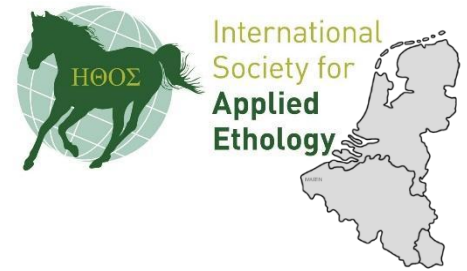


ISAE Benelux



Proceedings

ISAE Benelux meeting 2021

Thursday 9th December - online

9:00 – 12:30

Zoom link:

<https://us02web.zoom.us/j/89511455158>

Regional secretaries:

Lisanne Stadig (Dierenbescherming)

Laura Webb (Wageningen University and Research).

Member organizing committee: Saskia Kliphuis (Utrecht University)

Program

- 9:00 9:10 Intro & welcome – Lisanne Stadig, Laura Webb & Saskia Kliphuis
- 9:10 9:45 Keynote 1: Training of laboratory rodents used for teaching – *Esther Langen*
- 9:45 9:50 *Short break*
- Session 1 – Hi-Tech for High Welfare**
- 9:50 10:10 An ultra-wideband animal tracking system for monitoring range use by free-range poultry – *Michael Plante-Ajah*
- 10:10 10:30 The utility of voluntary weighing in captive group-living macaques (*Macaca mulatta*) – *Dian Zijlmans*
- 10:30 10:50 Brave breed and brain: Effect of hybrid and lighted incubation on fear, and consistency between fear tests – *Britta Mescher*
- 10:50 11:05 *Break*
- 11:05 11:40 Keynote 2: From welfare assessment to sustainability – *Marc Bracke*
- Session 2 – Effective Enrichment**
- 11:40 12:00 The effect of providing live black soldier fly larvae (*Hermetia illucens*) as edible enrichment on piglet behaviour around weaning – *Allyson Ipema*
- 12:00 12:20 Effects of environmental enrichment on small parrots in an Animal Assisted Intervention setting – *Elizabeth Walsh*
- 12:20 12:30 Closing – Lisanne Stadig, Laura Webb & Saskia Kliphuis
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Keynote 1

Training of laboratory rodents used for teaching

Esther Langen, Utrecht University

Experimental animals may be subjected to stressful (medical or husbandry) procedures. It is important that such procedures are performed in a way that minimizes the stress they induce – in terms of the 3Rs: researchers should always strive for refinement.

Training experimental animals on the procedures that they might later undergo can help with refinement. On the one hand, it can make animals more likely to cooperate with procedures, reducing the need for handling and restraint (which on their own can already be stressful). On the other hand, animals that are trained to undergo specific procedures are more familiarized with the procedures, which increases predictability of the situation. Training can also help with desensitizing animals to stressful procedures.

Training is already relatively common in studies focusing on larger animals, such as non-human primates or dogs – also in non-research settings, for example in zoos. We are currently investigating if and how training can be practically applied in smaller laboratory animals, in this case rodents such as rats and mice.

For this, we have been training some of the animals that we use for teaching at Utrecht University (at the Faculty of Veterinary Medicine). We have focused mainly on procedures that are also taught using these animals, in order to reduce the stress that these animals might experience during these teaching events. Because we work with teaching animals, we can also directly demonstrate the results of our training to students in our courses. This way, we hope to inspire them to think about training can be a way to refine procedures in their own studies later on.

In this lecture, we would like to show you some of our first results, and hopefully inspire you to think about using training in your own work as well!

Session 1 – Hi-Tech for High Welfare

The challenges of implementing an ultra-wideband animal tracking system for monitoring range use by free-range poultry in an outdoor area with vegetation

Michael Plante-Ajah

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Ultra-wideband (UWB) technology has been used for localization of items in indoor environments, and recently it has been extended to animal localization indoors, and in limited cases outdoors. While this technology benefits from good accuracy with minimal power consumption, it is difficult to employ in outdoor environments containing obstructions which hinder communication between the devices. However, with an optimal configuration it is possible to achieve successful localization even with vegetation present. Outdoor range use by poultry has long been a hot topic of research, as range use is generally poor in commercial flocks. Poor range use represents a welfare challenge as it is a risk factor for negative welfare (e.g. feather-pecking), and is a loss of the positive welfare associated with free-range systems. At the experimental free-range poultry facility at ILVO, we are employing an UWB tracking system to track free-range laying hens in a large outdoor environment containing different types of vegetation, including short-rotation coppice of willow (SRC) that is harvested every few years, and leaf coverage is thick during regrowth. This blocked UWB signals between tags and anchors in the SRC areas of the field, while the more open areas of the field had much better coverage. Furthermore, the growing canopy eventually blocked sub-GHz communication between devices, which is necessary for orchestrating localization events. A higher density of anchors (and thinner trees as the seasons progressed) allowed increased coverage in dense vegetation, while a more powerful sub-GHz antenna and fine-tuning of anchor positions aided in maximizing sub-GHz communication, resulting in more complete coverage of the study area.

The utility of voluntary weighing in captive group-living macaques (*Macaca mulatta*)

Dian Zijlmans, Marit Vernes, Liesbeth Sterck, and Jan Langermans

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Body weight is an important measure for monitoring health and welfare of captive non-human primates (NHPs). Measuring body weight usually requires animals to be caught and/or sedated, which is stressful and can have negative side-effects. NHPs housed in large social groups are therefore preferably weighed only once or a few times per year. Voluntary weighing means that the animal itself decides to step on a scale, which allows more regular weighing without having to handle or train animals. We investigated the utility, i.e. participation, reliability and time investment, of voluntary weighing in 92 rhesus macaques (*Macaca mulatta*) housed in four social groups at the Biomedical Primate Research Centre in Rijswijk, the Netherlands. Likeable food items, e.g. apple syrup, jam and lemonade, were needed to attract animals to the scale. Eventually, 68% of the macaques participated in voluntary weighing and participation was related to exploratory tendency and social group. Age and dominance rank had no effect on participation. Body weight during voluntary weighing was very similar to body weight during sedation. These results indicate that most animals in a social group can be weighed voluntarily and that the resulting body weights are reliable. However, the method is relatively time-consuming. We therefore conclude that voluntary weighing can be a valuable tool in NHP captive management when the method is further developed and optimized.

Note: This study has been published in *Animal Welfare* <https://doi.org/10.7120/09627286.30.3.002>

Brave breed and brain: Effect of hybrid and lighted incubation on fear, and consistency between fear tests

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Severe feather pecking is a major and painful problem in the laying hen industry. Fearfulness is thought to be related to feather pecking, and may play a role in its development. Different hybrids show different levels of fearfulness and feather pecking. Additionally, light during incubation may decrease fearfulness, due to effects on brain lateralisation. However, a chicken that is fearful in one test may not score as fearful in another test. This study therefore aims to assess the effect of hybrid and lighted incubation on fear, and the consistency of fearfulness across different tests. A 2x2 treatment design was used, comparing a brown and white layer hybrid (ISA Brown and White Leghorn respectively), and incubation with a 12h green light/12h dark cycle, versus darkness. A first round of experiments, providing preliminary results, included 200 chicks, divided over the 4 treatments (n=50). A Novel environment test (NET), Voluntary approach test (VAT), Open field test (OFT) and Tonic immobility test (TIT) were performed. Treatment effects were assessed with ANOVA, using generalised linear mixed models with Gamma distribution for each behaviour. Agreement between different tests was assessed with Spearman correlations, using the residuals of each behaviour model. ISA Brown chickens showed a shorter latency to approach during the VAT than White Leghorns, and froze less and walked sooner and faster during the OFT, indicating less fear. However, ISA Browns took longer to rise during the TIT, indicating more fear. No effect of lighted incubation was found in this study. Correlations between tests could only be found between the NET and TIT, and between the VAT and OFT. This low consistency of fearfulness between tests is likely because fear is a multidimensional emotion. In addition, it may not be fear that was measured, but overlapping concepts like anxiety, coping style or social motivation.

Keynote 2

From welfare assessment to sustainability

Marc B.M. Bracke, Wageningen Livestock Research, Wageningen

When I started my PhD almost 26 years ago on the topic of modelling animal welfare, the objective was to express animal welfare as a score, on a scale from 0 to 10, perhaps even as a basis for scoring overall sustainability. I defined animal welfare as the quality of life as perceived by the animals, and based on that definition, and its decomposition into welfare needs, I developed a methodology called semantic modelling to 'translate' scientific findings into overall welfare scores for different pregnant-sow housing systems. Semantic models have since also been developed for tail biting and enrichment for pigs, housing of laying hens, dairy cattle and farmed salmon, and welfare scores have been generated also for calves and broilers. The uptake of this modelling methodology and welfare scores, however, has been limited, as may be illustrated by the five domains model and the principles for positive welfare proposed in the most recent RDA report on farm animal welfare.

Recently, the question has been arising how animal welfare conceptually relates to sustainability, in particular to the principles of circular agriculture. The perhaps novel suggestion is that sustainability is a matter of animal welfare, that is to say the promotion of the welfare not only of humans, but also of all other non-human animals in an unbiased way. Thus, rather than trying to secure some kind of subordinate place for animal welfare in the wider picture of sustainability (people, planet, profit, pigs/poultry (and other animals)), it is conceptually more accurate to say that the ultimate goal of sustainability is to respect animal welfare, and that we must move beyond our unscientific prejudice that some animals, such as producers or consumers, are more equal than others, i.c. farm animals.

Session 2 – Effective Enrichment

The effect of providing live black soldier fly larvae (*Hermetia illucens*) as edible enrichment on piglet behaviour around weaning

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Weaning is a stressful event for piglets, involving substantial changes to their nutritional and social environment. Providing edible enrichment around weaning may ease the weaning transition by increasing feed-directed behaviour pre-weaning, which in turn could improve post-weaning performance, and by reducing damaging behaviours post-weaning. Providing enrichment around weaning may also benefit piglets' emotional state. Here, we investigated the effects of providing live black soldier fly larvae (BSFL) as edible enrichment in a 2x2 arrangement. Pre-weaning, piglets received either only creep feed (Pre-C, n=14 litters) or creep feed and live BSFL (Pre-L, n=15 litters) *ad libitum*, and post-weaning piglets either had no access to live larvae (Post-C, n=24 pens) or they could rotate tubes that released larvae (Post-L, n=24 pens) in amounts up to 20% of their expected dry matter intake. During the pre-weaning period, larvae provisioning did not change the time spent eating and the number of piglets that ate solid feed. Pre-L piglets preferred to interact with larvae over creep feed, and Pre-C piglets interacted more with creep feed than Pre-L piglets. Home-pen behaviour observations on d8, 15 and 20 post-weaning indicated that Post-L piglets spent much time exploring and eating the larvae. Post-C piglets spent more time on exploring the environment and nosing pen mates, and they spent more time on manipulating pen mates and playing on d8 and d8 & 15, respectively, compared to Post-L piglets. Piglet responses to a novel environment and an attention bias test performed on d4 and 5 post-weaning were not influenced by larvae provisioning. Overall, it appears that BSFL provisioning is more beneficial for piglet behaviour after weaning than before weaning. Optimization of the amount of larvae and the manner of larvae provisioning may yield further benefits for piglets around weaning.

Effects of environmental enrichment on small parrots in an Animal Assisted Intervention setting

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Appropriate environmental enrichment can positively impact the behaviour of captive animals, suggesting an increase in their welfare. Additionally, it can highlight their presence and environmental interaction for visitors, which might be important in Animal Assisted Intervention (AAI) settings, creating a more ethologically inspired experience. This pilot study was conducted in September-October 2019 to evaluate the effects of environmental enrichment on the behaviour of nine small parrots (three *Agapornis selby*, six *Melopsittacus undulatus*) housed in a 1.2x1.2x1.5 metre cage at an AAI centre. The birds were directly observed by continuous focal animal sampling for 15 minutes per day, for four days per week, prior to the introduction of enrichment items and again, for four days per week, after gradual introduction of these items. The enrichment consisted of ropes, bells, toys, card-board houses, and branches of different diameter, at different heights in the cage, in addition to the pre-existing furniture (perches, branches, food and water, bathing-bowl, a rope, three wooden houses). After descriptive analyses, Wilcoxon Rank tests for paired data were used to compare the mean durations of the parrots' behaviours before and after enrichment. The presence of the enrichment increased vocalizations ($p < 0.05$), allo-preening ($p = 0.03$), use of the bathing-bowl ($p = 0.03$), and decreased inactivity ($p = 0.03$). It promoted increased use of the central level of the cage (from 32.9% to 71.3%, $p = 0.03$) which was the level with most visibility to AAI users of the centre. However, the time the parrots spent out of sight was also increased ($p < 0.05$). Apart from vocalizations and central level use (decreasing from 74.4% of the time to 64.3%), a similar pattern was seen also in the three *Agapornis selby*. It is concluded that further studies are needed to improve both the welfare of small parrots in AAI settings and the resulting, possible, positive impact on people.

Poster abstracts

Hot Horns part I: Establishing methods to investigate the thermoregulatory function of horns in dairy cattle using infrared thermography

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To prevent injuries within the herd and ease management of the cattle, currently 80.7% of dairy cattle in Europe is being dehorned. While consequences of the pain- and stressful procedure on welfare have been investigated, little is known whether the removal of horns may further impact the biological functioning and adaptive capacity of the animal. Although social functions of cattle horns have been investigated, the same cannot be said about their potential physiological functions. However, studies in other bovid species, such as goats, suggest that horns could have a thermoregulatory function. The anatomy of bovid horns, such as high vascularisation and the distal location, indeed allows for thermoregulation. Additionally, anecdotal evidence from farmers suggest that horns get warmer during rumination. To investigate a potential thermoregulatory function of horns, this study has set up protocols to measure heat radiation of horns using Infra-Red Thermography (IRT). Based on the literature on IRT in cattle, camera angle, distance, measurement methods, and additional parameters (behaviour and environmental factors), etc. were reviewed. Based on these data, protocols were established and applied in a full-scale study. The study included six horned cows from one farm and six dehorned cows from another farm. We tested whether there was a correlation between horn temperature and different environmental conditions, and whether there was a difference in horn temperature between different behaviours, mainly ruminating. The dehorned cows were used as a control to compare ear temperatures to test whether there was a difference in ear temperature between horned and dehorned cows. The results suggest that horns indeed have a thermoregulatory function in dairy cows. Although more data is needed to fully understand the impact of dehorning on cattle welfare, the results are promising.

Hot Horns part II: Assessing the thermoregulatory function of horns in dairy cattle using infrared thermography

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Currently, 80.7% of EU dairy cattle are being dehorned or disbudded. However, several indications have been found suggesting a thermoregulatory function of cattle horns. Additionally, farmers have reported that their cows have warmer horns during ruminating, indicating that the horns might have a function during rumination. This study investigated for the first time whether horns indeed have a function in thermoregulation in dairy cows, using protocols developed by De Keijzer (in prep.). In addition, we investigated whether horn temperatures differed during specific behaviours. With a combination of infrared thermography, behavioural observations, and measurements of environmental parameters, the horn temperatures of twelve dairy cows of two different farms were studied. Repeated measures correlations between horn temperature and air temperature and heat load index (which combines air temperature, humidity, wind speed, and solar radiation into an index that represents the heat load experienced by a cow) showed a strong positive correlation. Negative correlations were found between horn temperature and humidity and wind speed. This result suggests that blood flow to the horn increased in situations where heat needs to be lost, thus attempting to cool the body. Additionally, there was a significant increase in mean horn temperature during ruminating compared to during other behaviours. These results suggest that cow horns indeed have a function in thermoregulation, possibly also during ruminating specifically. As adaptation to the environment is a crucial aspect of animal welfare, dehorning might cause decreased welfare. Therefore, further research should be conducted on the impact of dehorning on the risks of heat stress.