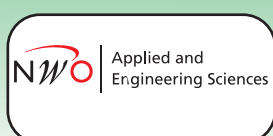
Celebrating 10 years
Insect Research and Industry

March 21 & 22, 2018
Ede-Wageningen

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Book of Abstracts

Edible Insects: The Value Chain

Symposium 2018

21st – 22nd March 2018

Wageningen

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Sponsors

The Organizing Committee would like to express their appreciation for the following sponsors who have supported this symposium:

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VENIK



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WELCOME

Welcome

A global protein shortage might arise in the future. How can we face this increasing challenge of nutrition security? Insects offer a high quality, efficient and sustainable alternative, and have the capacity to valorize organic side streams. As such, insects can close the loop in a circular economy. The symposium “Edible Insects; the Value Chain” 2018 aims to give an overview of the state-of-the-art with regard to edible insects and the insect value chain from a scientific and industrial perspective.

The symposium “Edible Insects: the value chain” 21-22 March 2018 in Ede-Wageningen celebrates 10 years of insect research in The Netherlands. Researchers of Wageningen University & Research will present the latest insights and findings related to the applicability of insects as a novel protein source considering different steps of the value chain.

The symposium connects the latest research results with the broad expertise of industry, and government obtained also thanks to the private public research initiative of the last 10 years. Renowned international scientists will also present their last findings.

The interdisciplinary conference gives excellent opportunity for researchers, industries and users interested in the research on insects to explore potential solutions for a more efficient and effective use of this novel protein source.

Within a broad scientific program with a number of oral sessions over the two-day symposium the following themes are covered:

- *Insect rearing*
- *Insect processing*
- *Insects: consumers and society*
- *Insects in food and feed industry*
- *Insect nutrition and health*

It is our pleasure to host this insect symposium in Ede-Wageningen. The organising committee would like to thank you for your contribution.

Catriona Lakemond, Marian Peters, Femke Obbema, Vincenzo Fogliano

PROGRAMME

Programme

Program Symposium “Edible Insects: The Value Chain” 21-22 March 2018, Akoesticum, Ede-Wageningen, NL	
<i>Wednesday 21 March</i>	
08.30h	Registration
09.20h	Welcome by Eric Michels, Chairman Venik (Associated Dutch Insect Producers)
09.30h	<i>Keynote Chair Catriona Lakemond</i> Anne-Marie Spierings Deputy Agricultural Development and Energy of the Province of North Brabant <i>How politicians can contribute to sector development</i>
09.50h	Arnold van Huis, WUR-ENT, The Netherlands <i>Prospects of insects as food and feed to become a successful agricultural sector</i>
10.30h	Coffee/tea break
Theme Insect rearing Chair Arnold van Huis	
11.00h	Dennis Oonincx, WUR-ENT, The Netherlands, <i>Ultraviolet light in insect production systems</i>
11.20h	Arjan Borghuis, HAS Den Bosch, The Netherlands, <i>Mealworm breeding and rearing: high impact improvements for mass rearing?</i>
11.40h	Lotte Frooninckx, Thomas More, Belgium, <i>Disaster management in rearing</i>
12.00h	Marinus van Krimpen, Wageningen Livestock Research, <i>Growth performance and behaviour of young turkeys fed live black soldier fly larvae</i>
12.20h	Poster pitching <ul style="list-style-type: none"> • Giulio Zorzetto, Swedish University of Agricultural Science (SLU), <i>Effect of moisture and substrate on the survival of early instar black soldier fly larvae in cold storage</i> • David Deruytter, Inagro, <i>Optimizing feed conversion ratio for Hermetia illucens</i> • Bas Godschalk, Insectsforall, <i>Producing fish feed from black soldier fly larvea in Bangladesh</i> • Kristof Das, Agropolis Kinrooi, <i>Agropolis Business park and incubator for innovation in agriculture and horticulture</i> • Thomas Spranghers, VIVES, <i>Automated insect rearing</i>
12.45h	Lunch and poster session
Theme Insect processing Chair Vincenzo Fogliano	
14.10h	Catriona Lakemond, WUR-FQD, The Netherlands, <i>Insect protein and processing</i>
14.30h	Renske Janssen, WUR-FQD/FCH, The Netherlands, <i>Enzymatic and non-enzymatic off colour formation during grinding of insects</i>
14.50h	Laura Gasco, University of Turin, Italy, <i>Use of insect meals on animal nutrition</i>
15.10h	Marieke Bruins, WUR-FBR, The Netherlands, <i>Impact of processing on enzymatic browning and texturization of yellow mealworms</i>
15.30h	Domenico Azzollini, WUR-FQD, The Netherlands <i>The 3F of insect product design (fractionation, functionality, formulation)</i>
15.50h	Leen van Campenhout, KU Leuven, Belgium, <i>Microbiological dynamics during rearing of edible insects</i>
16.10h	Coffee/tea break
Theme Insects in Food and Feed Industry Chair Marian Peters	
16.30h	Catriona Lakemond, WUR/ Marian Peters, NGN The Netherlands: <i>Edible insects 10 years of sector transformation in the Netherlands: Past, present, and future</i>
16.50h	Jonas Claeys, Inagro, Belgium, <i>Insect research at semi-industrial scale</i>
17.00h	Jonathan Koppert, Bestico/Koppert Biological systems, member VENIK, IPIFF, The Netherlands <i>Benefits of collaboration in a starting sector</i>
17.10h	Natasja Gianotten, Protifarm, The Netherlands, <i>Evolution of insect production</i>

17.30h	Cultural program: Musical intermezzo inspired by insects: piano by Bert van den Brink http://www.bertvandenbrink.com/ Marcel Dicke, WUR-ENT " <i>Insects as a source of inspiration</i> "
18.15h	Celebration Cocktail Party 'borrel' : <i>10 years of edible insects on the market & foundation of Venik 10 years ago</i> Speech chairman of Venik: Eric Michels Dinner
<i>Thursday 22 March</i>	
08.30h	Registration
Theme Insect nutrition and health Chair Catriona Lakemond	
9.00h	Keynote: Nanna Roos, University of Copenhagen, Denmark <i>Are insects superfoods? Evidence and knowledge gaps for nutritional and health properties of edible insects</i>
9.30h	Ine v/d Fels, RIKILT, The Netherlands, <i>Heavy metal and mycotoxin accumulation and excretion in insects for feed and food</i>
9.50h	Erik-Jan Lock, Institute of Marine Research, Norway, <i>The use of insects in aquafeed – nutrition and safety considerations</i>
10.10h	Coen Govers, WUR-FBR, The Netherlands, <i>Immunomodulatory and health effects of chitin(-derivatives)</i>
10.30h	<i>Coffee/tea break</i>
Theme Insects in Food and Feed Industry Chair Vincenzo Fogliano	
11.00h	<i>Key note:</i> Andreas Baumann, Bühler Insect Technology Solutions AG; <i>Industrial insect production, Status and perspectives</i>
11.30h	Evelien Decuyper, Strategic Platform Insects, Belgium, <i>Unifying research, policy and sector about insects</i>
11.50h	Hetty Karman, Netherlands food and consumer product safety authority (NVWA), The Netherlands, <i>Insects for human consumption, official controls by the NVWA</i>
12.05u	<i>Round table session 1:</i> Interactive on stage discussions with Insect industry based on provocative statements Theme: Insect processing and value chain development: Discussion leader: Vincenzo Fogliano, WUR-FQD, The Netherlands with; Tarique Arsiwalla, Protix, The Netherlands; Ofir Benjamin, Tel Hai, Israel; Marco Ceriani, Italbugs, Italy; Marleen Vrij, NGN, the Netherlands
13.00h	<i>Lunch and poster session</i>
Theme Insects: Consumers and society Chair Nanna Roos	
14.20h	Erwin Beckers, TNO/WUR, The Netherlands, <i>Challenges of setting up a cricket value chain from scratch in Kenya & Uganda</i>
14.40h	Faith Manditsera, WUR-FQD/Chinhoyi University of Technology, The Netherlands/ Zimbabwe, <i>Are edible insects future protein source in Sub Saharan Africa?</i>
15.00h	Jonas House, University of Sheffield/WUR, UK/The Netherlands <i>Consumer acceptance of insect-based foods: Academic and commercial implications</i>
15.20h	<i>Coffee break</i>
15.50h	Poster pitching <ul style="list-style-type: none"> • Sharon Schillewaert, VIVES, <i>Entomofood</i> • Ofir Benjamin, Tel Hai College, <i>Extraction, characterization and functional properties of soluble proteins from edible grasshopper (Schistocerca gregaria) and honey bee (Apis mellifera)</i>
Theme Insects in Food and Feed industry	
16.10h	<i>Round table session 2:</i> Interactive on stage discussions with Insect industry based on provocative statements

	<p>Theme: Insect rearing and upscaling:</p> <p>Discussion leader: Marcel Dicke, WUR-ENT, The Netherlands</p> <p>with e.g. Nathalie Berezina, Ynsect, France; Bart de Rooter, Protifarm, The Netherlands; Jonathan Koppert, Bestico/Koppert Biological systems & IPIFF, The Netherlands; Eric Michels, chairman VENIK (associated Dutch insect producers), the Netherlands</p>
	<p>Closing session Vincenzo Fogliano & Marcel Dicke</p>
17.00h	<p>Wrap up, concluding remarks and looking forward: Marcel Dicke, WUR-ENT, Vincenzo Fogliano, WUR-FQD</p>
17.20h	<p>& Eric Michels, VENIK, The Netherlands</p>

ABSTRACTS

Abstracts

Introduction

Speaker – Anne-Marie Spierings

How politicians can contribute to sector development?

ANNE-MARIE SPIERINGS

Department of Agricultural Development and Energy, Noord Brabant

Speaker Notes:

Introduction

Not just politicians, but governments can and should contribute to the development of insect production

Insect production has potential of creating a more sustainable way of acquiring proteins for food and feed.

The beginning

10 years ago edible insects were first introduced in the western market by poultry company from Noord-Brabant, M. Ruig & Sons, in collaboration with three insect producers and Wageningen University & Research.

This innovation put a whole new source of protein for human and animal consumption on the map.

10 years ago the Dutch association of insect producers (Venik) was established.

And 10 years ago the first insects were sold at wholesale retailer Sligro, in compliance with Dutch regulations for human food (NVWA).

Now

Not only is this year the tenth anniversary of edible insects for food and feed, but the sector has grown considerably.

Several Dutch companies have shown the way forward in growth and innovation, such as Protifarm and Protix. I've had the privilege of visiting the plant of Protix in Dongen in Noord-Brabant. [Personal account of Agrofoodpluim for Protix]

The future for edible insects looks bright, but there is still a long way to go. But I believe firmly that you should always commemorate important milestones. So, happy tenth anniversary for this sector!

The way forward

Creating value chains is the theme of this symposium and is obviously the way forward for the sector.

The provincial government of Noord-Brabant supports innovations in agrofood. The transition from animal based to insect and plant based proteins is an important part of our agenda.

Regulatory, financial, support and communications

Insect Centre at HAS is conducting applied research in production of protein out of insects. This has been co-financed by the province of Noord-Brabant.

We have lobbied in Brussels for the application of insects for feed.

Several ways of supporting innovations in agrofood (FoodUp!, LIB, TransLab)

Show and tell and connecting networks (example: Dutch Design Week tastings of mealworm)

I wish you an inspiring symposium and a happy tenth anniversary and extend a warm welcome to Noord-Brabant to all companies that want to help move the innovations forward.

LIFE TRAITS AND CHEMICAL COMPOSITION OF THE BLACK SOLDIER FLY ON BY-PRODUCTS

C. JUCKER¹ (COSTANZA.JUCKER@UNIMI.IT), S. SAVOLDELLI¹, D. LUPI¹, G. GISLON², S. COLOMBINI²

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² Department of Agricultural and Environmental Sciences - Production, Landscape, Agroenergy,
University of Milan, Italy

The black soldier fly (BSF) *Hermetia illucens* is able to growth on a wide variety of organic matter, from animal waste and municipal garbage to fruits and vegetables, and market waste. Larvae are able to transform high percentage of this mass into high protein biomass. Thus, BSF was identified as a promising candidate for the protein production for aquaculture, poultry and livestock.

The following by-products were tested: maize distiller grains, okara (soy pulp) and brewer's spent grain mixed with trub (from brewing process). Hen diet was used as control. Effects of different feeds on larval survival, larval weight, and duration of larval period were recorded. Prepupae obtained from each substrate were analysed for their nutritional value.

BSF larvae grew and developed on all substrates. Survival rate was high on all diets, except on maize distiller where a higher percentage of larvae dead. Larvae fed with brewer's spent grain took more days to reach prepupal stage. Differences were observed also on the final larval weight: larval growth on maize distiller was similar to the control, while the final larval weight on the other substrates was lighter.

BSF Larvae were characterized by a high ether extract content (% on DM): 25.1 (control), brewers and trub (23.2), maize distiller grains (29.9), and 31.3 (okara). Crude protein content was on average 52.9% on DM.

The tested by-products can be considered valid substrates for BSF rearing for animal feed, but need more research to be used in mass rearing production.