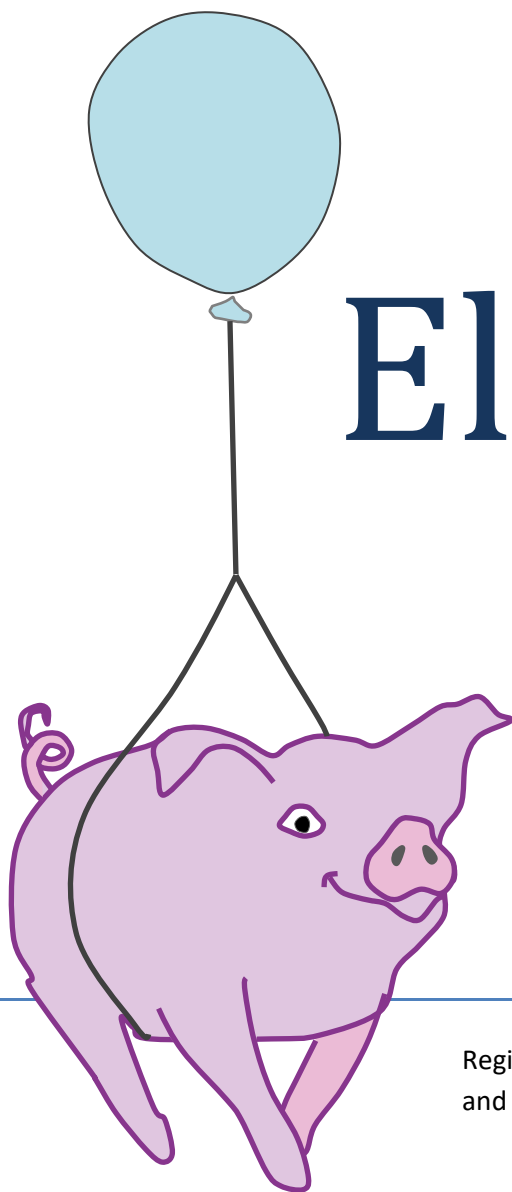


# ISAE Benelux meeting 2020

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*November 3<sup>rd</sup> - online*



# Elevating animal Lives

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Regional secretaries: Lisanne Stadig (Dierenbescherming)  
and Laura Webb (Wageningen University and Research)

# Program

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**9h00 9h15** Intro & welcome – *Laura Webb and Lisanne Stadig*

## Session 1: Creepy crawlies in your feed

**9h15 9h35** Black Soldier Fly larvae as enrichment for layer chicks: a PPILOW pilot – *Saskia Kliphuis*

**9h35 9h55** Long-term access to live black soldier fly larvae (*Hermetia illucens*) stimulates activity and reduces broiler fearfulness – *Allyson Ipema*

**9h55 10h10** Break

## Session 2: Go go go with the flow

**10h10 10h30** Validation of a passive radio frequency identification tracking system to monitor individual broiler activity throughout life – *Malou van der Sluis*

**10h30 10h50** Feeding patterns as real-time indicator of growing-finishing pig welfare – *Jacinta Bus*

**10h50 11h20** Influence of the punisher on the feasibility and sensitivity of a Judgment Bias Task for cattle – *Louise Kremer*

**11h20 11h35** Break

## Session 3: Hot and bothered

**11h35 11h55** Transport of finishing pigs and broilers during high ambient temperatures – An animal welfare risk assessment - *Lodi Laméris*

**11h55 12h15** Effect of a stressor on eye-temperature in horses (*Equus caballus*) – *Hilde Vervaecke*

**12h15 12h30** Closing – *Laura Webb and Lisanne Stadig*

# Session 1

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## *Creepy crawlies in your feed*

### **Black Soldier Fly larvae as enrichment for layer chicks: a pilot**

*Saskia Kliphuis, Maëva Manet, Vivian Goerlich-Jansson, Rebecca Nordquist and Bas Rodenburg*

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The circumstances in which we keep animals for our food often leads to behavioural restrictions. In laying hens, the living conditions may cause the development of abnormal behaviours such as feather pecking, which affects the health and welfare of the flock. The provision of insect larvae as environmental enrichment has the potential to satisfy the behavioural needs of laying hens, and thereby prevent the development of feather pecking. However, developing enrichment that is actually perceived as such by the chickens is a challenge in itself, and involves careful consideration of the birds' preferences for visual stimuli. The objective of this pilot study was to develop an optimal method of providing Black Soldier Fly (BSF) larvae as foraging enrichment to layer chicks. Using 28 ISA Brown layer chicks divided over four pens, a 2x2 preference test was performed, by providing alive (A) vs. dead (D) larvae in transparent (T) vs. non-transparent (NT) tubes. Hence, four conditions were defined: AT, ANT, DT, DNT. After a training phase, two chicks per pen were observed for one hour after the tubes were given, at day 14, 15, 20 and 22 of age. Active behaviour (scratching and pecking) directed towards the tubes was scored. Furthermore, tubes were weighed before and after providing them to the chicks, to assess the percentage of larvae consumed. Chicks showed more active behaviour towards the AT tubes compared to the other tubes ( $P < 0.01$ ). Additionally, the AT and ANT tubes had a lower residual weight compared to the DT and DNT tubes ( $P < 0.01$ ). Based on these results, the chicks showed a preference for alive larvae in a transparent tube. Hence, this combination will be used in the main experiment on the effect of BSF larvae provision on feather pecking in laying hens.

# Long-term access to live black soldier fly larvae (*Hermetia illucens*) stimulates activity and reduces broiler fearfulness

*Ipema, Allyson F.<sup>1</sup>, Bokkers, Eddie A.M.<sup>2</sup>, Gerrits, Walter J.J.<sup>3</sup>, Kemp, Bas<sup>1</sup> and Bolhuis, J. Elizabeth<sup>1</sup>*

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Commercially housed fast-growing broilers frequently experience limited environmental stimulation and various health issues, compromising their welfare. Providing environmental enrichment can alleviate these problems by facilitating activity. We investigated the effect of providing live black soldier fly larvae (BSFL) to Ross 308 broilers housed at lower-bound commercial densities (33 kg/m<sup>2</sup>) on behaviour, fearfulness, health, and performance. One-day-old broilers were distributed over five treatments with eight pens/treatment: a control without BSFL; two treatments where 5% of the daily dietary intake was replaced with BSFL, provided four or seven times a day; and two treatments where 10% of the daily dietary intake was replaced with BSFL provided four times a day or in transparent tubes with holes. Behaviour was determined weekly by observations for 7h per day using 8-min instantaneous scan sampling. In all BSFL treatments foraging behaviour and activity were increased ( $p < 0.001$ ), and this increase was strongest and most long-term in broilers receiving larvae seven times a day or in tubes. Broilers in these two treatments also spent less time in tonic immobility ( $p = 0.01$ ) compared to controls in a tonic immobility test performed on day 15/16, indicating reduced fearfulness. While growth was temporarily reduced in all BSFL treatments except the one receiving 5% of their diet as BSFL provided four times a day, broiler final weight was not affected by treatment. Treatment also did not influence contact dermatitis, lameness, white striping, tibial dyschondroplasia, and tibial length and fluctuating asymmetry ( $p > 0.05$ ) measured at 40-42 days of age, while tibia width was reduced in broilers receiving 10% of their diet as BSFL provided four times a day (mean $\pm$ SEM: 8.2 $\pm$ 0.1 mm) compared to controls (mean $\pm$ SEM: 8.7 $\pm$ 0.1 mm,  $p = 0.02$ ). Overall, long-term access to live BSFL seems most effective in improving broiler welfare by facilitating natural behaviour and reducing fearfulness, without hindering broiler performance.

# Session 2

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## *Go go go with the flow*

### **Validation of a passive radio frequency identification tracking system to monitor individual broiler activity throughout life**

*Malou van der Sluis<sup>1,2</sup>, Yvette de Haas<sup>1</sup>, Britt de Klerk<sup>3</sup>, T. Bas Rodenburg<sup>2,4</sup> and Esther D. Ellen<sup>1</sup>*

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Broilers are often housed in large groups, which can hamper identification and monitoring of individual birds. One trait that is of interest to record on individual broilers is activity, given the relationship between activity and different aspects of health, welfare and performance. In this study, we implemented a passive radio frequency identification (RFID) system to track individual broilers throughout their whole life, i.e. approximately five weeks, with the aim of validating the RFID system. In total, 40 broilers were fitted with an RFID tag in a leg band and were housed in a pen in which a grid of 30 antennas was situated. The RFID system stored a log of the positions, i.e. presence at antenna grid cells, of individual animals over time. From this log file, the distances moved were calculated using the shortest possible distance in a straight line between the centre points of subsequently recorded antennas. We compared the output of the RFID system to video observations to validate the recorded 1) locations and 2) distances. For the location validation, the position of birds was scored from top-view images of the tracking pen and were compared to the RFID output. It was observed that in a total of 62.5% of the cases, the video and RFID log were in complete agreement, although the percentage differed for different ages of the birds. This increased to 99.2% when allowing for a deviation of one neighbouring antenna grid cell. In the distance validation, a moderately strong rank correlation ( $r_s = 0.82$ ) was observed between the distances recorded with the RFID system and on video. Overall, the RFID system appears suitable for tracking activity of individual broilers throughout life. Information on individual broiler activity throughout life can be valuable for breeding programmes and to study the relationship between activity and health, welfare and performance in more detail.

## Feeding patterns as real-time indicator of growing-finishing pig welfare

Jacinta D. Bus<sup>1</sup>, Iris J.M.M. Boumans<sup>1</sup>, Laura E. Webb<sup>1</sup>, and Eddie A.M. Bokkers<sup>1</sup>

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Feeding patterns, encompassing feed intake, feeding frequency, duration and rate, may show rapid and extensive deviation from basal levels during welfare challenges. As feeding patterns can be continuously recorded by electronic feeding stations, they may serve as feasible, real-time indicators of welfare. We systematically reviewed the literature on the relation between feeding patterns and growing-finishing pig welfare, covering both negative states, i.e. health and behavioural issues, and positive states. Studies on health issues have focused on the impact of clinical disease and thermal stress on feed intake, while other health issues and the behaviours underlying intake have received less attention (e.g. subclinical disease & skin lesions, feeding frequency & duration). Moreover, feeding patterns are commonly reported at group level and with a daily time step, despite extensive variation in feeding behaviour between pigs and across the day, suggesting that some individual- or time-specific impacts on feeding patterns may have been overlooked. Regarding behavioural issues, tail biting alters feeding frequency during the weeks preceding an outbreak, but may not alter feeding patterns once the outbreak has commenced. Feed competition strongly alters feeding patterns of both dominant and subordinate pigs, but it is unclear which changes reflect appropriate adaptation to the social environment and which indicate severe social stress. Few studies have considered feeding patterns and positive states concomitantly. Feed intake differences have been reported between pigs housed in barren or enriched environments, but studies using animal-based indicators of positive states, such as play or tail posture, are currently absent. We conclude that feeding patterns are promising indicators of real-time pig welfare, especially if several feeding behaviours are included, with short time steps (e.g. hourly) at the level of the individual pig. We propose that negative states may induce deviations from basal patterns, while positive states may be characterised by stable patterns.

# Influence of the punisher on the feasibility and sensitivity of a Judgment Bias Task for cattle

Louise Kremer<sup>1,2</sup>, Laura Webb<sup>1</sup>, Eddie Bokkers<sup>1</sup>, Jozef van der Werf<sup>2</sup>, Bas Engel<sup>3</sup>, Sabine Schnabel<sup>3</sup> and Cornelis van Reenen<sup>1,2</sup>

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Affect influences decision-making: individuals experiencing positive affect interpret ambiguous situations more positively than individuals experiencing negative affect. In animals, decision-making under ambiguity, hence affect, is assessed using judgment bias tasks (JBTs). Since JBT has not yet been designed for cows, we aimed to develop a feasible and sensitive task for cows.

Cows were allocated to one of three punishers: “no-reward” (NOTH, n=12), an air puff (AIR, n=12), or an electric shock (ELEC, n=12). Cows were trained to discriminate a positive (P) from a negative (N) cue based on feeder location. Cows learnt to reach (P) within 20s to get concentrates and to not reach (N) during 90s to avoid punisher. Percentage of correct responses to (N) was used to assess JBT feasibility. Data were analyzed using GLMM including the fixed effects of batch and punisher.

Cows then faced three ambiguous cues placed between (P) and (N). Latencies to reach these cues were recorded. In a sensitive test, a linear relationship is expected between latencies and distance of the cues from (P) – i.e. latencies decrease when cues are closer to (P). Area between the theoretical line and the experimental profile of responses obtained for each punisher was calculated to assess JBT sensitivity. Data were analyzed using Wilcoxon tests.

Percentage of correct responses to (N) was lower for NOTH- compared with AIR- ( $p=0.032$ ) and ELEC-cows ( $p<0.001$ ) ( $46 \pm 4.7\%$ ,  $66 \pm 7.0\%$  and  $84.6 \pm 2.1\%$ , respectively) during training. Thus, “no-reward” is a less suitable punisher for a feasible JBT since NOTH-cows kept responding to (N). Area between the theoretical and the experimental profiles of responses was smaller for trained AIR-cows than trained ELEC-cows ( $p<0.001$ ,  $-0.20 \pm 0.186$ ,  $0.96 \pm 0.140$ , respectively) indicating that air puff led to a more sensitive test. We therefore advise using air puff as a punisher in JBTs for cows.

# Session 3

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## *Hot and bothered*

### **Transport of finishing pigs and broilers during high ambient temperatures – An animal welfare risk assessment**

*Lodi Laméris, Johan Bongers, Nanda Ursinus and Dick Sijm*

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Heat waves with temperatures over 30°C and even over 35°C occurred in The Netherlands in 2018-2019. During these periods, animal transport to slaughterhouses poses a potential animal welfare risk. Prevailing European Animal Transport Regulation has open standards, which complicates surveillance by the Netherlands Food and Consumer Product Safety Authority (NVWA). Therefore, the aim of this study was to assess the risks and provide animal-based indicators to measure the welfare of finishing pigs and broilers during transport. The risk assessment, derived from the EFSA method which constitutes of a hazard identification, a hazard characterization, an exposure assessment and a risk characterization, was based on literature and data-analysis. The hazards identified were temperature, humidity, ventilation, loading density, journey duration and animal-related factors (e.g. genetics) or related to the slaughterhouse (e.g. climate control). Heat stress was characterized as the welfare consequence, with varying impact on the animal, from mild (panting) to very severe (death). To quantify the impact on broiler welfare during transport, the DOA% (percentage dead-on-arrival) was related to temperature and to the temperature-humidity-index (THI). Results showed that from 27.3°C every rise in temperature with 1°C has a greater effect on the increase in DOA% (no results on pigs due to insufficient data). Exposure was estimated using national weather data combined with the number of animals transported during critical periods on hot days. The estimated risk for the welfare of finishing pigs during transport at high temperatures was characterized as medium. For broilers this estimated risk was characterized as medium to high. Panting was identified to be the best animal-based indicator to establish heat stress. A combination of animal- and resource-based indicators should be used to measure the impact on animal welfare caused by exposure to the aforementioned hazards. The results of the study will help to substantiate the enforcement by the NVWA.



## Effect of a stressor on eye-temperature in horses (*Equus caballus*)

Lien Merckaert<sup>1</sup>, Steven Janssens<sup>2</sup>, Marina Sole Berga<sup>3</sup>, Heidi Arnouts<sup>1,4</sup> and Hilde Vervaecke<sup>1</sup>

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Non-invasive eye-temperature measurements through infrared thermography (IRT) are being explored as stress indicator in animal welfare research. The tear mound in the eye, the canaliculus lacrimalis, with many capillaries and good blood perfusion, can give a good indication of the internal body temperature. We tested whether exposure to a stressor had an effect on the eye temperature in 19 competition eventing horses, taking into account gender, age (7 months-19 year), time of the day (morning, afternoon) and eye side (left, right). Eye temperature was measured with an infrared camera at an angle of 90 ° at a distance of one meter with three successive measurements of each eye. The measurements took place in a familiar barn, both before and after seeing the stressor, a suddenly opened umbrella. We also scored the horses' behaviour during exposure to the stressor and scored the degree of showing visible eye-white. The observed temperature range was between 31.10°C and 34.20°C). A mixed linear model revealed that a strong behavioural stress response (jumping away) was significantly associated ( $p=0.0204$ ) with a higher eye-temperature (average=33.05°C; SD=0.648), in contrast to the average temperatures in horses showing little stress behaviour (focusing eyes and ears on stressor) (average=32.72°C; SD=0.719). Age, gender, time of day, before or after exposure to stressor, left or right eye, and degree of showing visible eye-white, did not relate significantly to eye temperature. Carrying out the measurements in itself was fairly easy to achieve. We conclude that in our study the results of the IRT eye measurements confirmed the validity of behavioural parameters such as jumping away after seeing a stressor, but overall revealed limited additional information as an extra welfare parameter.

# Attendees

Name		Position	Field of research	Affiliation	E-mail
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<b>Elly</b>	Zeinstra	research analyst	histology, behavior, welfare, cognition	Behaviour and Welfare in Farm Animals   Animals in Science and Society   Faculty of Veterinary Medicine   Utrecht University	e.c.zeinstra@uu.nl