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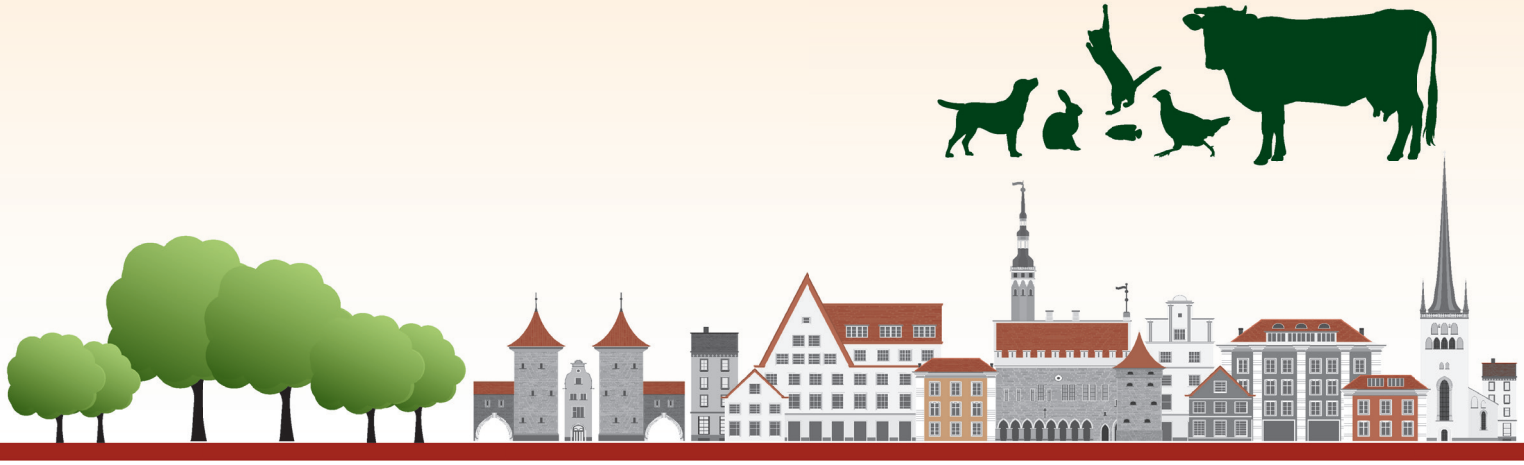
BOOK OF ABSTRACTS



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Miscellaneous Section (Ruminants)

Social ranking and personality modulate learning in cows managed in automatic milking systems

Tuesday, 1st August - 10:45: Miscellaneous Section (Ruminants) (Grande Hall) - Oral

Ms. Francesca Johansen [1], ***Dr. Gareth Arnott*** [2], ***Dr. Stephanie Buijs*** [3]

1. *Queens University Belfast,* ***2.*** *Institute for Global Food Security, School of Biological Sciences, Queen's University, Belfast, United Kingdom,* ***3.*** *Agrifood and Biosciences Institute (AFBI)*

Successful learning in automatic milking systems (AMS) requires cows to perform a relatively complicated behaviour; visiting the milking robot voluntarily at appropriate intervals and at a high enough frequency to maintain production. Failure to correctly learn this behaviour can lead to prolonged training periods for the affected cows, which in turn can result in increased labour, reduced milk yields, and reduced welfare. There is currently considerable individual variation between cows in the number of voluntary milking visits achieved per day; with 6-45% of cows requiring prolonged training periods, suggesting variation in learning ability. A better understanding of factors influencing dairy cow learning within an AMS context may ensure better adaptation to these systems. To that end, this study investigated the hypothesis that social ranking and measures of personality will influence the ability of cows to learn to use AMS.

Data were obtained from a 48-cow herd newly transferred to an AMS. The personality attributes of all cows were assayed using three validated tests (human approach, novel object, social runway). Principal component analysis revealed four distinct attributes: Activity/exploration, Boldness, Sociality/curiosity, and Locomotor playfulness. In addition, agonistic interactions were collected over a three-week period and used to construct a social ranking of the herd using the Elo method. Social ranking and the four personality attributes were used as independent variables in further analysis. Learning was assessed by the following variables, which were included in four separate general linear mixed models as dependent variables; 1) Average voluntary visit frequency weeks 0-2, 2) Average voluntary visit frequency weeks 0-4, 3) Days until the cows' first voluntary milking, 4) Days until final occurrence of insufficient visit frequency. All models also included cow(subject) as a random effect. Cows with higher "locomotor playfulness" scores had fewer average voluntary visits in weeks 0-4 ($p<0.05$) and had a longer latency until achieving a sufficient visit frequency ($p<0.005$). Cows scoring high on the "sociality/curiosity" attribute also had fewer average visits in weeks 0-4 ($p<0.01$). Cows with higher social rankings had a higher average voluntary visit rate weeks 0-4 ($p<0.001$) and a lower latency until their first voluntary milking ($p<0.05$). There were no effects of personality or social ranking on voluntary visit frequencies in weeks 0-2. The results indicate that social ranking and personality attributes play a role in learning success, and suggest that specific training strategies targeting low-ranking, playful and social/curious cows may improve learning efficacy, productivity, and welfare.

Spontaneous head-related behaviors three weeks after caustic paste disbudding in dairy calves

Tuesday, 1st August - 11:00: Miscellaneous Section (Ruminants) (Grande Hall) - Oral

Ms. Alycia Drwencke [1], ***Dr. Sarah Adcock*** [2], ***Dr. Cassandra Tucker*** [1]

1. *Center for Animal Welfare, Department of Animal Science, University of California, Davis,* ***2.*** *Department of Animal and Dairy Sciences, University of Wisconsin, Madison*

Disbudding with caustic paste, or the chemical destruction of horn growth tissue, is becoming more common on US dairy farms. Previous work shows that wounds from caustic paste take twice as long to heal than those from a hot-iron (18 vs 7-9 wks). Calves with wounds from paste remain more sensitive to mechanical stimulation than undamaged controls during at least the first 6 wks afterwards, indicating evoked pain is present. Non-evoked or spontaneous measures of pain have been quantified in calves that are disbudded with a hot-iron. They flick their ears and shake, rub, and scratch their heads more than those given local anesthetic 11 d after the procedure and will seek pain-relief, in the form of local anesthetic, 3 wk afterwards. Thus, our objective was to quantify spontaneous, head-related movements in calves 3 wk after caustic paste disbudding or undergoing a sham procedure. Jersey and Holstein female calves were disbudded using caustic paste at 3 d of age with a local anesthetic (lidocaine) and an NSAID (n=18) while control calves received a sham procedure (n=15). To manipulate the level of pain experienced, 3 wk later we measured behavior under 2 conditions for all calves, first without pain relief (baseline) and then with 7 mL of 2% lidocaine per horn bud at the same time of day. We predicted less head-related behavior in controls and when paste calves were administered lidocaine. Total counts of ear flicks, head shakes, head rubs, and head scratches were measured for 50 min/d from video and were analyzed with linear mixed models (*glmmTMB* in R) with a negative binomial distribution. Treatment (disbudded vs control), observation day (baseline vs lidocaine), and their interaction were fixed effects, while calf was a random effect. We found no evidence of significant differences for any of the behaviors ($P^3 0.13$). These results differ from our predictions and previous literature. We speculate that sensation changes associated with lidocaine may induce head-related behavior. While non-significant, paste disbudded and control calves performed more ear flicks (EF) and head shakes (HS) on lidocaine days compared to baseline, respectively (mean±SE no/50 min: paste 40±12 vs 35±11 EF; 12±2 vs 8±2 HS; control 57±17 vs 34±12 EF; 9±2 vs 7±2 HS). These results suggest that the use of head-related behaviors to assess pain and manipulating calf experiences with a local anesthetic requires caution. Future models should consider other options, such as NSAIDs, in this context.

Cow-calf contact rearing in pasture-based dairy production – Farmer's motivations and experiences

Tuesday, 1st August - 11:15: Miscellaneous Section (Ruminants) (Grande Hall) - Oral

Prof. Susanne Waiblinger [1], ***Dr. Denise Hebesberger*** [1]

1. *Institute of Animal Welfare Science, University of Veterinary Medicine, Vienna*

Dairy farmers' interest in cow-calf contact (CCC) rearing of calves is increasing but scientific knowledge is limited especially in combination with access to pasture. The aim of this study was to gather experiences of farmers who are practicing cow-calf-contact rearing (Current), who were practicing cow-calf contact rearing in the past (Past), and farmers who are interested in the system but did not yet start with it (Interested). An online questionnaire comprising 146 questions was presented to the three groups of farmers. Questions were predominantly closed and tackled topics such as (CCC system in use, weaning, perceived outcomes regarding animal health and economic aspects, reasons for practicing CCC or not, general contentment with the system, problems, challenges, and information gaps. Participants were recruited among BIO AUSTRIA members, the project "Farming for Future" in Austria, and email-lists of farmers with (interest in) CCC in Germany and Switzerland. In total, 188 participants responded (71 Current, 40 Past, 77 Interested). Most "Current" practiced dam-calf-contact systems, 20% pure foster rearing. 54% of calves were at least 11 weeks old when separated from the dam. Regarding reasons for CCC, in all groups health/growth was mentioned by about 38% of farmers. However, "Current" more often mentioned emotion-related reasons (e.g., joy at work, calves need their mother; 39%) as compared to "Past"/"Interested" (29%/28%, $p<0.001$), while marketing opportunities were less important for "Current" (5%) than for "Interested" (17%, $p=0.03$; "Past", 8%). In "Past", the most frequent reasons for stopping CCC were milking problems (22%) and increased time efforts (16%). In open responses not suitable barn design, hygienic problems, and udder injuries were mentioned as well. The most frequent reason of "Interested" for not yet starting was the necessity for bigger barn reconstruction (22%). 74% "Current" did not or only little change the barn, the rest did some reconstruction, extension or had a new barn. "Current" farmers were largely satisfied with the system (87%; no dissatisfied), while 48% of "Past" were dissatisfied, so that groups differed (MWU, $p<0.001$). Similarly, "Past" reported more problems (many 38%, some 55%) than "Current" (no problems 13%, few problems 69%, some 17%, MWU, $p<0.001$). Largest challenges reported were weaning, but also shyer calves in CCC on pasture. Results point at a large variability on farmers' perception and experiences with CCC, highlighting the need for differentiated support services for farmers practicing and interested in CCC. Funded by BMLRT EIP-AGRI PastureInnovation.

Pair-housed dairy calves may show more social adjustment shortly after weaning compared to individually-housed calves

Tuesday, 1st August - 11:30: Miscellaneous Section (Ruminants) (Grande Hall) - Oral

Ms. Elizabeth Patton [1]***, Dr. Beth Ventura*** [2]***, Ms. Michaela Thomas*** [3]***, Dr. Whitney Knauer*** [3]

1. *Department of Animal Science, University of Minnesota,* ***2.*** *Department of Life Sciences, University of Lincoln,* ***3.*** *Department of Veterinary Population Medicine, University of Minnesota*

Pair housing of dairy calves can offer welfare improvements over individual housing, but effects on social behaviour upon grouping at weaning are poorly understood. Our objective was to characterise behaviour of previously pair- (PP) or individually- (PI) housed calves by observing video of 24 calves following entry into weaned group pens (n=12 PP, n=12 PI; housed with treatment group). Five min scan sampling in three 6 h increments (0 h, 24 h, and 72 h after pen entry) captured the behaviours: lying, standing, and walking by self; and social lying, standing, or walking. Continuous sampling (frequency [n] or time [s]) for 6 h directly after pen entry characterised self groom, explore by self, self locomotor play, cross-suck, social explore, kick, mock fight, mount, allogroom, social sniff, and social locomotor play behaviours. Observations were aggregated for each calf over each observation period (day, hour) and analysed using repeated measures linear mixed models controlling for period, interaction between hour and pre-weaned housing, breed, the random effect of being moved together, and pen. Behaviours observed infrequently (social groom, kick, mock fight, mount) were dichotomized and analysed using general estimating equations accounting for breed and repeated measurements by hour. PI calves displayed more bouts and spent more time engaged in self locomotor play (PI vs. PP; 35 vs. 13 ± 3 bouts; 152.6 vs. 47.6 ± 13 s), social locomotor play (PI vs. PP; 14 vs. 7 ± 2 bouts; 70.6 vs. 22.5 ± 10 s), explore by self (PI vs. PP; 50 vs. 40 ± 3.4 bouts), social sniff (PI vs. PP; 268.2 vs. 159.7 ± 29.7 s), and had a higher odds of mock fight compared to PP calves (PI vs. PP; 56 vs. 18% of observations; OR: 5.3 (1.5, 18.4)). In contrast, PP calves were observed exploring more together (PP vs. PI; 27 vs. 13 ± 3 bouts), had a higher odds of being observed to social groom (PP vs. PI; 14 vs. 3% of observations; OR: 5.9 (1.3, 27.2)), and were more frequently observed to lie next to another calf 72 hours after pen entry (PP vs. PI; 25 vs. 9 ± 4 obs). Overall, previously paired calves exhibited more behaviour suggestive of social bonding and adjustment, whereas PI calves experiencing social housing for the first time displayed more locomotive activity and exploration.

Development and responsiveness of a grimace scale for pain assessment in Angus beef calves

Tuesday, 1st August - 11:45: Miscellaneous Section (Ruminants) (Grande Hall) - Oral

Mr. Mostafa Farghal [1], ***Prof. Ed Pajor*** [2], ***Prof. Stelio Pacca*** [3], ***Dr. Claire Windeyer*** [2], ***Prof. Daniel Pang*** [2], ***Dr. Maria Camila Ceballos*** [2]

1. *Faculty of Veterinary Medicine, University of Calgary, Calgary, AB.,* ***2.*** *Faculty of Veterinary Medicine, University of Calgary, Calgary, AB, Canada.,* ***3.*** *Faculty of Veterinary Medicine, São Paulo State University, São Paulo*

Pain is an aversive experience that can lead to distress with detrimental physical and mental effects, compromising animal welfare. We aimed to develop a grimace scale for assessing pain in Angus beef calves and evaluate its responsiveness. The study was conducted at W.A. Ranches at the University of Calgary, Canada. A total of 69 Angus beef calves, 6-8 weeks old, were enrolled in this study. They were alternatively allocated into surgically castrated (n = 34) and sham castrated (n = 35) groups. Castrated calves received a single oral administration of meloxicam (1.0 mg/kg body weight) immediately after castration. All calves were video recorded at multiple periods pre-, during- and post-castration/sham castration. Still images of front and side facial views were extracted by a reference observer (RO). Facial action units (FAUs) used to compose the pain grimace scale were identified from 480 images of 40 calves (20 castrated and 20 sham calves, 2 images/calf/period). The RO and another trained observer, who were blind to the treatment, scored 50 images to evaluate inter-observer reliability. The same images were scored again after 15 days by RO to evaluate intra-observer reliability. To evaluate the responsiveness of the grimace scale, 284 front and side images of 34 castrated calves pre- (n = 180) and post-castration (n = 104) were used. Wilcoxon signed rank test was used to evaluate responsiveness and weighted Kappa analyses for inter- and intra-observer reliability using R Studio. Six FAUs were identified: ear position, orbital tightening, tension above the eye, nostril dilation, strained chewing muscle, and mouth opening, each with a three-point scoring system (0 = not present, 1 = partially present, 2 = obviously present). Results of inter- and intra-observer reliability for all FAUs were above 0.8 indicating very good agreement. A single total pain score was calculated (i.e., the sum of scores of each FAU/maximum score) ranging from 0 to 1. Median (IQR) pain score for calves after castration was higher 0.50 (0.40 - 0.58) than before castration 0.30 (0.20 - 0.42), ($Z = -6.53$, $P < 0.01$). Results revealed that the identified FAUs have a high level of reliability and together, composing the developed grimace scale, are responsive to pain. Therefore, the grimace scale, once it has been fully validated, could represent a promising tool for pain assessment in Angus beef calves.

Validation of a health-related quality of life tool for respiratory disease in dairy calves

Tuesday, 1st August - 12:00: Miscellaneous Section (Ruminants) (Grande Hall) - Oral

Dr. David Bell [1], Prof. Carol-Anne Duthie [1], Mr. Colin Mason [1], Mr. Andrew Hancock [2], Mr. Colin Penny [3], Mr. Isaac Odeyemi [2], Prof. Marie Haskell [4]

1. *SRUC,* ***2.*** *Zoetis Research,* ***3.*** *Zoetis UK,* ***4.*** *Animal Behaviour and Welfare, Animal and Veterinary Sciences Department, Scotland's Rural College (SRUC), Edinburgh*

Respiratory disease is a major health challenge for young calves and is associated with significant negative welfare consequences. Better methods of detecting the disease could reduce its prevalence in the herd and severity at the individual level. A health-related quality of life (HRQoL) approach is one such method that could be applied. This approach aims to capture how the mental experience of the subject is expressed in their demeanour and behaviour, and thus may generate welfare indicators that enhance disease detection. These behavioural/demeanour indicators can also be assessed without handling the calves, unlike current clinical scoring methods that require measurement of the rectal temperature. Previous work had created a draft tool for respiratory disease that contained 13 indicators across two domains: clinical signs/demeanour (e.g. body and head posture, ear position, respiratory effort) and behavioural expression (e.g. motivation to feed, milk consumed, vigour). The aim of this study was to optimise this tool by determining whether it could correctly distinguish between sick and healthy animals classified using a 'gold standard' health scoring system. One hundred group-housed, pre-weaned dairy and dairy-cross calves were used in the study. Each calf was assessed using both the new tool and a standard, well-recognised clinical health assessment tool (Wisconsin score (WS)) by independent observers five days/week from approximately 7 to 50 days of age. The draft tool was refined using Inter-item correlation which resulted in 6 items being removed as they did not contribute to the overall score (correlations of 0.2 or less). The final tool had a Cronbach's alpha of 0.5 indicating moderate internal consistency. To determine whether the tool could correctly identify sick animals, the WS was used to categorise calves as healthy (scores<=3) or sick (scores >=5). To balance for calf and environmental characteristics, calves were paired for analysis based on pen, date, sex and breed. This resulted in 28 pairs for analysis. A Kruskal-Wallis test showed that sick calves had significantly poorer HRQoL scores than healthy calves ($H= 14.09$, $df = 1$, $P<0.001$; mean score ± SEM: healthy: 0.04 ±0.034; sick: 1.43 ± 0.354). However, there was only a significant difference between healthy and sick calves in the clinical signs/demeanour domain ($H=13.26$, $df=1$, $P<0.001$) but not the behavioural expression domain ($H=2.03$, $df=1$, $P=0.154$). This suggests that indicators such as quality of the posture, ear carriage and respiratory effort, together with feeding motivation variables may be used to detect respiratory illness in calves.

Blood in milk as a result of injurious social behaviour in horned dairy cows: exploration of herd incidences and prevention opportunities

Tuesday, 1st August - 12:15: Miscellaneous Section (Ruminants) (Grande Hall) - Oral

Dr. Asja Ebinghaus [1]***, Dr. Julia Johns*** [1]***, Prof. Ute Knierim*** [1]

1. *University of Kassel, Farm Animal Behaviour and Husbandry Section*

Husbandry of horned dairy cows is one alternative to dehorning/disbudding that respects the animals´ integrity. Simultaneously, it means a challenge to align housing and management to the cows´ needs to minimise agonistic interactions. Horn butts can result in integument damage, and in udder injuries resulting in blood in milk (BM). Based on research on injurious interactions leading to integument damage and knowledge exchange with the practice, a prevention guideline (orgprints.org/id/eprint/40225/) has been developed. However, to date no information is available on the extent of BM in horned herds and specific prevention measures. Thus, the aim was to describe BM incidences in horned dairy herds and to test whether compliance with the guideline recommendations also contributes to the mitigation of horn butt-related BM.

On 21 German dairy farms with horned cows in loose housing, farmers documented BM cases and visible udder damage over a seven-month period covering part of summer with half or full day pasture access and part of winter in the barn. Via interviews and observations, a total of 52 farm factors were recorded relating to the guideline recommendations, divided into five groups: 'milking' (e.g. parlour type, waiting area space), 'feeding' (e.g. feeding gate type, cow:feeding place ratio), 'lying' (e.g. cow:lying place ratio, front exit from cubicles), 'activity' (e.g. barn area per cow, access to water troughs) and 'herd management' (e.g. integration and regrouping of animals). Each factor was binomially categorised into recommendation fulfilled or not fulfilled, and for each area the percentage of fulfilled recommendations was calculated at farm level (range for 'milking': 33-83%, 'feeding': 42-92%, 'lying': 0-80%, 'activity': 18-82%, 'herd management': 42-83%). Average monthly BM incidences varied from 0.3 to 7.9%, with 38% being associated with visible udder damage (BMvD). A generalised mixed model with 'monthly binomial BMvD' per farm (occurrence yes/no) and the fixed effects 'percentages of fulfilled recommendations' at farm level and 'season' (pasture/barn) at the level of monthly recordings revealed a higher BMvD risk during the barn season (odds ratio (OR) = 2.39), highlighting the importance of pasture grazing to alleviate social conflicts due to extended space. At farm level, each percentage point of higher fulfilment of recommendations concerning 'feeding' and 'activity' was associated with a lower BMvD risk (OR = 0.94 and 0.95), indicating that the conflict potential in these areas also plays a role for BM and can be lowered by a combination of improvement measures.

Towards a deeper understanding of whether goats understand photos as referential depictions of conspecifics

Tuesday, 1st August - 12:30: Miscellaneous Section (Ruminants) (Grande Hall) - Oral

Dr. Jan Langbein [1], ***Mrs. Katrin Siebert*** [1]

1. *Research Institute for Farm Animal Biology (FBN), Institute of Behavioural Physiology, 18196 Dummerstorf, Germany*

Recently, we have shown that goats that were trained to discriminate photos of familiar from unfamiliar conspecifics required more than twice as many trials in a subsequent reversal-learning test where now the formerly unrewarded stimulus was rewarded. We concluded that the goats had formed a general learning rule over training, and were able to interpret 2D photos as referentially representing real conspecifics. In this study, we used transfer learning to see if animals could transfer learned categories to new images.

In the current study, we trained goats in four consecutive 4-choice discrimination tests (T1-T4). Two groups of goats were presented with the same sets of photos, each consisting of four portrait photos of conspecifics. For one group (Group A, N=12), one goat was familiar (rewarded) while the three other goats were unfamiliar (unrewarded). For the other group (Group B, N=12), one goat was unfamiliar (rewarded) while the three other goats were familiar (unrewarded). Each test ran for six days and was preceded by a one-day pretest to test for spontaneous preferences for single photos. Finally, in T4new, eight new sets of portrait photos of previously not presented goats were interspersed with the previously trained photo sets of T4, with the sets being assembled according to the previous rule.

To analyse differences in the number of trials to reach the learning criterion (TtC) between group (A, B) and test (T1-T4), we used a linear mixed model. In T4new, we analysed which photo the goats chose when they were first exposed to one of the novel interspersed photo sets. We found identical preferences for certain photos in T2-T4 in both groups. Test or group had no statistically significant impact on TtC. At T1-T4, the goats reached the learning criterion on the second day of training and the TtC ranged from 77 to 136. On the first presentation in T4new, five goats from group A but only one goat from group B chose the correct photo in the majority of the interspersed photo sets.

Learning performance T1-T4 suggests that the photos are initially learned as visual stimuli without reference to the real conspecifics. However, the T4new transfer-test results can be interpreted as goats understanding the photos as referential representations of real conspecifics after sufficient training.

Evaluating the consistency of dairy goat kids' responses to two methods of assessing fearfulness

Tuesday, 1st August - 12:45: Miscellaneous Section (Ruminants) (Grande Hall) - Oral

Ms. Holly Vickery [1]***, Ms. Francesca Johansen*** [2]***, Dr. Rebecca Meagher*** [3]

1. *University of Reading,* ***2.*** *Queens University Belfast,* ***3.*** *Department of Animal Science and Aquaculture, Dalhousie University*

Evidence suggests that understanding individual behavioural differences could enhance animal welfare research. Many methods for assessing fear to make inferences about 'personality' have been proposed but have not been validated for goat kids. The study aimed to 1)assess individual level test-retest reliability of Novel Object (NO) and Familiar Person (FP) tests; 2)establish the reliability of two testing procedures, Modified Home (MH) or Unfamiliar Testing (UT) arenas; 3)assess interobserver reliability; and as kids were Gradually (GW; n=18) or Abruptly Weaned (AW; n=17), 4)check for weaning differences. One AW pen and one GW pen were used for each testing procedure (MH/UT). Four NO tests occurred; two pre-weaning (age 25d and 29d), and two post-weaning (age 63d and 67d), a FP test occurred the day after each NO test. All tests lasted 180s (plus 90s habituation for NO tests) and were recorded. All videos were scored by an observer blinded to weaning, and another observer scored 1 kid's test for each timepoint/pen (totalling 32). One kid (AW) from the MH and seven kids (3 GW, 4 AW) from the UT procedure were removed from testing and subsequent analysis due to distress. Kendall's test of concordance indicated good interobserver reliability ($W(1)=0.670$, $p<0.001$). For FP tests 'bipedal stance' ($W(3)=0.379$ $p<0.001$) and 'stand still-look' ($W(3)=0.378$ $p=0.010$) and for NO tests bipedal stance ($W(3)=0.234$ $p=0.006$) and 'latency to interact' $W(3)=0.202$ $p=<0.001$ showed good test-retest repeatability. Each behaviours concordance coefficients were compared with Mann-Whitney U tests and found no impact of testing procedure ($p=0.579$). Concordance coefficients between tests for each kid were the dependent variable in a linear model with test type, kid age and pen as independent variables. A backwards elimination procedure removed independent variables with p-values <0.05; test type ($p=0.184$) did not predict individual consistency, but pen did ($p=0.002$). GLMMs with a backwards elimination procedure found no effect ($p>0.05$) of 'personality' indicators on weight gain, milk intake/day, or weaning treatment, but a trend towards effect of 'latency to interact with NO' and average milk station visits post-weaning ($p=0.052$), and a significant effect of bipedal stance on milk meals/day ($p=0.04$). Results indicate that 'bipedal stance' in both tests, 'stand still-look' in FP tests, and 'latency to interact' in NO tests have good interobserver reliability and repeatability, therefore could be 'personality' indicators. Testing environment did not affect fear but the unfamiliar environment resulted in more distress related removals therefore a modified home pen procedure is recommended.

PLF and other new techniques for measuring animal behaviour (Pigs and sheep)

Associations between salivary biomarkers, and respiratory health status and activity level measured by PLF sensors in pigs

Tuesday, 1st August - 10:45: PLF and Other New Techniques for Measuring Animal Behaviour (Pigs and sheep) (Bolero hall) - Oral

Dr. Heng-Lun Ko [1], ***Dr. Damián Escribano*** [2], ***Dr. Marina López-Arjona*** [1], ***Ms. Maria Botia*** [2], ***Ms. Alba Ortín-Bustillo*** [2], ***Dr. Fernando Tecles*** [2], ***Dr. Pablo Fuentes Pardo*** [3], ***Prof. José Cerón*** [2], ***Prof. Xavier Manteca*** [4], ***Dr. Pol Llonch*** [4]

1. *Department of Animal and Food Science, Universitat Autònoma de Barcelona, 08193 Cerdanyola del Vallès, Barcelona,* ***2.*** *Interdisciplinary Laboratory of Clinical Analysis, Interlab-UMU, Regional Campus of International Excellence "Campus Mare Nostrum", University of Murcia, 30100 Espinardo, Murcia,* ***3.*** *Department of I+D+i, CEFU, S.A., 30840 Alhama de Murcia, Murcia,* ***4.*** *Universitat Autònoma de Barcelona, Department of Animal and Food Science*

This study aimed to investigate the association between salivary biomarkers and three animal-based parameters measured by two PLF sensors in pigs. The two PLF sensors are: SoundTalks (SoundTalks NV, Belgium) and Peek Analytics (Copeeks SAS, France). SoundTalks measured Respiratory Health Status (ReHS) and Peek Analytics measured activity level (Activity) and number of active pigs. ReHS is a numeric value from 0 to 100 which was measured once per day. The higher the ReHS, the healthier the pigs. Activity is a numeric value without a unit, as it is measured by tracking the movement of the dots plotted on each pig, which omits the distance and the speed of the movement. Activity was measured roughly every 30 minutes from 07:00 to 22:00. ReHS, Activity, and number of active pigs were measured at pen level. The study was conducted at three pig units: one commercial nursery unit (Grower 1), one commercial fattening unit (Fattener 1), and one research fattening unit (Fattener 2), one batch of each unit. Two pens of Grower 1, four pens of Fattener 1, and four pens of Fattener 2 were followed. One hundred pigs were housed per pen in Grower 1 (0.25 pig/m^2), 13 pigs per pen in Fattener 1 (0.7 pig/m^2), and 10 pigs in Fattener 2 (1.11 pig/m^2). Two saliva sampling were carried out at each unit: when pigs entered the unit, and when pigs were about to leave the unit. In each unit, 30 males and 30 females were randomly selected for saliva sampling. Cortisol (CORT), haptoglobin (Hp), and adenosine deaminase (ADA) were analyzed from the saliva samples as the biomarkers of stress, inflammatory, and immune system, respectively. Data were analyzed by several general linear models. The response variables were the average of CORT/Hp/ADA of each unit. The explanatory variables were the daily average of ReHS/Activity/number of active pigs of each unit, with the time period of 5-days pre- to 5-days post-sampling. Preliminary results showed that Activity and number of active pigs were highly associated with salivary Hp and ADA ($P < 0.05$), whereas ReHS was not associated with these salivary biomarkers ($P > 0.05$). From the previous work, Activity was also highly associated with environmental parameters like humidity, CO_2, and NH_3. These may suggest that Activity and number of active pigs collected from the PLF sensor can be a potential welfare indicator to monitor animal welfare.

Computer vision as a means to determine optimal sampling interval for feeding behaviour duration of finisher pigs

Tuesday, 1st August - 11:00: PLF and Other New Techniques for Measuring Animal Behaviour (Pigs and sheep) (Bolero hall) - Oral

Dr. Mona Lilian Vestbjerg Larsen [1], ***Dr. Dong Liu*** [2], ***Mr. Martin Kobek-Kjeldager Sigvartssøn*** [1], ***Prof. Tomas Norton*** [2], ***Prof. Lene Juul Pedersen*** [1]

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Instantaneous sampling is used to make observation of behavioural states more efficient. Although being an intrinsic behavioural need of pigs, the optimal sampling interval for the duration of pigs' feeding behaviour has yet to be determined. To determine the optimal sampling interval, video of finisher pigs was recorded from 3 pens across 8 weeks (training data) and another 3 pens across 4 weeks (internal validation data), each from 1100 to 1300 h on one day per week; including pig weight variations from the beginning to the end of the finisher period. Each pen included 18 pigs and one feeder with three separated feeding places. A computer vision rotated object detection algorithm was applied on the recorded video, providing data on location and snout direction of each pig in the pen. Average overlap between each feeding place and the detected one-third anterior part of each pig was calculated per second of video (18 frames). Manual continuous observation of feeding duration from the video was used to identify the weekly optimal threshold for classifying each second of video into a pig feeding or no pig feeding at each feeding place in the pen. The developed classifier of feeding behaviour performed with a recall, precision, and specificity of 0.97, 0.97 and 0.98, respectively, on both the training and the internal validation data. When comparing observed and computer vision duration for each 2-hour video, a MAE, RMSE, and R^2 of 0.92-1.32 min, 1.25-1.81 min and 0.99-1.0, respectively, were achieved. On average, the classifier performed with an error of 1% (range: 0-6%) and was thus deemed appropriate to investigate the sampling interval for feeding behaviour in finisher pigs. Instead of using 18 frames per second of video, feeding behaviour was classified from one frame per 1, 2, 5, 10, 20 and 30 sec and per 1, 2 and 10 min. With a sample interval of 30 sec, the average error increased to 1.5% (0-6%), while sampling intervals of 1, 2, 5 and 10 min resulted in an average error of 2.1% (0-7%), 2.8% (0-13%), 5.7% (0-21%), and 8.0% (0-37%), respectively. Based on these results, for pigs fed ad libitum with restricted feeding space per animal, a sampling interval of 30 sec for feeding behaviour in finisher pigs is recommended, due to a decreased validity and reliability of the observed duration with higher sampling intervals.

What is that smell? Development of a scale to assess pigs' immediate behavioural reaction to novel odours

Tuesday, 1st August - 11:15: PLF and Other New Techniques for Measuring Animal Behaviour (Pigs and sheep) (Bolero hall) - Oral

Mrs. Rebecca Grut [1], ***Ms. Johanna Stenfelt*** [1], ***Dr. Maria Vilain Rorvang*** [1]

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Although the highly developed olfactory apparatus of the domestic pig suggests that odours are important to pigs, little is known about pigs' behaviour when exposed to olfactory stimuli. As part of a larger project on odour exploration in pigs, this study aimed to develop a scale to measure pigs' immediate behavioural reactions to novel odours in the habituation/dishabituation test paradigm. The experiment included 184 growing-finishing Hampshire pigs tested in 92 pairs of opposite-sex littermates. All pig pairs were presented with three out of a total of twelve different odours, in a balanced order. The odour samples consisted of six drops of essential oil (n=8) or synthetic perfume oil (n=4) on filter paper in a plastic container. Each of the three odours was presented three times in a row (n=9 trials), along with an odourless control (distilled water). The odour and control samples were available to the pigs during 1-minute trials, followed by 2-minute pauses before the next trial began. The pigs' immediate behavioural reaction was recorded six seconds after each pig had first approached the sample. Approach was defined as one pig being within 12 cm of the sample. The reaction was scored on a scale from 1-7, with scores 1-3 being explorative behaviours (e.g., sniffing, oral manipulation), score 4 being neutral, and scores 5-7 being avoidance behaviours (e.g., leaving, not approaching). An ordinal regression and post hoc analysis of pairwise comparison on ~20% of the data (n=19 pairs) preliminarily shows a significant effect of treatment as pigs were more explorative towards odour samples compared with controls (estimate±SE=0.34±0.18, P=0.05). No significant difference was found between the different odours. A significant effect of trial (P<0.01) indicates higher avoidance rating after three odour presentations, which is in line with the theory of the habituation/dishabituation paradigm. The preliminary results from this study are supported by the results of the overall project on odour exploration behaviour in pigs (Rørvang et. al, under review). To our knowledge, this is the first example of a behavioural scale designed to measure pigs' immediate reaction to olfactory stimuli. It serves as a starting point to understand how pigs perceive and react to odours in a commercial production environment. The scale may in the future be used to evaluate pigs' immediate reactions to other kinds of sensory stimuli and could be adapted to other species.

A critical note on meal criteria in growing-finishing pigs: behaviour between feeder visits

Tuesday, 1st August - 11:30: PLF and Other New Techniques for Measuring Animal Behaviour (Pigs and sheep) (Bolero hall) - Oral

Ms. Jacinta Bus [1], ***Dr. Iris Boumans*** [1], ***Ms. Lauïs Staüble*** [1], ***Dr. Laura Webb*** [1], ***Dr. Eddie Bokkers*** [1]

1. *Animal Production Systems group, Wageningen University & Research*

The feeding behaviour of growing-finishing pigs (fed *ad libitum*) consists of sequential visits to the feeder separated by intervals ranging from seconds to hours. Visits separated by intervals shorter than a criterion are commonly merged into one 'meal', a more biologically-relevant unit. The most common method to determine this meal criterion (developed in dairy cows: three-part probability density function fitted to log-transformed intervals) distinguishes three interval types: short within-meal intervals (WMIs, ±0-60s), long WMIs (±1-20min) and between-meal intervals (>±20min), placing the criterion between the latter two (±20min). The fit obtained for growing-finishing pigs is, however, poor, questioning this method's validity. We aimed to better underpin meal criteria by observing pig behaviour during short and long WMIs. Midway the growing-finishing phase (d54), for each of 108 barrows (10 pens) one short (<60s, n=105) and one long (60-1661s, n=99) WMI were, when available, observed from video. Scored were voluntary versus forced exits from the feeder and all subsequent mutually-exclusive behaviours until feeder re-entrance (first 60s continuously, afterwards 15s-instantaneous sampling). Forced displacements from the feeder occurred more often in long (35%) than short (12%) WMIs (binomial regression: P<0.01). During the first (≤)60s, the proportions of time spent drinking (short WMI: 0.07; long WMI: 0.20) and social nosing (0.07; 0.11) were higher in long than short WMI (beta regression: P<0.01). Descriptively, feeder exit (0-3s) was followed (3-9s) by (median percentage of pigs performing the behaviour at each second: short; long WMI): pen exploration (33%; 29%), walking (23%; 35%), standing (16%; 13%), social nosing (10%; 13%) and aggression (5%; 8%), after which (9-60s) inactive lying (9%; 12%) and drinking (17%; 26%) became more frequent. For long WMIs, a gradual reduction (1-4min) in pen exploration (29% to 18%) and drinking (26% to 0%) and increase in inactive lying (12% to 53%) followed, which was retained until the end of the WMI. Our results suggest that short WMIs are feeding interruptions linked to chewing outside the feeder (walking + standing), rooting or searching for pellets outside the feeder (pen exploration), and (unsuccessful) displacements. Long WMIs were associated with successful displacements impeding re-entrance to the feeder, and withdrawal from the feeder for social interaction, drinking and, predominantly, inactive lying. We conclude that long WMI reflect an end of feeding and should be considered between-meal intervals. We suggest to use a meal criterion no larger than 1-4min (when inactivity rises), depending on the observed interval distribution in the dataset.

Sow activity patterns elaborated from computer vision data are associated with piglet growth in early lactation

Tuesday, 1st August - 11:45: PLF and Other New Techniques for Measuring Animal Behaviour (Pigs and sheep) (Bolero hall) - Oral

Ms. Océane Girardie [1], ***Dr. Mathieu Bonneau*** [2], ***Mr. Denis Laloë*** [3], ***Mr. Yvon Billon*** [4], ***Mr. Jean Bailly*** [4], ***Dr. Ingrid David*** [1], ***Dr. Laurianne Canario*** [1]

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Recent advances in deep learning enable the automatic analysis of video images and thereafter the analysis of behavioural traits over extended periods of time. We collected data to compute 101 maternal ability traits for 21 Large-White and 22 Meishan primiparous sows housed in individual farrowing pen. Sows were filmed continuously around farrowing. Three periods were considered: pre-farrowing (D-3 to D-1), at farrowing (D0) and post-farrowing (D1 to D7). Sow traits were grouped in 11 blocks of data: predicted posture activity (incl. posture changes) pre, at and post-farrowing, predicted standing activity (plus daily feed consumption) pre, at and post-farrowing, farrowing performance, ease at handling and adaptation to the farrowing unit, reactivity at farrowing, teats functionality and body reserves. To obtain sow behaviour, we used 8,400 annotated images to train the convolutional neural network (CNN) Yolo-v2. Sow postures (standing, sitting, lying sternally, lying laterally with udder hidden or not) were predicted. The five postures were combined in a daily posture budget. The CNN accuracy calculated from the use of 25,830 randomly chosen images was 80%. Another Yolo-v2 CNN was trained to detect the sow's head to analyse the standing activity budget as the time spent eating, drinking and doing something else. The numbers of postural changes in total, risky for piglets and hiding the udder were calculated. Variations in behaviour within each breed and between breeds was large. Analyses were corrected for the breed effect. Three successive piglet average daily gains were calculated from D0 to D7. The number of posture changes in the three periods influenced piglet growth ($p<0.001$). The number of posture changes hiding the udder was favorable to growth (+71g/d). Multifactorial analyses enabled to quantify the contribution of each block of data to piglet growth. Growth was significantly explained at 14% (95%CI: 10-25) by sow pattern of standing activity on D0. Although not significant, the contributions of farrowing reactivity (12%, 95%CI: 3-19), body reserves (10%, 95%CI: 4-18), postural activity at D0 (9.9%, 95%CI: 2.4-15.4) and teat functionality (9.5%, 95%CI: 4.6-12.8) were also substantial. A partial triadic analysis of early growth and standing activity highlighted an evolution in the correlation structure between those traits, from D0 to D4-D7. On average, piglet growth was correlated positively to drinking and negatively to feeding duration and consumption. To conclude, standing activity on the day of farrowing is one of the main maternal factors for early piglet growth.

Individual and pen level behavior as early indicator of post-weaning diarrhea in newly-weaned piglets

Tuesday, 1st August - 12:00: PLF and Other New Techniques for Measuring Animal Behaviour (Pigs and sheep) (Bolero hall) - Oral

Ms. Vivian Witjes [1], ***Ms. Fleur Veldkamp*** [2], ***Dr. Francisca Velkers*** [1], ***Dr. Ingrid De Jong*** [2], ***Prof. Johanna Rebel*** [2], ***Prof. Jan Stegeman*** [1], ***Dr. Tijs Tobias*** [1]

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A major health and welfare issue causing mortality in newly weaned piglets is post-weaning diarrhea (PWD). Behavioral changes indicating impaired health may be detectable before the onset of clinical signs and could be a useful tool to predict the occurrence of PWD, enabling timely interventions. Recently developed algorithms enable automated observations of behavior on pen level. However, PWD may not affect all piglets in one pen and individual level analysis may be required to detect early behavioral changes indicative of illness. Therefore, this study aimed to assess whether changes in pen activity or individual piglet behavior can predict PWD occurrence. During 3 replicate experiments, 72 piglets (*Sus scrofa*, TN70 x Tempo) were weaned at 28 days of age and housed in 4 pens with 6 piglets per pen. Individual faecal consistency was scored (0-4; ≥3 considered as diarrhea) using rectal swabs on post-weaning (PW) days (d) 0, 2, 4 and 7. Additionally, pen level stool scorings, body weight and feed disappearance were assessed. Two methods were applied on the same video recordings, namely scoring individual behavior manually and instantaneously, and analyzing pen activity automatically and continuously. Video recordings during the first 6 days PW between 08:00-17:00h were analyzed for pen activity (lying, standing, walking, eating, drinking; n=12) using an algorithm (Serket, Amsterdam, the Netherlands). Of two out of the three replicate experiments, the same recordings were scored manually for the same behaviors of individual piglets (n=48) by 5s instantaneous sampling with a 5min interval. Across all replicates, the proportion of piglets with diarrhea was highest on d4, (34 of 72 piglets; proportion 0.47) and 44 out of 72 piglets (0.61) had diarrhea on at least one of the sampling days. According to the individual behavioral analysis (2 replicates), piglets (n=48) spent most of the observations lying (mean±sd; 0.71±0.07), followed by standing (0.17±0.05) and eating (0.06±0.02). Relatively higher proportions of lying (d2: 0.75±0.08, d3: 0.73±0.09) and lower proportions of standing (d2: 0.15±0.06, d3: 0.16±0.06) and eating (d3: 0.05±0.03) were observed before the peak in diarrhea (d4: lying: 0.70±0.09, standing: 0.19±0.07, eating: 0.06±0.03; not yet statistically tested). The correlation between behavior before the onset of PWD and diarrhea scores will be assessed on the individual and pen level, clarifying whether early behavioral changes can be used to predict PWD occurrence. Early detection may facilitate the use of more timely supportive or therapeutic treatments to reduce negative impacts on piglet health and welfare.

Social networks in pigs based on computer vision: impacts of proximity definitions

Tuesday, 1st August - 12:15: PLF and Other New Techniques for Measuring Animal Behaviour (Pigs and sheep) (Bolero hall) - Oral

Ms. Clémence A.E.M. Orsini [1], ***Ms. Bernadett Hegedűs*** [2], ***Dr. Lisette E. van der Zande*** [3], ***Dr. Inonge Reimert*** [1], ***Dr. Piter Bijma*** [2], ***Dr. J. Elizabeth Bolhuis*** [1]

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Social network analysis is a powerful tool to quantify inter-individual interactions and identify the social roles of each individual. In farm animals, this method has become a popular approach to study agonistic interactions, damaging behaviours, or preferential associations. Previous social network studies mostly relied on human observations with a small sample size, often focusing on one type of social interaction or proximity. However, little opportunity has been given to compare networks built with different definitions of the connections between individuals. Recent advances in sensing technologies and artificial intelligence provide new opportunities to monitor social behaviours continuously, at an individual level, and over a long period. The aim of this study was to investigate the potential of a computer vision tracking algorithm to assess social networks based on spatial proximity, and to explore how proximity definitions affect these networks. For this purpose, video data were collected over three consecutive days, in 21 pens, each containing six pigs. A tracking-by-detection method (YOLOv3 combined with SORT) was applied to detect the location and track each individual by using bounding boxes. Networks were constructed with five different definitions of proximity, four categorical definitions: (1) distance between the centers of the bounding boxes <30cm, (2) occurrence of overlap of the surface of the bounding boxes, (3) surface of overlap of the bounding boxes >20%, (4) a combination of (1) and (3), and one quantitative definition: (5) the harmonic mean of the distance between the two individuals. The data were filtered to integrate proximity in the social network only when the two interacting individuals were inactive. We analysed whether individuals exhibited similar network positions across these different proximity networks. Our preliminary results reveal correlations between centrality metrics across social networks built with different definitions of proximity. For example, the correlation between eigenvectors centrality criteria (2) and (5) was $r = 0.83$, $p<0.001$. The results indicate that the proximity definitions affect the social network positions of individuals (i.e., rank in centrality score). We conclude that the proposed tracking algorithm is a promising method to quantify the social structure of groups of pigs and identify preferential affiliations within the group over a long period. However, caution should be taken in the choices made when assessing or comparing social networks. The results highlight the need to develop standardized methods regarding proximity definitions before drawing conclusions about the position of an individual in a social network.

Computer vision system to identify lameness in sows

Tuesday, 1st August - 12:30: PLF and Other New Techniques for Measuring Animal Behaviour (Pigs and sheep) (Bolero hall) - Oral

Ms. Tauana Maria De Paula [1], ***Dr. Marisol Parada Sarmiento*** [1], ***Mr. Ton Kramer*** [2], ***Mr. Leandro Sabei*** [3], ***Ms. Júlia Silvestrini Machado*** [1], ***Mr. Edson Sardinha*** [4], ***Prof. Rafael Vieira de Sousa*** [4], ***Prof. Adroaldo Zanella*** [1]

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Lameness in sows is a common condition of multifactorial origin, causing pain and compromising animal welfare. Currently, lameness assessment is done using validated visual locomotion scores. However, this approach is often subjective and neglected because it is time-consuming and laborious. In this context, computer vision has been investigated as an efficient and innovative tool to assess locomotion scores by non-invasively and accurately outperforming traditional approaches. This study aims to generate a computer vision model using the Social Estimates Animal Poses (SLEAP) (https://sleap.ai/) framework for multi-animal pose tracking by deep learning. Data were acquired at the University of São Paulo and in a commercial swine farm (TOPGEN), using one camera to record lateral videos in 2D of sows in locomotion. Experts (n=13) assessed these videos with different scores using a validated locomotion score system. Scores between 0 and 3 were assigned, with 0 being an animal walking easily and 3 for an animal lame, reluctant to walk. SLEAP was used to identify, monitor, and register the kinematics of the swine skeleton's keypoints to create an automatic identification tool for locomotion scores. From these videos, two databases were organized, one with 345 labeled frames (only frames with higher quality) and another with 801 labeled frames (a mixture of frames with different qualities). The frames were labeled with 9 keypoints (snout, neck, end of the rump, front/rear - right/left hoofs, and right/left hock) and 11 (added right/left pastern) keypoints of the swine skeleton. The models were trained (90% database) and tested (10% database) using LEAP and Resnet50 architecture (100 epochs, batch sizes of 4, and single pipeline animal); the metrics: higher object keypoints similarity (OKS_voc.mAP); and the lower average distance among the position expected and labeled keypoints (dist.avg). LEAP obtained the best performance according to the metrics OKS_voc.mAP=0.8 and dist.avg=10. The results indicate that the generated model can identify sow's movement and provide keypoints in videos for score evaluation, which has been carried out, by identifying kinematic patterns associated with lameness.

Vision-AI for animal welfare: automatic detection of sheep lameness analysing face, gait and motion from video

Tuesday, 1st August - 12:45: PLF and Other New Techniques for Measuring Animal Behaviour (Pigs and sheep) (Bolero hall) - Oral

Dr. Marwa Mahmoud [1]***, Mr. Lutian Liu*** [1]***, Dr. Krista Mclennan*** [2]

1. *University of Glasgow,* ***2.*** *University of Chester*

Lameness is a critical indicator of sheep health conditions and is a serious animal welfare concern. Traditional methods of assessing lameness are slow and costly. An automated lameness detection system that can detect early signs of lameness (or other painful conditions) through continuous monitoring of the flock can save on treatment costs and improve animal welfare. With the emergence and rapid development of computer vision and deep learning technologies, the lameness detection problem has the possibility to be solved efficiently and effectively. We present our work on using inference models in a hierarchal model to detect changes in the animal's facial expressions, gait and motion from video. For facial expressions analysis, we leverage transfer learning and Convolutional Neural Networks (CNNs) for face detection, pose estimation and pose-informed landmarks detection. For gait analysis, we build on the extracted body parts from DeepLabCut and use machine learning models to predict lameness by extracting spatio-temporal features of the body and movements. We evaluate our models on a dataset of videos of sheep that suffer from lameness recorded in their natural environment. Our models achieve up to 80% accuracy in detecting pain from the sheep facial expressions and 77.5% accuracy in predicting lameness scores from automatic analysis of gait. Although our proposed methods are evaluated on a dataset specifically for lameness, but it can be utilised and extended to detect other diseases that may elicit a pain response in sheep. Our work shows the potential of using computer vision , as a non-invasive technique, that can allow for continuous monitoring of sheep – and other animals – for early prediction of diseases and to improve animal's welfare.

Human-Animal Interactions (Ruminants)

Effects of tactile stimulation and application of umbilical disinfectant on preweaned beef calves's reactivity to human handling: Preliminary results

Tuesday, 1st August - 14:00: Human-Animal Interactions (Ruminants) (Grande Hall) - Oral

Mr. Victor Brusin [1], ***Dr. Claire Windeyer*** [1], ***Ms. Rafaela Pena*** [2], ***Dr. Jennifer Pearson*** [3], ***Prof. Ed Pajor*** [1], ***Dr. Maria Camila Ceballos*** [1]

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The aim of this study was to investigate the impacts of the experience of tactile stimulation and application of umbilical disinfectant shortly after birth on beef calves' reactivity. A total of 120 calves were randomly divided using a 2x2 factorial design into one of four experimental intervention groups with 30 calves per group: TSUD, calves with tactile stimulation and application of umbilical disinfectant; TS, calves with only tactile stimulation; UD, calves with only application of umbilical disinfectant, and C, calves without tactile stimulation or application of umbilical disinfectant. Calves received tactile stimulation for two minutes, and the navel structures were immersed in 7% iodine solution for 15 seconds by dipping in and out of a teat cup, both within the first day of life. Flight speed (FS, m/s) was measured exiting the squeeze chute and avoidance distance (AD, m) was assessed in a holding pen adjacent to the processing area at Spring and Weaning events. After square root transformation, FS and AD had normal distributions. The differences in calves' reactivity indicators (FS and AD) between groups over both events were analyzed using generalized linear mixed models (PROC GLIMMIX in SAS). The FS and AD models included the experimental group (TSUD, TS, UD, C), event (Spring, Weaning), calf sex (male, female), and the interaction group*event as fixed effects, and a random effect of the calf was included to account for repeated measures. Means were compared using post-hoc Tukey tests. For FS, there were significant effects of event ($P<0.001$) and group ($P<0.05$), but not of the interaction ($P>0.05$). The FS differed between groups with the lowest mean ± SE for TS (1.10 ± 0.035) compared with TSUD (1.24 ± 0.035, $P = 0.008$), UD (1.22 ± 0.036, $P = 0.016$), and C (1.23 ± 0.035, $P = 0.014$), which did not differ from each other ($P>0.05$). There was no significant effect on AD ($P<0.05$) for any fixed effect. Newborn calves receiving tactile stimulation during their first handling had lower speed when exiting the squeeze chute, suggesting lower reactivity when interacting with humans in a handling facility. This suggests tactile stimulation early in a beef calf's life has the potential to reduce reactivity during handling. Further analyses using additional reactivity indicators to assess the effects of tactile stimulation and umbilical disinfectant on calves' reactivity are underway to better understand the potential effects of these two management practices.

Indication of social buffering in disbudded calves

Tuesday, 1st August - 14:15: Human-Animal Interactions (Ruminants) (Grande Hall) - Oral

Dr. Katarína Bučková [1], ***Ms. Ágnes Moravcsíková*** [2], ***Dr. Radka Sarova*** [3], ***Dr. Marek Špinka*** [3]

1. *Iowa State University,* ***2.*** *Czech University of Life Sciences Prague,* ***3.*** *Institute of Animal Science in Prague*

Most dairy calves are housed individually in early ontogeny but social housing has positive effects on calf welfare including an advantage of social buffering, i.e., when negative effects of stress are mitigated through social support of conspecific. The effects of social buffering have not yet been examined in relation to disbudding; a husbandry procedure commonly performed on young dairy calves without use of any pain relief medication. The main objective of the study was to investigate the effect of pair versus individual housing on calves' behavioral reaction to disbudding. In total 34 female calves were randomly allocated either to individual (INDI, n=10) or pair housing (PAIR, n=24, 12 focal animals). Calves were hot-iron disbudded with a local anesthetic and their spontaneous behavior in home pens was recorded for 24 h pre- and post-disbudding. Eating forage, ruminating, resting, exploration, play, and pain-related behaviors (head shaking, head rubbing, foot stamping, self-grooming) were quantified in eight 20 min intervals during the 24 h periods pre- as well as post-disbudding. In PAIR calves social resting, active and passive allo-grooming were additionally recorded. The differences between INDI and PAIR calves were tested by general linear models. The changes in pre- and post-disbudding behaviors in all calves as well as in social behaviors of PAIR calves were tested by paired t-test. We found that head shaking (mean post- minus pre-disbudding difference=6.86; t=-3.46, P=0.002), head rubbing (mean post- minus pre-disbudding difference=9.95; t=4.96, P<0.0001) and self-grooming (mean post- minus pre-disbudding difference=7; t=2.11, P=0.04) increased in all calves after disbudding. The only significant difference between INDI and PAIR calves was in eating forage. Disbudded PAIR calves fed forage more often than INDI calves (lsmeans: -8.27 and 8.23 for INDI and PAIR respectively; $F_{1,18}$=12.96, P=0.002;) which may be an indication of improved ability of PAIR calves to recover from disbudding. No other signifcant diferences were detected between treatment groups which might have been caused by our limited sample. Our results provide the first evidence that housing treatment affects calves' reactions to disbudding, with possible indication of social buffering. The results on increase in pain-related behaviors contribute to the growing body of literature that non-steroidal anti-inflammatory drugs should be also administered to calves before disbudding. This study has been financed by Grant No. MZE-RO0718 from the Czech Ministry of Agriculture, and in part by Iowa Farm Bureau Federation to support Dr. Bučková's salary.

Examining fear responses during artificial insemination in dairy cattle

Tuesday, 1st August - 14:30: Human-Animal Interactions (Ruminants) (Grande Hall) - Oral

Mrs. Jennifer Heinsius [1]***, Prof. Marina A.G. von Keyserlingk*** [2]***, Prof. Daniel Weary*** [2]

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Dairy cattle experience a variety of stressors associated with routine farm practices, including injections, pen movements, regrouping, artificial insemination (AI), and introduction to milking equipment and procedures. Ear positions have been associated with varying emotional states in sheep and pigs, but limited work has used this approach on dairy cattle. The first objective of this study was to assess the use of ear position as indicators of emotional state in cattle, by tracking changes in ear position before during and after exposure to a novel and aversive management procedure, first time AI. The second objective of this study was to test whether training heifers with positive reinforcement (PRT) affected ear position during this novel experience. We tested 12 heifers (13 ± 0.7 mo old); 7 of these had been trained using PRT (as part of another study) and 5 with no PRT experience. All heifers were removed from their home pen and restrained in a headlock for three events: the 5 minutes before AI, during AI, and the day following AI. During each event, the PRT heifers continued training positive reinforcement. For control heifers, the trainer stood in the identical location but no training occurred. Ear position was assigned to one of six defined categories using an established ethogram, and the frequency of each position was compared across events using a linear mixed effect model. For all 6 ear positions we found no evidence of a difference between pre-AI and post-AI so these events were averaged to create single baseline values. Two of the ear positions, ears axial and forward, were observed more frequently during the baseline observations than during the AI event (4.61 ± 0.93 no. vs. 0.33 ± 0.12 no., P=0.001 and 3.17 ± 0.61 no. vs. 0.42 ± 0.42, P=0.001 , respectively), and one other position, ears backward down, was observed less frequently during the baseline observations that during AI (0.09 ± 0.06 no. vs. 3.58 ± 1.05 no., P<0.001). We found no evidence of an effect of PRT on these responses. We conclude that ear position is associated with responses to aversive management procedures in dairy cattle, and that certain positions increase and other decrease during the event. Further work is required to determine how well these responses generalize to other procedures, and what treatment methods can be applied to mitigate these responses and the corresponding negative affective experience.

A comparison of industry and public perceptions of dairy cow handling scenarios

Tuesday, 1st August - 14:45: Human-Animal Interactions (Ruminants) (Grande Hall) - Oral

Dr. Jesse Robbins [1], Prof. Grahame Coleman [2], Prof. Paul Hemsworth [3], Dr. Lauren Hemsworth [2], Mr. Jeremy Skuse [4], Dr. Kathryn Proudfoot [5], Prof. Elizabeth Strand [6], Prof. Peter Krawczel [7], Prof. Jennifer Van Os [1]

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Inappropriate animal handling poses a reputational threat to the U.S. dairy industry. For social sustainability, animal care practices must resonate with societal values. Our objective was to evaluate how differently the dairy industry and public stakeholders perceive various animal handling practices. We administered an online survey to samples of stakeholders from the U.S. dairy industry (IND; n = 201; convenience sample) and the Wisconsin general public (PUB; n = 136; stratified by U.S. census data on age, gender, educational attainment, and income). Participants viewed 12 brief videos depicting realistic handling situations with animal welfare impacts ranging from negative to positive. After each video, participants responded to measures assessing their attitudes and beliefs about each scenario, their perception of the emotional response of the cows, and their personal emotional response. Before watching the videos, preexisting beliefs about cattle treatment on U.S. dairy farms and sociodemographic data, including self-reported dairy consumption, were collected. Before viewing the videos, 52.9% of PUB (vs. 79.0% of IND) believed cows were treated well, while 27.2% (vs. 9.0% of IND) believed cows were treated badly. Within PUB, female and younger participants were more likely to believe cows were treated badly before viewing the videos (Wilcoxon-Mann-Whitney tests; $P \leq 0.04$); within IND, such preexisting negative attitudes were more common among non-whites and those with greater formal education, more liberal politics, and living in urban or suburban environments ($P \leq 0.05$). In both samples, participants with more positive preexisting beliefs about dairy cattle treatment also reported consuming dairy products more frequently (Kruskal Wallis tests; $P \leq 0.02$). Videos which were rated more positively for attitudes, or for the cows' and respondents' emotional experiences, were also perceived as more common by both IND and PUB (r_s = 0.75 to 0.93). The samples did not differ in the overall valence of their attitudes (positive, neutral, or negative) toward the videos. In both samples, participants' composite attitudes toward the scenarios were correlated with both their own emotional response and their perception of the cows' emotional responses (r_s = 0.59 to 0.77). Contrary to the assumption that greater firsthand experience leads to desensitization toward the animals' emotional experiences, IND rated cows as experiencing a greater degree of negative emotion overall (t-test; $P < 0.01$). The agreement we observed between industry and public stakeholders regarding dairy cow handling practices could provide a common starting point for addressing other, more contentious animal welfare issues.

Tactile stimulation reduces the heart rate of newborn Nellore calves subjected to handling procedures

Tuesday, 1st August - 15:00: Human-Animal Interactions (Ruminants) (Grande Hall) - Oral

Prof. Mateus Paranhos da Costa [1], ***Ms. Mariana Parra Cerezo*** [1], ***Mr. Victor Brusin*** [2], ***Dr. Pedro Trindade*** [3], ***Dr. Adalinda Hernández*** [4], ***Dr. Jens Jung*** [4], ***Prof. Charlotte Berg*** [4]

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The aim of this study was to evaluate short- and long-term effects of tactile stimulation on the welfare of newborn Nellore calves. The study was carried out on a commercial farm located in the municipality of Araguaiana, state of Mato Grosso, Brazil. Fifty-four purebred Nellore calves were evaluated. Handling procedures were carried out from the third to the fifth day of the calves' life, following good animal welfare practices and covering the following activities: separating the calves from their mothers, catching, and holding each calf manually, umbilical cord dipping, and identification procedures (tattooing and punching small holes in the ears). Twenty-eight calves received tactile stimulation (WTS) for one minute (30 seconds before and 30 seconds after the identification procedures) and 26 not (NTS). Heart rate (HR) were recorded (Polar H9, heart rate sensor) at 3 seconds interval during handling procedures, and the heart rate means were estimated at three occasions: HR1 = when the calf was being restrained and positioned in lateral decubitus on the cushion, HR2 = during the identification procedures and HR3 = after completion of the identification procedures. After these procedures, the calves were weighed and returned to their mothers. Calves were weighed again at weaning (~8 months of age), and average daily weight gains (ADG) were calculated. A generalized linear model was used to analyse the fixed effects of treatment, sex and interaction treatment-sex on HR1, HR2, HR3, HR3-HR1 and HR3-HR2, and ADG. We observed elevated HR in all calves (range 114.32 to 232.00 bmp), which can be explained by their age (few days old) and the highly aversive procedures performed on them (separating them from the mothers, catching and holding them, and tattooing and punching holes in their ears). HR3-HR2 showed significant differences ($p<0.05$) between treatments (-6.28±2.61 and 1.38±2.78 bpm for WTS and NTS calves, respectively), while HR3 showed a trend ($p=0.06$), with WTS calves showing lower values than NTS ones (159±4.62 and 173±4.91 bpm for WTS and NTS calves, respectively). These results indicate a short-term positive potential effect of tactile stimulation on HR shortly after completion of identification procedures. ADG did not differ ($p>0.05$) between treatment, but as expected it differs ($p<0.05$) between sex (0.749±0.016 and 0.806±0.021 kg/day for heifer and bull calves, respectively). We conclude that the tactile stimulation during the first handling procedures of newborn Nellore calves has potential to promote their welfare in short-term.

Fear of humans or fear of isolation - The role of conspecifics in behavioural testing in sheep

Tuesday, 1st August - 15:15: Human-Animal Interactions (Ruminants) (Grande Hall) - Oral

Ms. Leigh Atkinson [1], ***Dr. Rebecca Doyle*** [2], ***Dr. Ellen Jongman*** [1]

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In a gregarious species such as sheep, social isolation is highly stressful and causes strong behavioural reactivity. Conversely, the presence of conspecifics may ameliorate stress and reactivity towards a physical stressor. As fear and temperament testing in sheep is commonly conducted under social isolation, the validity of such testing in a species managed in social groups is called into question. The aim of this study was to determine if measures of behavioural reactivity towards a human in sheep are ranked similarly in both the absence and presence of conspecifics. Testing involved 220 Merino lambs (3-4 months old) in an arena with a seated human and was repeated in both social conditions in alternating order. Two measures of fear, closest approach zone to (1-4) and number of interactions with the human, and two measures of alertness, time spent vigilant and time spent attentive towards the human, were recorded. Temperament was also accounted for using three measures: number of vocalisations, activity measured as number of steps, and number of escape attempts. As the presence of conspecifics is known to reduce the magnitude of reactivity, rank order of individual responses was compared, using linear mixed effects models with individual measures from group testing as the outcome variable and individual measures from social isolation as baseline covariates.

When in the presence of conspecifics, no lamb interacted with the human and vocalisations and escape attempts were performed by only 7 and 4 individuals respectively, compared with 179 and 112 in isolation. This suggests social isolation has a stronger influence on these behaviours than does fear of humans. Despite the temperament measures previously showing high temporal stability under social isolation, rank order was not stable between the social conditions (vocalisations; $p=0.049$, 95% CI [0.009, 0.089], steps; $p=0.352$, 95% CI [-0.052, 0.148], escape attempts; $p=0.113$, 95% CI [-0.006, 0.06]). Proximity to the human was also not stable ($p=0.049$, 95% CI [-0.016, 0.116]). However, stability of rank order was seen in the two alertness behaviours, vigilance ($p<0.001$, 95% CI [0.19, 0.41]) and attention towards the human ($p<0.001$, 95% CI [0.088, 0.303]).

These results suggest that this commonly used test is not suitable to identify behavioural reactivity towards humans in sheep that are predominantly managed in social groups. Alternatively, the two alertness measures better predict fearfulness towards humans across social conditions and may be more suitable measures of temperament where that classification is applied to sheep managed in groups.

Behaviours as indicators of positive welfare (Pigs)

The drinking fountain: Do pigs donate food to conspecifics?

Tuesday, 1st August - 14:00: Behaviours as Indicators of Positive Welfare (Pigs) (Bolero hall) - Oral

Prof. Jean-Loup Rault [1]***, Ms. Marie Bordes*** [1]***, Dr. Jim McGetrick*** [1]

1. *Institute of Animal Welfare Science, University of Veterinary Medicine, Vienna*

Prosocial behaviour, defined as behaviours that benefit other individuals, are ubiquitous in social animals in the wild, expressed in a variety of forms such as helping, sharing, and comforting. Prosocial behaviour gives individuals a stake in the well-being of others. However, there is a lack of research on prosocial behaviour in domestic animals, and especially in farm animals, resulting in little knowledge on the prevalence and type of prosocial behaviour in domestic animals.

We developed a novel testing paradigm that aims to elicit prosocial behaviour. This apparatus, which we coined the 'Drinking Fountain', is designed with a lever that, when lifted by applying a light pressure, activates a gravity-fed mechanism that releases food through a drinker pipe. An animal (the 'donor') can therefore lift the lever, releasing highly valued food (in our case apple juice) at the other end of the apparatus that a conspecific (the 'recipient') can consume. The juice only flows while the lever is lifted and the drinker is at a distance from the lever; therefore, the animal lifting the lever is not able to derive immediate benefit itself. The apparatus can be presented to groups of animals, therefore offering the advantage that animals can interact the device when they want, and can choose their dyadic partner within their group. This enables researchers to ask the questions of who provides for whom and when, which is advantageous for unravelling the context-dependent features of prosocial behaviour.

We presented the drinking fountain to farm-kept pigs to investigate their tendency to benefit conspecifics. Pigs typically lifted the lever using their snout, as we expected based on their species-specific behaviour, although some pigs developed more innovative methods such as a bite-and-lift technique. Preliminary results reveal variation between groups of pigs and between individuals. Groups of 4 pigs successfully lifted the lever (*i.e.* leading to the release of juice) on average 15.6 ± 1.9 times (mean ± SD) during the 1-hour of daily testing. However, pigs also interacted with the lever without successfully lifting it on a similar number of occasions in the same hour, suggesting that they had not yet mastered the task in 10 1-hour daily sessions. All pigs successfully lifted the lever at some point, but with large variation between individuals. Further work is needed, possibly with longer testing period, to assess whether pigs understand the consequence of their action, *i.e.* lifting the lever provide conspecifics with juice.

Variation in physical contact between pigs

Tuesday, 1st August - 14:15: Behaviours as Indicators of Positive Welfare (Pigs) (Bolero hall) - Oral

Mr. Piero Seddaiu [1], ***Dr. Irene Camerlink*** [1]

1. *Institute of Genetics and Animal Biotechnology Polish Academy of Sciences*

Social touch is an important aspect of social relationships and has a major influence on development and health and provides a buffer against stress. However, in many species the occurrence and function of social touch is unknown. Pigs have frequent physical contact but this behavior is largely unexplored. We therefore investigated natural variation in the frequency and duration of physical contacts. A stable group of ten 8-month old gilts was observed for five days and nights by live observation and video (102h/pig). They were housed indoor (108m^2 pen) on deep-straw bedding. The ethogram distinguished the amount of surface contact when lying (extremities: 1-24% of body in contact; partial body contact: 25-74%; full body contact: >75%), the orientation to others (parallel head-to-head, parallel head-to-tail or anti-parallel), nose contact, other non-agonistic social behavior and agonistic behavior; noting the actor and receiver. Resting location within the pen was recorded 50 times per pig. Ethics permission was not required according to the local jurisdiction. Dominance relationships were calculated from agonistic behaviors (Modified David's Score; MDS). Data were analysed with Pearson correlations and mixed models. Values are percentages or means with SE. Pigs spent on average 46.3% (9.4h) of the observed time per day (20.4h) lying in body contact (day:38.5%,night:54.0%). They preferred lying with extremities (e.g. legs) in contact (day:63.8%, night:60%) rather than in partial body contact (day:26.7%, night:19%) or full body contact (day:9.5%, night:21%). Lying head-to-head (day:41%, night:57.6%) occurred more than anti-parallel (day:43.7%, night:35.6%) or head-to-tail (day:15.3%, night: 6.8%). Head-to-tail was significantly more frequent during the day (7.1±1.19) than during the night (2.3±1.19) ($p=0.02$). During the day pigs spent significantly less time (6.16±1.68h) in head-to-head orientation than during the night (18.9±1.77h) ($p<0.001$). There was no significant correlation between any of the behaviors and dominance rank. Individuals had on average seven different lying locations. The number of locations, reflecting potential displacement, did not significantly correlate with dominance rank ($p=0.27$). However, the dominant pig occupied one specific location in 77% of observations whereas others were maximum 56.5% of observations in one specific location. In conclusion, under large space allowance, pigs spent nearly half of their time in body contact, day and night, and were mostly lying with a small part (up to 24%) of their body in contact with another pig and in a head-to-head or anti-parallel orientation. Further work will investigate contact behavior across seasons.

Effect of light intensity on behavioural welfare indicators in growing-finishing pigs

Tuesday, 1st August - 14:30: Behaviours as Indicators of Positive Welfare (Pigs) (Bolero hall) - Oral

Mrs. Alice Scaillierez [1], ***Dr. Sofie van Nieuwamerongen-de Koning*** [2], ***Dr. Iris Boumans*** [2], ***Dr. Rik van der Tol*** [3], ***Dr. Eddie Bokkers*** [2]

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Domestic pigs are diurnal animals and their behaviour is affected by lighting, especially light intensity, since they prefer being active in lit conditions. European legislation requires a minimum light intensity of 40 lux in pig barns. Although the optimal light intensity for pigs remains unknown, higher light intensities could improve their welfare. A study suggest that pigs housed with a light intensity of 80 lux displayed less agonistic behaviours compared to 40 lux. Therefore, this study aimed at exploring the role of light intensity on behavioural welfare indicators of growing-finishing pigs.

The experiment was conducted at a commercial pig farm equipped with LED-based luminaires creating four light intensity treatments: low (45 lux), medium (198 lux), high (968 lux) and a spatial gradient of intensity with a brighter pen area (301 lux) and a dimmer one (71 lux). Fifty-six pigs per treatment were studied in 2 batches of 4 pens per treatment. Video recordings were observed in week 2, 4, 6, 8, 10 of the growing-finishing phase. A 0-1 sampling method with 1 min intervals was used to observe 3 blocks (morning, midday, afternoon) of 20 minutes. Observations included exploration, positive and negative social interactions, object, individual locomotory and social forms of play, ear and tail manipulation, and belly-nosing. Data were analysed using generalised linear mixed models including light treatment in interaction with observation week, block as fixed effect and batch, room, pen and pig as nested random effects.

Preliminary results indicate that the interaction between the light treatment and observation week was significant for exploration ($p<0.001$), positive and negative social interactions ($p<0.001$, $p<0.001$), social and individual locomotory forms of play ($p<0.001$, $p<0.01$) and ear manipulation ($p<0.001$). However, results were not consistent over weeks. For example in week 2, spatial gradient had lower positive social interactions in proportion of time (0.099) compared to low and medium intensities (0.190 $p<0.001$, 0.164 $p<0.05$). However, in week 8, spatial gradient had higher positive social interactions (0.191) compared to high intensity (0.056 $p<0.001$) and no differences were observed between treatments in other weeks. No significant effect of light and observation week was found for object play, tail manipulation and belly-nosing.

In conclusion, exploration, social interactions, social play, individual locomotory play and ear manipulation were influenced by light intensity and observation week. Further analyses are required to get more insights into optimal light intensity for pigs.

Auditory laterality in pigs and the emotional valence hypothesis

Tuesday, 1st August - 14:45: Behaviours as Indicators of Positive Welfare (Pigs) (Bolero hall) - Oral

Dr. Charlotte Goursot [1]***, Dr. Sandra Duepjan*** [2]***, Dr. Armin Tuchscherer*** [3]***, Prof. Birger Puppe*** [4]***, Dr. Lisette Leliveld*** [5]

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Studying laterality (i.e. asymmetries of brain and behaviour, where each hemisphere controls the contralateral part of the body) represents a promising approach to better understand emotional processing in animals. For example, stimulating only one side of a sensory modality (such as monaural hearing) permits the non-invasive modulation of brain mechanisms involved in perception and/or emotional appraisal. According to the emotional valence hypothesis, positive emotions are mostly processed by the left hemisphere and negative emotions by the right hemisphere. We tested this hypothesis in the context of auditory laterality on 90 male piglets (German Landrace) at 5 and 6 weeks of age. The animals were divided into two conditions in which an artificial tone was associated either with a food reward (positive stimulus) or with a mild punishment (waving a plastic bag for 3 seconds; negative stimulus). This tone (without any reinforcer) was then presented to the piglets via earphones with 3 different treatments: tone from right earphone (R treatment), from left earphone (L treatment), or from both (B; control treatment). During one minute of playback the behavioural and autonomic response (heart rate variability) were evaluated. Data were analyzed using mixed effects models with minute, condition, treatment and their interaction as main effects, and pairwise multiple t-tests (Tukey-Kramer and Bonferroni corrections). Monaural presentation had no clear effect on the reaction of the negatively conditioned pigs. In contrast, we found some differences between monaural treatments within the positively conditioned pigs. The pigs submitted to the L treatment showed longer freezing ($t=-2.55$; $p=0.029$) and vocalized less ($t=2.94$; $p=0.009$) at the beginning of the stimulus compared to the control treatment. Additionally, the L treatment differed from R treatment and control because it caused a decrease in vocalizations during the first 10 seconds ($t=4.16$, $p<0.001$). In contrast to other treatments, the R treatment caused an increase in vocalizations at the end of the stimulus ($t=-3.27$; $p=0.007$). These findings suggest that hearing with the left ear only, resulting in reduced inputs to the left hemisphere, may have reduced the positive valence of the sound. This study on auditory laterality in pigs seems to reproduce the findings of our previous study on monocular viewing in pigs, and only partly supports the emotional valence hypothesis.Therefore, other alternative hypotheses need to be considered to understand emotional processing in pigs, which is a central aspect of their well-being.

Assessment of lying down behaviour in temporarily crated lactating sows

Tuesday, 1st August - 15:00: Behaviours as Indicators of Positive Welfare (Pigs) (Bolero hall) - Oral

Dr. Gudrun Illmann [1], ***Dr. Helena Chaloupková*** [2], ***Dr. Sebastien Goumon*** [3]

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Temporary crating may be a more acceptable housing system for lactating sows than permanent crating from an animal welfare point of view. It remains unclear whether opening the crate leads to changes in sow lying down behaviour and piglet activity that may pose an increased risk of injury to piglets. This study aimed to assess whether the lying down behaviour of lactating sows housed in temporary crating changed shortly after removal of confinement, whether it was influenced by piglets' behaviour and age and whether sows preferentially used some support during lying down after crate opening. Sows (n = 13) were crated from 5 days pre partum to 3 days post partum. Their behaviours were recorded on video over a 24-h period both preceding and following crate opening, as well as over a 24-h period on day 25. The following behaviours were analysed: position and activity of the piglets when the sow lay down, duration of the lying down events, use of pen walls or crate bars as support when lying down; and position of the sow in the pen when lying down. Piglet mortality was assessed every day. Data were analysed in SAS using GLM. The duration of lying down events did not differ between the 24-h periods before and after opening the crate but increased on day 25 ($P < 0.01$). Similarly, the percentage of piglets in the danger zone did not differ between the 24-h periods before and after opening the crate, but increased on day 25 ($P < 0.0001$). The percentage of piglets in the creep area increased temporarily the day after the crate opening ($P < 0.0001$). Piglet mortality was too low to be statistically analysed. Sows frequently utilised support when lying down, but less over the 24-h period after the crate opening compared to the two other periods ($P < 0.001$; 100%, 85% and 90% respectively). The present study shows that opening the crate does have an immediate impact on lying down behaviour and piglet behaviour, but it does not pose an increased risk to piglets. Our results also indicate that piglet behaviour changed with age and influenced sow lying down behaviour. Finally, our findings further suggest that some available lying down support may be a very important feature of the pen during the whole lactation period.

Can we promote positive welfare in pigs through play behaviour?

Tuesday, 1st August - 15:15: Behaviours as Indicators of Positive Welfare (Pigs) (Bolero hall) - Oral

Ms. Karolina Steinerova [1], ***Dr. Sarah E. Parker*** [2], ***Dr. Jennifer Brown*** [3], ***Dr. Yolande Seddon*** [1]

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The provision of opportunities to express behaviours linked to rewarding experiences is an emerging concept to support better quality of life of farm animals. Play has been associated with positive welfare, suggesting that playing animals experience pleasurable states. Considering this, providing increased opportunities for play may be a means to enhance pig welfare in intensive rearing systems. Pigs play between 2-6 weeks and the behaviour has been rarely reported in older pigs. This study investigates if play can be promoted and sustained in pigs beyond the window of its natural expression in an intensive system. Ten-week-old pigs (n=288) were assigned to three treatments and housed in a group of eight in a part-slatted "home" pen: i) no play promotion (Control: CON, 1 m^2/pig); ii) play promotion 3x/week with novel objects in the home pen (Novelty: NOV, 1 m^2/pig); iii) play promotion 3x/week through access to extra space in a play pen with novel objects (Play pen: PLP, 2.9 m^2/pig). The novel objects were destructible, rotated weekly and novelty supported with olfactory stimulation. Frequency and duration of locomotor, social and object play were recorded on four focal pigs per pen during a 30-minute play session at 11, 16 and 21 weeks of age. Data were analysed using mixed models with a negative binominal distribution accounting for repeated measures with Bonferroni correction for p-values. The pig was the experimental unit. Compared to CON, NOV and PLP played more frequently and sustained the same level of play at 16 and 21 weeks, whereas play in CON continued to decline (11 weeks: NOV: 46±10, PLP: 54±12, CON: 10±2; 16 weeks: NOV: 17±4, PLP: 24±5, CON: 5±1; 21 weeks: NOV: 12±3, PLP: 23±5, CON: 2±1, mean frequency±SEM per 30-minute play session; p=0.0015). NOV and PLP also played for a greater duration (NOV: 285±51, PLP: 207±37, CON: 36±6, mean duration (seconds)±SEM per 30-minute play session; p=0.0000). Frequency and duration of play between NOV and PLP at the observed ages did not differ. Play was promoted and sustained until the end of finishing period suggesting a rewarding experience. Play was equally expressed with and without access to extra space suggesting that the pigs were motivated to play regardless of the size of space provided. This work contributes knowledge for the development of pig friendly husbandry and animal care considering for provision of positive experiences, which is a crucial concept to support improved welfare for intensively farmed pigs.

Human-Animal Interactions

Owner's recognition of sentience improves welfare of donkeys in challenging working environment

Tuesday, 1st August - 16:15: Human Animal Interactions (Grande Hall) - Oral

Dr. Syed Saad Ul Hassan Bukhari [1], ***Dr. Alan Gerard McElligott*** [2], ***Dr. Sarah Margaret Rosanowski*** [3], ***Dr. Rebecca Sarah Victoria Parkes*** [1]

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Working donkeys (*Equus asinus*) support human living standards globally. However, there is little information on the effect of human perceptions of sentience (ability to feel pain and to have positive and negative emotions) on their welfare. We interviewed donkey owners (n = 332) in Pakistan to determine the relationship between human perspectives of donkey emotions, the ability to feel pain, and working practices that could impact welfare. The majority of owners used padding under the saddle [n=211; 63.6%; 95% CI (58.3% - 68.9%)] and provided access to food [n=213; 64.2%; 95% CI (58.9% – 69.3%)] and water (n=195; 58.7%; 95% CI (53.4% - 64.1%)] during the working day. Two-thirds of owners reported load-associated injuries during their donkey's life (65.3% (95% CI 60.2% - 70.5%)), of which 27.7% (n=92; 95% CI 22.8% - 32.5%) were wounds, 20.5% (n=68; 95% CI 16.1% - 24.8%) were lameness, and 7.2% (n=24; 95% CI 4.4% - 10.0%) were back pain. In total, 81.3% (95% CI 77.1% - 85.5%; n=270) of owners believed that their donkeys felt pain, and 70% (95% CI 65.2% - 75.1%; n= 233) believed that their donkeys had emotions. We used Multiple correspondence analysis (MCA) to understand the relationship between owners' recognition of emotions and pain in donkeys and how they worked with the animals. The variance explained by Dimension One and Dimension Two was 45.89% and 22.09%, respectively. The MCA factor map revealed two clusters, named positive and negative ones. The positive cluster included owner's recognition of donkey pain and emotions, the availability of food and water, use of padding under the saddle, the absence of injuries, and a reported willingness to follow potential loading guidelines. The negative cluster represented practices that did not benefit donkey welfare, such as using saddles without padding and a lack of food and water during work. The presence of injuries, owners not recognizing that donkeys feel pain and emotion along with a reported unwillingness to follow potential loading guidelines were also found in the negative cluster. We show that owners who recognized sentience in their donkeys were more likely to work in a manner that is good for welfare. The ability of owners to identify sentience, along with their willingness to follow guidelines, are very important factors for better donkey welfare even in very challenging working environments.

Early human contact and fear of novelty and humans in piglets

Tuesday, 1st August - 16:30: Human Animal Interactions (Grande Hall) - Oral

Dr. Lauren Hemsworth [1], ***Dr. Megan Lucas*** [1], ***Mrs. Rutu Galea*** [1], ***Dr. Maria Jorquera-Chavez*** [2], ***Dr. Rebecca Morrison*** [2], ***Mr. Kym Butler*** [1], ***Prof. Alan Tilbrook*** [3], ***Prof. Paul Hemsworth*** [1]

1. *Animal Welfare Science Centre, The University of Melbourne,* ***2.*** *Rivalea Australia,* ***3.*** *Centre for Animal Science, QAAFI and School of Veterinary Science, The University of Queensland*

High levels of fear towards humans, and fear in general, can impair animal welfare and productivity. The development of fear in pigs is affected by early life experiences including those with humans. This study further investigated the effects of human interaction on fear in piglets, hypothesising that positive human contact would reduce fear in piglets.

Twenty litters of piglets in standard farrowing crates received one of three treatments: routine human contact (C, n=6), or positive human contact (5 min scratching/patting) either daily for the first 4 days of life (+HC4d, n=8) or 5 days/week until weaning (+HC, n=6). At 3 wk of age in an unfamiliar arena during 1-min consecutive tests, the behavioural responses to a novel object (traffic cone) and an unfamiliar human were assessed in 2 male and 2 female piglets per litter (20 pairs of males and 20 pairs of females). Analysis of variance was used to examine the effects of treatment and sex on the approach behaviour of litter mate pairs.

There were no significant treatment effects on the responses of piglets to the two stimuli (back transformed means of C, +HC4d, and +HC: time to approach within 0.5 m of i. cone (20s, 20s, 25s; p>0.05) and ii. human (33s, 50s, 33s; p>0.05); time to interact with i. cone (33s, 33s, 33s; p>0.05) and ii. human (50s, 50s, 17s; p>0.05); number of interactions with i. cone (0.32, 0.32, 0.33; p>0.05) and ii. human (0.38, 0.37, 0.38; p>0.05)). There were also no significant sex or interaction effects. These data indicate that either brief or regular positive human contact did not affect piglets' fear of a novel object or an unfamiliar human. Our recent research showed that regular positive human contact reduced piglets' fear of both novelty and unfamiliar humans. A major difference between experiments was that piglets in the present experiment moved in a were tested in a large arena (2.4m x 2.3m x 1.5m) in an adjacent building to the farrowing shed, while the previous experiments tested piglets in a smaller arena (1.8m x 0.6m x 0.6 m) adjacent to their home pen. Few pigs approached either stimuli in the present experiment and thus high fear of a large unfamiliar environment away from the sow may have inhibited approach behaviour to the two study stimuli. Further analysis of piglets' behavioural responses to routine husbandry procedures, weaning, and novelty and humans at different ages are underway.

A long-term positive human-animal relationship does not improve pigs' response to an LPS immune challenge

Tuesday, 1st August - 16:45: Human Animal Interactions (Grande Hall) - Oral

Dr. Océane Schmitt [1], ***Prof. Ulrike Gimsa*** [2], ***Mrs. Birgit Sobczak*** [2], ***Prof. Jean-Loup Rault*** [1]

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Although the human-animal relationship has clear implications for animal welfare, little is known about the effects of a positive human-animal relationship on animal health. We investigated the effects of long-term positive human-animal interactions on pigs' immune competence. A total of 24 female pigs were recruited at weaning (5 weeks of age), and siblings of similar weights were allocated to either the positive contacts treatment (P) or a control treatment (C; human standing silently in front and outside the pen). In the P treatment, the experimenter sat in the home pen, talked softly to the pigs, and offered strokes and scratches to the pigs that approached, and contacts were never forced. Treatment sessions lasted 10 min per group of three pigs, twice daily, three days a week, over nine weeks. At 16 weeks-old, pigs were submitted to an immune challenge by an intravenous administration of lipopolysaccharide (LPS; 2µg/kg). Sickness behaviour (lethargy, cramps, tremors, panting, vomit, diarrhoea) were observed using scan sampling every 5 min over 6 h post-administration. Blood samples were collected before and 1h and 3h post-LPS administration, and the plasma analysed for TNF-alpha, IL-6, IL-10, IgA and cortisol concentrations. At 15 weeks-old, pigs which received positive contacts were faster to approach the experimenter than control pigs (4.4±1.34 s vs. 20.8±8.26 s, P=0.006). However, no difference (all P >0.1) was found between the two treatments in the frequency of sickness behaviours (lethargy: 0.02 ± 0.24; cramps: 0.11 ± 0.079,; tremors: 0.02 ± 0.024; panting: 0.08 ± 0.077; vomit: -0.03 ± 0.045; diarrhoea occurred once for a P pig) or in the concentration of TNF-alpha (t0: -655.1 ± 11276, t1: 27369.1 ± 11461; t3: 2.8 ± 11281), IL-6 (t0: 5.7 ± 555; t1: 77.7 ± 412; t3: 378.2 ± 402), IL-10 (t0: -18 ± 126.1; t1: 164 ± 126.3; t3: 20.8 ± 126), IgA (t0: 0.5 ± 0.32; t1: 0.4 ± 0.32; t3: 0.2 ± 0.32) and cortisol (t0: -0.2 ± 0.21; t1: 0 ± 0.2; t3: 0 ± 0.2). Therefore, long-term exposure to positive interactions with a human over several weeks does not enhance the pigs' response to this immune challenge or the immune parameters measured. Nonetheless, there was individual variation in the responses of the P pigs to the immune challenge, which will be discussed in relation to their interest in the human during the interaction session.

Early-life positive human contact causes quicker stabilisation of piglet behaviour following weaning

Tuesday, 1st August - 17:00: Human Animal Interactions (Grande Hall) - Oral

Ms. Katelyn Tomas [1], ***Dr. Jemma Savaglia*** [2], ***Dr. Kate Plush*** [2], ***Dr. Darryl D'Souza*** [2], ***Mr. Kym Butler*** [3], ***Prof. Paul Hemsworth*** [3], ***Prof. Alan Tilbrook*** [4]

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Weaning is arguably the most stressful experience that farmed pigs undergo. Early life interactions, such as those with the dam or stockpeople, may mitigate subsequent stress responses in farm animals. It was hypothesised that piglets receiving increased maternal contact or positive human contact would have improved stress resilience indicated by stabilisation of behaviours following weaning.

Ninety-eight litters were allocated to a 2x2 factorial randomised block design for treatments maternal contact (MC+) / restricted maternal contact (MC-); and positive human contact (HC+) / control (HC-). Each experimental unit contained four or five adjacent sows and litters. Modified farrowing crates were used to restrict maternal contact (MC-). Litters in the HC+ treatment received five minutes of daily positive human interaction (stroking) upon approach to technician. Treatments ceased at 22 days of age (weaning). Forty-three pigs were mixed into group pens of the same treatment at weaning for further study. Each pen underwent scan sampling every 2 minutes to obtain time budgets of behaviour for 0-30 min, 30-60 min, 60-90 min and 90-120 min post mixing. Behaviours were categorised as play, aggression, social (nosing, sniffing penmates), consumption (eating, drinking), active (manipulating pen, walking) or inactive (standing, sitting, lying). Data underwent angular transformation prior to analysis using a randomised block ANOVA. Back transformed means are presented.

There were few effects of MC on behaviours examined and these are not reported. There was no difference in play or social behaviour ($P>0.05$) between HC treatments. HC+ piglets displayed aggressive behaviours less frequently than HC- pigs (0-30min 0.07% vs 0.4% $P=0.035$; 30-60min 0.01% vs 0.17% $P=0.010$; 60-90min 0.002% vs 0.08% $P=0.014$; 90-120min 0.05% vs 0.08% $P=0.57$), along with reduced activity (0-30min 8.7% vs 17.2% $P=0.011$; 30-60min 3.6% vs 6.7% $P= 0.042$; 60-90min 2.5% vs 5.3% $P=0.033$; 90-120min 3.4% vs 4.3% $P=0.55$). Consumption behaviour were lower for HC+ pigs to 30 minutes post-mixing (0-30min 1.7% vs 5.1% $P<0.05$). Inactive behaviours were higher in HC+ pigs to 90 minutes (0-30min 88.9% vs 76.1%; 30-60min 95.7% vs 91.8%; 60-90min 97.0% vs 93.3% $P<0.05$).

HC+ pigs displayed fewer aggressive and active behaviours in the first 90 minutes and spent more time inactive whereas HC- pigs took around 2 hours to display similar levels of behaviours. The finding that HC+ pigs displayed fewer aggressive and active behaviours in the first 90 minutes and spent more time inactive suggests that early positive human contact assists pigs in coping with the stress of weaning.

Sows fear of human is transmitted to their weaned piglets and impacts piglets behaviour in a spatial memory test.

Tuesday, 1st August - 17:15: Human Animal Interactions (Grande Hall) - Oral

Ms. Celine Tallet [1], ***Mrs. Mathilde Lanthony*** [2], ***Ms. Emmanuelle Briard*** [1], ***Dr. Marek Špinka*** [3]

1. *PEGASE, INRAE, Institut Agro, 35590 Saint-Gilles, France,* ***2.*** *PEGASE, INRAE, Institut Agro, 35590 Saint-Gilles, France, AgroParisTech, 75005 Paris, France,* ***3.*** *Department of Ethology and Companion Animal Science, Faculty of Agrobiology, Food and Natural Resources, Czech University of Life Sciences, 165 21 Prague, Czechia*

Fear of humans can negatively impact offspring's' behaviour and cognition whereas early positive handling has positive impacts. The aim of this study was to evaluate the crossed effects of trans-generational transfer of fear of humans and familiarization with an experimenter on piglets' behaviour. Sows were classified into two categories (Fearful, n=11 and Docile, n=13) based on whether they avoided human contact or not during a human approach test at 71 days of gestation. At 72 days of gestation, saliva collection was done by an operator inserting a salivette in sows' mouth so that they could chew during 10 seconds. Salivary cortisol concentrations were measured by doubled luminescence luminoassay. Fear of humans wasn't related to salivary cortisol levels of the sows (F =2.72, P=0.10), sampled. Fearful sows' piglets stood immobilized for longer than docile sow's piglets (Chisq= 6.24, P=0.01), and females stood immobilized for longer than males (8.70, P=0.003) during a tonic immobility test (TIT) at 7 days but not at 15 days. The behaviour of two male and two female piglets per sow (n=96) was studied after weaning (28 days). We found no effect of sow's reaction to the experimenter on piglets' emotionality expressed during an open-field test (OFT) at 32-33 days. However, during a Human voluntary approach test (HVAT) piglets born from fearful sows were more fearful than piglets born from docile sows (Chisq=8.23, P=0.004,). Half of the piglets (n=48, 1 male and 1 female per sow) were then familiarized with an experimenter while the others received minimum contact. We found no main or crossed effect of sow's reaction to the experimenter and piglet's treatment on piglets' emotionality during an OFT, nor on their exploratory behaviour during HVAT at 46-47 days. Piglets' born from fearful sows were less attracted to the experimenter during HVAT2 (Chisq=8.33, P=0.004) and familiarized piglets were more attracted (Chisq=15.05, P<0.001). Piglets born from docile sows found the reward faster in a spatial maze test than those born from fearful sows. Both sows perception of humans (fearful or docile) and piglet familiarization with an experimenter seemed to specifically affect humans related behaviours without affecting their general emotionality, except in the spatial maze test.

Assessment of health and welfare of Asian Elephant in Human Elephant Conflict (HEC) situations in India

Tuesday, 1st August - 17:30: Human Animal Interactions (Grande Hall) - Oral

Prof. Kafil Hussain [1]

1. *Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu (SKUAST-Jammu)*

India's very rich biodiversity comprises 2.4% of the world's land area, accounts for 7-8% of all recorded species, including over 45,000 plant species and 91,000 animal species.Most conflicts occur in the rural area and generally more inside and around the protected areas where the elephant population is more and animals often move into adjacent cultivated fields.Elephants usually move out of forests when they feel threatened due to human activity near the habitat, reproductive needs or scarcity of food and lack of corridors for passage on the highways for movement's leads to frequent HEC. Present study is based on the evaluation of wild animal health monitoring approaches to assess the health and well-being of elephants in the region at rescue centres in India from 2018 to 2021in captivity and free range. This presentation addresses about the practical approaches including routine haemato-biochemical examination, faecal parasitological examination and welfare indicators (Body function, appearance and behaviour) in Asian elephants health monitoring in captivity for species conservation and welfare effort. In the study conducted on elephants, 7 elephants were observed and examined. These elephants were suffered with injuries having wounds on the body at the rescue centre were under the investigation. Observations were made on the elephant's ingestive behaviour, lameness, elimination/voiding, effort, pain, pattern, discharges from orifices and social behavior, including their interactions with other elephants. The animals were eating normally with few injuries. Only one animal which had large areas of wounds on the body showed less interest in eating and social interest. Results of the faecal examination of elephants for parasitic examination revealed the presence of Amphistomes sp. and Schistosome sp. eggs in the samples collected in two animals. The swab samples obtained from the elephant wounds indicated the presence of Staphylococus bacteria. The identified bacterial isolates underwent antibiotic sensitivity testing, which involved exposing the bacteria to a range of antibiotics to determine their susceptibility or resistance. Ampicillin and Gentamicin antibiotic were found to be sensitive and the animals were treated accordingly. The results of the elephant haematological and serum biochemical examination revealed leukocytosis and hypoglycaemia in one animal. Haemoglobin levels ranges from 9.2-16.7 g% in animals.Blood samples and trunk wash of elephants were found to be negative for tuberculosis.Present study provides a roadmap for improving the health of wild animal populations in the region and helps in establishing the early warning system to prevent HEC and traumatic injury to humans and elephants.

PLF and other new techniques for measuring animal behaviour (Dairy Calves)

Contact to their own calf slightly alters the activity patterns of dairy cows, but has no influence on their rhythmicity

Tuesday, 1st August - 16:15: PLF and Other New Techniques for Measuring Animal Behaviour (Dairy Calves) (Bolero hall) - Oral

Ms. Marie Schneider [1], ***Prof. Christina Umstätter*** [2], ***Dr. Hassan Roland Nasser*** [3], ***Dr. Kerstin Barth*** [1]

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Activity recording is commonly used on dairy farms, often to monitor oestrous. Another option, monitoring the ultra- and circadian rhythms of cow activity as a welfare indicator, has yet not been used. Healthy organisms are characterized by circadian rhythms, and their absence over an extended period indicates an impaired welfare. Prolonged cow-calf contact is often suggested to improve animal welfare in dairy cows, but little is known about how their rhythmicity is affected. Therefore, we investigated how contact with calves (daytime or whole-day) influences the rhythmicity of dams.

This study included German Holstein cows housed in two herds (32–48 cows each) in a mirrored freestall barn. In one herd, 14 dams had daytime contact, whereas the other herd contained 11 dams that had whole-day contact with their calves. Additionally, each herd included 9 cows that were separated from their calves shortly postpartum. Using 3-axis accelerometers, the activity of cows was recorded between 28 and 83 days postpartum, excluding the calving and weaning phases. It was used to visually analyse the differences of the cows' average activity patterns between contact times (no, daytime, and whole-day contact). The degree of functional coupling (DFC) and the diurnality index (DI) were calculated to examine the cows' circadian rhythm and distribution of diurnal and nocturnal activity, respectively. Generalized linear mixed-effects models were used to estimate the effect of contact time on these indices, considering the effects of light days, bedding days, grazing season, and oestrous. The DFC calculation was based on the proportion of harmonic periods, whose distribution was descriptively analysed.

In general, the average activity patterns of the cows did not differ among different contact times. However, dams that had contact with their calves showed an additional activity peak before the evening milking. Nevertheless, the DFC did not significantly increase with increasing contact time (OR= 1.21, p= 0.33). However, it was significantly lower during oestrous (OR= 0.17, p< 0.01). The distribution of the harmonic periods showed a high amount of 24h, 4.8h and 3.4h periods in all contact times. The DI was not affected by contact time but was significantly higher during the oestrous and grazing season due to greater diurnal activity.

Although the daily activity patterns of the dams were slightly affected by contact with their calves, the effect on rhythmicity was not significant. Concerning this indicator, whole-day or daytime contact with calves did not seem to affect the welfare of dams.

Baby's firsts: Onset of feed intake and rumination in milk-fed dairy calves

Tuesday, 1st August - 16:30: PLF and Other New Techniques for Measuring Animal Behaviour (Dairy Calves) (Bolero hall) - Oral

Dr. Blair Downey [1], ***Dr. Cassandra Tucker*** [2]

1. *Department of Animal Science, University of Tennessee, Knoxville,* ***2.*** *Center for Animal Welfare, Department of Animal Science, University of California, Davis*

Little attention has been given to how patterns of feed and water intake develop in young dairy calves, or how traditional management influences the development of species-specific behaviors, like rumination. Our objective was to describe the onset of grain, water, and hay intake in calves from birth. We evaluated whether early access to hay influenced the onset of grain and water intake, and rumination, using biologically relevant thresholds (grain:50,100,250,500,900g; water:1,2,3,4,5L; rumination:5,10,15,20% of a 24-h d), as well as the age at which these were reached. We enrolled 49 Holstein heifer calves over 2 years (2018: 22; 2019: 27) that were housed individually and fed milk replacer via a bottle (2018: 5.7-8.4 L/d; 2019: 3.8-5.6 L/d); these are common US management practices. Calves received ad libitum water and grain (Control: n=20) with additional access to chopped mountaingrass hay (Hay: n=29) from d 0-49±1. Intake was measured daily. Calves were ear-tagged at 1±2 d (mean±SD) of age with an accelerometer (MSD Animal Health Technology) that classified rumination by minute continuously through 39±9 d of age. We found that calves consumed grain, hay, and water within 1 d of birth. We analyzed age of onset as the first of 3 consecutive days that a calf met the threshold level with a zero-inflated regression model. The logistic regression component of this model evaluated whether access to hay affected the likelihood of reaching each onset threshold. Hay calves were more likely to reach each rumination threshold compared to Control (P≤0.032): 100% vs. 95% reached 5%; 96% vs. 74% reached 10%, 86% vs. 37% reached 15%, 50% vs. 5% reached 20% (Hay vs. Control, respectively). Other results were mixed: Hay calves were more likely to reach some grain and water thresholds than Control (P<0.001), but not all thresholds (P≥0.463). The second, conditional component of the model evaluated, among the calves that met a given threshold, if having access to hay affected the age they reached it. There was no evidence that access to hay affected age at reaching rumination or grain thresholds (P≥0.112), but it tended to reduce the age at 3L of water intake (P=0.082). Overall, our results demonstrate that calves will consume grain, hay, and water as soon as they are provided. Withholding hay, which is common in the US, delays the development of natural feeding behaviors by interrupting the onset of rumination and some aspects of grain intake.

Machine learning algorithms can be used to predict disease in preweaned dairy calves

Tuesday, 1st August - 16:45: PLF and Other New Techniques for Measuring Animal Behaviour (Dairy Calves) (Bolero hall) - Oral

Dr. Rielle Perttu [1], ***Dr. Marcia Endres*** [1], ***Dr. Tiago Bresolin*** [2], ***Dr. Joao Dorea*** [3], ***Dr. Mateus Peiter*** [1]

1. *University of Minnesota,* ***2.*** *University of Illinois Urbana-Champaign,* ***3.*** *Department of Animal and Dairy Sciences, University of Wisconsin, Madison*

Automated milk feeders (AMF) can provide individual monitoring of preweaned dairy calves housed in groups. Research has shown that feeding behaviors recorded by AMF can be a useful screening tool for detecting disease in dairy calves. These data from AMF could potentially be used to create a more powerful and efficient model to predict disease before clinical symptoms of illness are apparent. Therefore, the objective of this observational study was to predict disease in preweaned dairy calves using AMF feeding behavior data and machine learning algorithms. We conducted this study on a 2,500-cow dairy farm located in the Upper Midwest USA. Research personnel visited the farm on a weekly basis from July 2018 to May 2019 and collected AMF data and calves' treatment records. In addition, researchers visually scored calves for attitude, ear position, ocular discharge, nasal discharge, hide dirtiness, and cough score. The final dataset consisted of 741 (healthy = 560 and sick = 484) calves with 1,044 observations. Data used for the analyses included primarily daily calf treatment records by farm staff in addition to weekly health scores by research personnel. Calf visit-level feeding behaviors from AMF data including milk intake (mL/d), drinking speed (mL/min), visit duration (min), rewarded (with milk being offered) and unrewarded (without milk) visits (number per d), and interval between visits (min) were used to predict health status using three predictive approaches: Generalized Linear Model, Random Forest, and Gradient Boosting Machine. A total of 16 models were built using different combinations of behavior parameters including number of rewarded visits, number of unrewarded visits, visit duration, interval between visits, intake, intake divided by rewarded visits, drinking speed, drinking speed divided by rewarded visits, and age as predictor variables. Of all algorithms, Random Forest and Gradient Boosting had the best performance to predict health status of dairy calves (e.g., F1-scores of 0.775 and 0.784 for Random Forest and Gradient Boosting). This study suggests that these ML predictive models could potentially be used for more automated disease detection and delivery of supporting therapy (such as pre and probiotics, or electrolytes) to preweaned dairy calves housed in groups.

Food neophobia test explains variation in feeding behavior and performance during the milk-feeding and post-weaning periods in dairy calves

Tuesday, 1st August - 17:00: PLF and Other New Techniques for Measuring Animal Behaviour (Dairy Calves) (Bolero hall) - Oral

Mrs. Megan Woodrum Setser [1], ***Dr. Heather Neave*** [2], ***Dr. Joao H.C. Costa*** [3]

1. *University of Kentucky,* ***2.*** *Section of Behaviour, Stress and Welfare, Department of Animal and Veterinary Sciences, Aarhus University, Tjele, Denmark,* ***3.*** *University of Kentucky, Animal Science*

Food neophobia, the aversion of novel feeds, is commonly expressed in ruminants. The aim of this study was to determine if food neophobia in dairy calves is associated with feeding behavior and performance in the pre-weaning, weaning, and post-weaning periods. Holstein calves (n=28) were placed in group housing with an automatic feeding system at 4 d of age that measured milk replacer intake, starter intake, and rewarded and unrewarded visits to the feeder. The enrollment period was divided into 4 periods based on the milk allowance: 1) pre-weaning [full milk allowance; 4-46d of age], 2) weaning [milk reduction period; 47d -66d of age], 3) post-weaning [no milk allowance; 67-81d of age], and 4) overall [4-81d of age]. Calves were subjected to a food neophobia test (FNT) at 83 ± 3d of age in a test arena separate from their home pen for 30 minutes. The FNT exposed calves to 3 identical buckets that contained a familiar feed (alfalfa hay), an empty bucket, and a novel feed (corn silage based total mixed ration). Behaviors from the FNT (time spent manipulating each bucket, inactive, walking, grooming, attentive, latency to approach each bucket, and frequency of vocalizations and quadrants of test arena entered) were subjected to a principal component analysis that revealed 3 factors interpreted as personality traits (1: 'feed neophilia', 2: 'active', and 3: 'feed apathetic') that together explained 60.6% of variance. Regressions were conducted to assess the associations between factors from the FNT and feeding behavior and average daily gain (measure of performance; ADG). Factor 1 ('feed neophilia') had a negative association with rewarded visits in the preweaning (P=0.01) and overall (P=0.03) periods. Factor 2 ('active') had positive associations with starter intake in the weaning (P=0.01), post-weaning (P=0.01), and overall (P=0.01) periods. Factor 2 also had a positive association with ADG in the weaning period (P=0.02). Factor 3 ('feed apathetic') had positive associations with ADG in the preweaning (P=0.01) and overall (P=0.01) periods, with starter intake in the weaning period (P=0.05), and with rewarded visits in the post-weaning period (P=0.05). Overall, these results suggest that feeding behavior in the home pen or performance of calves may not be highly associated with a food neophobia trait. However, other personality traits measured with the FNT are associated with feeding behavior and growth over the milk-feeding and post-weaning periods

Effects of bovine respiratory disease on dairy calves' position within a social network

Tuesday, 1st August - 17:15: PLF and Other New Techniques for Measuring Animal Behaviour (Dairy Calves) (Bolero hall) - Oral

Ms. Katie Gingerich [1], ***Dr. Katharine Burke*** [1], ***Dr. Fiona Maunsell*** [1], ***Dr. Emily Miller-Cushon*** [1]

1. *University of Florida*

There is increasing adoption of social housing systems for dairy calves due to performance and welfare benefits, yet group housing also poses a challenge for efficient identification and management of disease. In dairy calves, bovine respiratory disease (BRD) has long-term health and productivity consequences. Evidence suggests a relationship between disease status and the expression of social behaviors, indicating that changes in social behavior may provide insight into health status. The objective of this study was to assess how disease status influences social behavior using proximity-based social network analysis (SNA) in group-housed dairy calves. At 2 weeks of age, calves (n = 90; 62 heifers and 28 bulls) entered group housing (9 groups; 10 calves/group) where they remained until after weaning at 8 weeks of age. Calves received a milk allotment of 8 L/d via an autofeeder. While in group-housing, calves' position within the pen was recorded continuously using an ultra-wideband positioning system generating undirected pairwise proximity estimates. We recorded health scores (Wisconsin calf health scoring chart) twice weekly to characterize clinical instances of BRD. Social network position was measured using strength (weighted degree centrality) and eigenvector centrality. To determine whether health status influences network centrality, we first tested whether an individual's social network position was related to clinical health scores during three time periods: pre-weaning, weaning, and post-weaning. Data were analyzed using general linear mixed models, controlling for season, week, and sex, with group and calf as nested random effects. During weaning, we found calves with clinical BRD (mean prevalence = 24%) had lower eigenvector centrality [$t(126) = -2.40$, $P = 0.01$] and a trend for lower strength centrality [$t(145) = -1.84$, $P = 0.06$]. Health status was unrelated to social network position during pre-weaning (mean BRD prevalence = 14%) and post-weaning (BRD prevalence = 25%). These results suggest a relationship between social behavior and respiratory disease that may depend on stage of development, such that future work may explore social networks as an indicator of health status.

The validation of an alert based on changes in milk feeding behavior to identify calves at-risk for diarrhea

Tuesday, 1st August - 17:30: PLF and Other New Techniques for Measuring Animal Behaviour (Dairy Calves) (Bolero hall) - Oral

Dr. Melissa Cantor [1], ***Ms. Allison Welk*** [2], ***Mrs. Megan Woodrum Setser*** [3], ***Dr. Joao H.C. Costa*** [3], ***Dr. Dave Renaud*** [2]

1. *The Pennsylvania State University, Animal Science,* ***2.*** *University of Guelph, Population Medicine,* ***3.*** *University of Kentucky, Animal Science*

The objective of this study was to develop and cross-validate an alert to identify calves at-risk for diarrhea using milk feeding data (**behavior**) from automated milk feeders (**AMF**). We enrolled calves (n=259) from two facilities who were health scored daily. For alert development, calves were offered 10 or 15 L/d of milk replacer. The alerts were cross validated using different data from the same facilities (127 calves all offered 15 L/d) for -2 to 1 d relative to diarrhea diagnosis. We enrolled calves that were either healthy or had a first diarrheal bout (loose feces ≥2 d or watery feces ≥1 d). Daily milk intake, drinking speed, and rewarded visits were recorded by an AMF. Relative change and rolling dividends for each behavior were calculated for each calf from the previous 2 d. Logistic regression models and receiver operator curves (ROC) were used to assess the diagnostic ability for relative change and rolling dividends in behavior to classify calves at-risk for diarrhea from -2 to 0 d relative to diagnosis. To maximize sensitivity (Se) to correctly classify calves at-risk with diarrhea, alert thresholds were based on ROC optimal classification cut-off. Diagnostic accuracy was met when the alert had a moderate ROC curve (≥0.70), high accuracy (Acc) (≥0.80), high Se (≥0.80), and very high precision (Pre) (≥0.85). For alert development, deviations in rolling dividend milk intake with drinking speed had the best performance for classifying a calf at-risk for diarrhea (10 L/d: ROC AUC=0.79, threshold ≤0.70; 15 L/d: ROC AUC=0.82, threshold ≤0.60). Our diagnostic criteria were only met in calves offered 15 L/d (10 L/d: Se 75%, Acc 72%, Pre 92%, specificity (Sp) 55% vs. 15 L/d: Se 91%, Acc 91%, Pre 89%, Sp 73%). For cross-validation, the best behavior alert was facility dependent. Deviations in rolling dividend milk intake with drinking speed met diagnostic criteria for one facility (threshold ≤0.60, Se 86%, Acc 82%, Pre 94%, Sp 50%). However, relative change in milk intake with drinking speed met diagnostic criteria for the other facility (threshold ≤-0.35, Se 83%, Acc 83%, Pre 0%, Sp 0%). We suggest that changes in milk feeding behavior may indicate diarrhea in calves. Future research should validate this alert and evaluate the practicality of implementing this alert into an automated milk feeder on farm.

The effect of early intervention using a nonsteroidal anti-inflammatory drug on diarrhea severity and feeding behaviour in dairy calves

Tuesday, 1st August - 17:45: PLF and Other New Techniques for Measuring Animal Behaviour (Dairy Calves) (Bolero hall) - Oral

Ms. Allison Welk [1], ***Dr. Melissa Cantor*** [2], ***Dr. Heather Neave*** [3], ***Dr. Dave Renaud*** [1]

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The objective of this study was to evaluate the effects of a nonsteroidal anti-inflammatory drug (NSAID) administered at the time of a milk feeding behaviour alert on diarrhea severity and feeding behaviour in dairy calves. Calves (n = 84) were fed up to 15 L/d of milk replacer with an automated milk feeder which recorded milk intake (L/d), drinking speed (L/min), and rewarded visits (visits/d). A milk feeding behaviour alert (≥60% relative change in milk intake and/or drinking speed) was used to detect calves at-risk for diarrhea. At their first alert, calves were randomly allocated to receive a single dose of meloxicam (NSAID) or saline (CON). Fecal consistency was scored daily, and diarrhea was diagnosed when calves had loose feces for ≥ 2 d or watery feces for ≥ 1 d. Dull calves with low milk consumption (<4 L/d) received 2 L of electrolyte until diarrhea resolution (normal feces for ≥ 2 d). Mixed models evaluated the associations of treatment with milk intake, drinking speed, and rewarded visits the day after the alert; and treatment and diarrhea duration. A Cox proportional hazard model evaluated the hazard of treatment on the number of days to diarrhea diagnosis relative to the alert. A logistic regression model tested if treatment was associated with the odds of receiving electrolytes. A total of 70 calves triggered an alert at (mean ± SD) 9 ± 2 d of age. Out of the 70 calves, 67 were diagnosed with diarrhea 0.7 ± 2 d relative to the alert. NSAID and CON calves had similar milk intake (7.6 vs. 6.8 ± 0.5 L/d, P > 0.10, respectively), rewarded visits (5.4 vs. 4.5 ± 0.3 visit/d, P > 0.10, respectively), and drinking speed (0.38 vs. 0.35 ± 0.02 L/min, P > 0.10, respectively) one day after the alert. Diarrhea duration was also similar between treatments (NSAID vs. CON: 3.3 vs. 3.2 ± 0.3 d, P > 0.10). However, NSAID calves tended to be diagnosed with diarrhea at a later age relative to the alert (HR = 0.61, P = 0.07, 95% CI: 0.35 to 1.04) and had reduced odds of being treated with electrolytes (OR = 0.30, P = 0.03, 95% CI: 0.01 to 0.89), compared to CON calves. Overall, providing an NSAID at the time of a milk feeding behaviour alert reduced the need for electrolyte treatment, but did not affect milk feeding behaviours or reduce diarrhea duration.

Having a friend close-by: social preference in piglets and its relevance at weaning

Having a friend close-by: social preference in piglets and its relevance at weaning

Wednesday, 2nd August - 09:00: Having a friend close-by: social preference in piglets and its relevance at weaning (Grande Hall) - Plenary

Dr. Irene Camerlink [1], ***Ms. Katharina Scheck*** [2], ***Ms. Tasha Cadman*** [3], ***Prof. Jean-Loup Rault*** [2]

1. *Institute of Genetics and Animal Biotechnology Polish Academy of Sciences,* ***2.*** *Institute of Animal Welfare Science, University of Veterinary Medicine (Vetmeduni), Vienna,* ***3.*** *Edinburgh University*

Various farm animal species form individual social preferences. Social preferences are commonly assessed through affiliative behaviour, or social behaviour indicative of a positive interaction, and spatial proximity. Studying this in farm animals is of relevance for the way social groups are managed. However, small space allowances may obscure true preferences for social contact and may result in a mismatch between social behaviour and proximity. We aimed to investigate the relationship between social behaviour and lying in proximity in commercially housed pigs; and the influence of the strength of the social relationship between familiar pigs at weaning. Piglets from 23 litters were observed in the first 3 weeks of life (pre-weaning) for their social interactions (scan sampling: 75 scans/pig) and spatial proximity (~30 scans/pig). From this, separate sociality indices (SI) were calculated for non-agonistic social behaviours (SI_{soc}) and spatial proximity (SI_{prox}). Littermate pairs (n=116) were weaned into one of 12 groups of unfamiliar pigs, based on their SI_{soc} and SI_{prox}. Pairs were selected from across the SI distribution, from weakly to strongly associated pairs, and one focal pig per pair was studied (experimental unit: 116 pigs). In the week post-weaning they were observed for social behaviour (240 scans/pig) and spatial proximity (~20 scans/pig), skin lesions, growth, and salivary cortisol concentration (pre-weaning, and 4h and 48h post-weaning). The study received ethical approval (ETK-04/01/2019). Non-agonistic social behaviours pre- and post-weaning (nose-to-nose contact: 1.3% of scans, allo-grooming: 0.5%, and other non-agonistic social behaviour: 8.2%) correlated with each other (r=0.67 to 0.84; $p<0.05$) but did not correlate with spatial proximity ($p>0.05$). At weaning, pigs showed less aggression ($P<0.001$) and more non-agonistic social behaviour ($P<0.001$) toward the familiar partner as compared to unfamiliar pigs. The strength of the pair relationship pre-weaning (SI_{soc} and SI_{prox}) did not significantly influence the behaviour or proximity towards the familiar partner post-weaning, or the amount of skin lesions or weight gain. Pigs who were weaned with a littermate with whom they were strongly affiliated with based on SI_{soc} tended to have a lower proportional increase in their cortisol concentration ($P=0.07$). In conclusion, non-agonistic social behaviours did not correlate with lying in spatial proximity under indoor farm conditions where space is restricted. Pigs distinguished between familiar and unfamiliar pigs, but the strength of the relationship with the familiar partner had limited effects on their response to weaning. The influence of longer term social relationships on pig welfare remains to be elucidated.

Human-Animal Interactions (Companion animals)

Using silent video footage to assess the objective and subjective difficulty of the interpretation of dog emotions by members of the public

Wednesday, 2nd August - 09:50: Human-Animal Interactions (Companion animals) (Grande Hall) - Oral

Ms. Jana Muschinski [1]***, Dr. Lauren Samet*** [1]***, Ms. Kassandra Giragosian*** [1]***, Dr. Jane Murray*** [1]***, Dr. Sara Owczarczak-Garstecka*** [1]***, Dr. Melissa Upjohn*** [1]***, Dr. Rachel Casey*** [1]

1. *Dogs Trust*

Understanding how members of the public interpret dog body language and emotion can improve interventions for supporting human-dog relationships and reducing bite risk. We surveyed 4,133 members of the UK/ROI public, asking them to interpret dogs' emotional states from silent videos. Each participant viewed five of 30 videos filmed opportunistically in home/rehoming centre environments. Participants scored videos' focal dogs from one to 15 on nine qualitative behavioural assessment (QBA) terms: "frustrated", "bored", "nervous/anxious", "stressed", "relaxed", "comfortable", "playful", "interested/curious", and "excited". Participants rated the difficulty of scoring each video on a five-point Likert-scale ("Very easy" – "Very difficult"). Eleven dog behaviour experts from UK dog welfare charity Dogs Trust scored all videos for comparison. Seven videos and one QBA term ("bored") were removed from analysis due to low inter-expert reliability. Principal components analysis (PCA) together with k-means clustering were used to reduce the QBA terms to two dimensions and to identify groupings of videos. This was completed for both the expert and public datasets, resulting in very similar PCA loading scores and identical clusters. Rotated component one (RC1) had strong loadings for "nervous/anxious", "stressed", "relaxed", and "comfortable" QBAs, while RC2 had strong loadings for "playful", "interested/curious", and "excited" QBAs. The three identified clusters aligned with different primary emotions (1: "nervous/anxious" and "stressed", 2: "playful", "excited", and "interested/curious", 3: "relaxed" and "comfortable"). A "difference variable" (DV) was calculated, summarising each observation's accuracy relative to the expert scores. Generalized linear mixed models (GLMMs) were used to assess the relationships between cluster (predictor), RC1 and RC2 (predictors), and subjective difficulty (outcome). A second set of GLMMs were used to assess the relationships between the same predictor variables and DV. Members of the public perceived videos in Cluster 2 as easier to interpret than Cluster 1 (odds ratio = 0.139, CI: 0.06 – 0.33, $p < 0.001$) but did not score these videos more accurately. Results for rotated components were similar, with a higher RC2 score being associated with a higher likelihood of a video being rated as easy to score (estimate = 0.33, CI: 0.22 – 0.50, $p < 0.001$), but no correlation with scoring accuracy. Overall, experts and members of the public interpreted the dogs' emotional states similarly, but public participants were overconfident interpreting videos of playful dogs. These results provide insights into which QBA terms are least reliably identified and identify potential mismatches between perceived and actual difficulty in interpreting canine emotion.

Relation between healthy test-persons' immediate physiological responses during different intensities of contact with a dog

Wednesday, 2nd August - 10:05: Human-Animal Interactions (Companion animals) (Grande Hall) - Oral

Mrs. Lene Høeg Fuglsang-Damgaard [1], ***Ms. Sigrid Juhl Lunde*** [2], ***Dr. Janne Winther Christensen*** [1], ***Prof. Lene Vase*** [2], ***Prof. Poul Videbech*** [3], ***Dr. Karen Thodberg*** [1]

1. *Department of Animal and Veterinary Sciences, Aarhus University, Denmark,* ***2.*** *Department of Psychology and Behavioural Sciences, Aarhus University, Denmark,* ***3.*** *Centre for Neuropsychiatric Depression Research, Mental Health Center Glostrup, Glostrup, Denmark*

As animal assisted interventions (AAI) have become increasingly popular, so have studies within this field. Several different physiological measures have been applied to investigate animals' effects on humans, but with varying and often contradicting results. Thus, there is a need for more basic research on how different physiological responses inter-correlate when humans are in contact with dogs.

The present study investigated the relationship between non-invasive measures of immediate physiological responses when healthy humans were exposed to different intensities of contact to a dog.

Thirty-three healthy participants (8 male, 25 female, age range 19-75 years) were exposed to four different test-situations in a random order, with well-defined dog contact intensities: 1: looking at a dog, 2: petting a dog, 3: performing tricks with a dog or 4: no dog present. Three Golden Retrievers unfamiliar to the participants. Each test-situation lasted 10 minutes with a 30-minute break between. Heart rate (HR), heart rate variability (HRV) and galvanic skin response (tonic level; GSR) were recorded continuously. Blood pressure (BP) and salivary cortisol (SC) were sampled before and after each test-situation. The data were analysed using Linear Mixed Models (SAS software). Two models were developed with either HR (average of the last 5 minutes) or SC (post-test cortisol levels), both as log transformed response variables, and the other physiological measures as fixed effects.

Looking at the relationship between the physiological responses we found that HR was higher with increasing systolic BP ($p=0.04$) and decreasing SC ($p<0.001$). Additionally, women had a higher HR compared to men (women 73bpm±1.02, men 66bpm±1.04, $p=0.03$) and a lowered HR was found with increasing age ($p=0.04$). Diastolic BP, GSR, HRV were not related to HR. Although we did not find test-situation to have an influence on HR, a higher HR was found with increasing test-number ($p<0.0001$).

Post-test SC-levels were higher with increasing systolic BP ($p=0.05$) and decreasing diastolic BP ($p=0.04$). Heart rate, HRV and GSR were unrelated to SC. Test-situation had no influence on HR, but a lower HR was found with increasing test-number ($p<0.0001$).

In conclusion, HR was related to systolic BP, SC, age and sex while SC was related to systolic and diastolic BP. Both HR and SC were related to test-number regardless of the test-situation.

Knowing which physiological measures may relate to each other and which measures can be applied in practise will service future studies, as all measures may not be necessary or suitable to implement.

Do nonlinear phenomena in puppy whines signal distress to human listeners?

Wednesday, 2nd August - 10:20: Human-Animal Interactions (Companion animals) (Grande Hall) - Oral

Dr. Mathilde Massenet [1], ***Dr. Andrey Anikin*** [2], ***Dr. Katarzyna Pisanski*** [3], ***Dr. Karine Reynaud*** [4], ***Prof. Nicolas Mathevon*** [1], ***Prof. David Reby*** [1]

1. *ENES Bioacoustics Research Lab, ENES/CRNL, University of Saint-Etienne,* ***2.*** *Division of Cognitive Science, University of Lund,* ***3.*** *CNRS, French National Centre for Scientific Research, Laboratoire de Dynamique du Langage, University of Lyon 2,* ***4.*** *Physiologie de la Reproduction et des Comportements, CNRS, IFCE, INRAE, University of Tours, Nouzilly*

Domestic dog puppies typically produce whines when separated from their mother. Similar to distress calls of other mammal infants, whines are typically high-pitched and characterized by a harsh-sounding vocal quality due to the presence of nonlinear phenomena (NLP), including frequency jumps, subharmonics, deterministic chaos and sidebands. If whines are known to attract mothers' attention and elicit care, human caregivers also appear to be highly sensitive to these calls.

Here, we investigated whether NLP in Beagle puppy whines are vocal indicators of high arousal by examining their temporal dynamic of production during a 5-minute separation from their mother (N= 32 individuals from 6 litters). Using Bayesian multilevel models, we showed that the proportion of whines containing frequency jumps, sidebands, subharmonics, and especially those with chaos, increased by an odds ratio of 1.4 [1.1, 1.9], 1.9 [1.5, 2.8], 3.7 [2.7, 5.5], 3 [1.6, 6] respectively as time since separation became longer. This indicates NLP in whines as possible cues to puppies' arousal.

In psychoacoustic experiments, we then tested whether NLP actually signalled heightened level of distress to 482 human listeners with or without extensive caregiving experience with pre-weaned puppies (e.g., breeders, veterinarians). To do this, we used pre-recorded whines from 20 different individuals as templates to prepare identical synthetic whine stimuli but affected or not by the different types of NLP naturally produced by puppies. Participants were exposed to a total of 20 stimuli broadcasted in a random order and were asked to assess the distress conveyed by each stimulus. We found that the presence of chaos in whines increased by 5.6% [3.8, 7.4] perceived distress relative to the same calls without NLP. Adding sidebands and subharmonics also increased perceived distress, but among professional caregivers only, indicating a higher sensitivity to NLP - possibly as a consequence of extensive exposure to puppy whines.

Together, our study shows that NLP in puppy whines can convey emotional information to human listeners and therefore may be crucial for offspring survival during breeding in a domesticated species. Our results may also contribute to the design of bioacoustics-based tools for monitoring animal welfare.

Comparing quantitative and impression-based measures of the immediate reaction of nursing home residents to dog visits

Wednesday, 2nd August - 10:35: Human-Animal Interactions (Companion animals) (Grande Hall) - Oral

Dr. Karen Thodberg [1], ***Dr. Janne Winther Christensen*** [2], ***Prof. Poul Videbech*** [3], ***Dr. Tia G. B. Hansen*** [4], ***Ms. Tina Bach Nielsen*** [2]

1. *Department of Animal and Veterinary Sciences, Aarhus University,* ***2.*** *Department of Animal and Veterinary Sciences, Aarhus University, Denmark,* ***3.*** *Centre for Neuropsychiatric Depression Research, Mental Health Center Glostrup, Glostrup, Denmark,* ***4.*** *Department of Communication and Psychology, Aalborg University*

Mainly impression-based measures have been applied to assess the immediate impact of dog visits on nursing home residents (NHR), more recently also with ethological methods. The aims of this study were 1) comparing quantitative behaviour measures with impression-based ratings of visitor and observer and 2) investigating whether NHRs' engagement in activities affect these ratings.

One-hundred-and-eighty-six NHR were randomly assigned to receive either 12 dog-accompanied visits (D); 12 dog-accompanied visits, including dog activities (DA); or 12 visits with activities but no dog (A). The approved visiting dogs were on-leash and within reach for voluntary mutual interactions, mainly initiated by NHR. Level of cognitive impairment was measured by the Gottfries-Bråne-Steen Scale. An observer sampled the NHR's behaviour quantitatively (e.g. dog contact and direction of conversation), and both visitor and observer rated the NHR's satisfaction with each visit (VisitorR, ObserverR), from '-5' (worst) to '+5' (best). Furthermore, the observer also scored the NHR's involvement in activities (DA and A) using a pre-defined scale (0-4). Data were analysed with generalised linear mixed models and non-parametric statistics.

The satisfaction ratings of visitors and observers correlated positively ($r_s = 0.85$, $p < 0.001$), but were differently impacted by visit type and NHR's level of cognitive impairment. Visitors rated D visits higher than A visits (odds ratio, D vs. A: 1.19 (1.01-1.40), $p < 0.05$), and assigned lower ratings when visiting NHR with higher cognitive impairment level ($p < 0$ .01). ObserverR was affected by the interaction with cognitive impairment and visit type ($p < 0.05$), as visits to NHR with low levels of cognitive impairment were rated higher after DA compared to D visits (odds ratio: 1.31 (1.03-1.65)), whereas for moderately or severely impaired NHR, ratings did not differ between visit types.

During D and DA visits, both VisitorR and ObserverR increased the more NHR touched the dog (both $p < 0.001$) or talked with the dog (both $p < 0.001$). VisitorR and ObserverR were higher in DA and A the more NHR were involved in planned activities (both $p < 0.001$).

In conclusion, visitors' and observers' ratings of NHRs' satisfaction with visits were higher the more NHR interacted with persons, dogs and activities during visits, and may rely on NHR's behaviour. Cognitively impaired persons were assigned lower ratings, reflecting either their lower satisfaction with visits, or difficulties with interpreting their response. Thus, more knowledge is needed about how to optimize animal-assisted activities to this population.

Understanding feline feelings: An investigation of cat owners' perceptions of cat behavior

Wednesday, 2nd August - 10:50: Human-Animal Interactions (Companion animals) (Grande Hall) - Oral

Dr. Lauren Powell [1], ***Dr. Brittany Watson*** [1], ***Dr. Chelsea Reinhard*** [1], ***Prof. James Serpell*** [1]

1. *School of Veterinary Medicine, University of Pennsylvania*

Cats are one of the most popular companion animals in the United States and around the world, yet millions of cats enter animal shelters each year. Preliminary data suggests that cat owners have a limited ability to identify cat behavior which may compromise animal welfare, harm the human-cat relationship, decrease ownership satisfaction, and increase the risk of relinquishment or abandonment. The goal of this study was to understand cat owners' perceptions of cat behavior and to identify specific behaviors that they consider problematic. Data were downloaded from an online database including 4941 cat owners who voluntarily completed the Fe-BARQ behavioral questionnaire between 2016-2022. Pearson Chi Square and Kruskal-Wallis tests were used to investigate univariate associations between owners' perceptions of cat behavioral problems (none, minor, moderate/severe) and cat age, sex, neuter status, and Fe-BARQ subscale and miscellaneous item scores, excluding items with >50% missing data. Candidate predictor variables ($p<0.20$) were retained in two ordinal logistic regression models including the whole sample and cats who cohabitated with other cats, respectively. Most cat owners reported no behavioral problems, although 31% experienced minor problems and 10% experienced moderate to severe problems with their cat's behavior. Univariate analyses showed owners' perceptions of cat behavior were significantly associated with cat age, sex and all Fe-BARQ subscales and miscellaneous items, except vocalizations and prey interest. The multivariate models showed owners were more likely to perceive their cat's behavior as problematic if they exhibited owner-directed aggression (OR 1.97, 95%CI 1.79-2.18), spraying (OR 1.59, 95%CI 1.44-1.75), crepuscular activity (OR 1.30, 95%CI 1.20-1.41), fearfulness (OR 1.11, 95%CI 1.04-1.18) or escaping behavior (OR 1.11, 95%CI 1.05-1.17). In multi-cat households, familiar cat aggression was also associated with greater odds of owners perceiving their cat's behavior as problematic (OR 1.59, 95%CI 1.41-1.80). Cats who readily adapted to change (OR 0.85, 95%CI 0.79-0.91), kneaded (OR 0.92, 95%CI 0.88-0.97), or slept on appliances or in elevated spaces (OR 0.91, 95%CI 1.04-1.18) were less likely to be perceived as problematic. Mirroring previous data from animal shelters, our findings underscore the impact of owner-directed aggression, cat-directed aggression, and inappropriate elimination on the human-cat relationship. Other problem behaviors, such as fearfulness, had less influence on owners' perceptions of cat behavior despite their potential impacts on animal welfare. Future studies should consider the efficacy of behavioral education to improve owners' understanding of cat behavior, the human-cat relationship, and animal behavior.

Acoustic parameters of rock cavy's (Kerodon rupestris) whistle as an ecological indicator of anthropic impact on a threatened habitat

Wednesday, 2nd August - 11:05: Human-Animal Interactions (Companion animals) (Grande Hall) - Oral

Prof. Sérgio Nogueira-Filho [1], ***Mr. Wesley Almeida*** [1], ***Prof. Kamila Barros*** [2], ***Prof. Selene Nogueira*** [1]

1. *State University of Santa Cruz,* ***2.*** *Universidade do Estado da Bahia*

Variation in the emission rate and acoustic parameters of calls can provide clues about animals' emotions, making acoustic monitoring an emerging tool for wildlife conservation. Thus, we aimed to compare the calls of rock cavy (*Kerodon rupestris*), living in two areas (A1 and A2) with different degrees of anthropic impact. This species is endemic to the Caatinga, a threatened Brazilian biome. The Caatinga shows a topographically complex and rocky landscape, making it extremely difficult to move around and collect regular ecological data. Area A1 was the most disturbed, as it is located 0.6 km away from the nearest urban area and characterized by small livestock production and the presence of feral and domestic dogs and cats. Area A2 is located 6.1 km away from an urban area and does not undergo human-caused disturbances. We collected ad libitum data on calls and associated behaviors of rock cavies in both areas. From a total of 616 records, we discriminated five distinct calls (whistle, snort, snort-like, whine and scream). The whistle call was the most prevalent, accounting for 73.5% of the total calls, and it was emitted in two distinct behavioral contexts (alarm and agonistic). Additionally, there was a greater number of whistle calls emitted by males in the most disturbed area (A1) (X^2_1 = 29.44, P < 0.001), due to the increased occurrence of interspecific and intraspecific threatening encounters (encounters with predators and competition over food, respectively). Furthermore, whistle calls emitted in the most disturbed area (A1) showed higher minimum frequency (1226.8 ± 7.8 Hz *vs* 1141.4 ± 9.8 Hz; $F_{1, 16.97}$ = 14.51, P = 0.001), higher maximum frequency (10220.0 ± 45.0 Hz *vs* 6588.3 ± 267.0 Hz; $F_{1, 17.01}$ = 10.74, P = 0.004), and higher peak frequency (2725.1 ± 60.8 kHz *vs* 2283.8 ± 41.5 kHz; $F_{1, 17.29}$ = 6.05, P = 0.025) than the whistle calls emitted in the less disturbed area (A2). Our data suggest that the differences in the emission rate and acoustic parameters of the rock cavy's whistle calls between areas may be an expression of the emotional state of animals responding to anthropic disturbance. It therefore provides an ecological indicator that can be used in remote monitoring of the Caatinga biome, through the use of autonomous recording units (ARUs).

Behaviours as indicators of positive welfare (Ruminants)

Nursing behaviour of dairy cows in different cow-calf-contact conditions

Wednesday, 2nd August - 09:50: Behaviours as Indicators of Positive Welfare (Ruminants) (Bolero hall) - Oral

Ms. Emma Hvidtfeldt Jensen [1], ***Dr. Heather W. Neave*** [1], ***Prof. Melissa Bateson*** [2], ***Prof. Margit Jensen*** [1]

1. *Section of Behaviour, Stress and Welfare, Department of Animal and Veterinary Sciences, Aarhus University, Tjele, Denmark,*

2. *Biosciences Institute, Newcastle University, Newcastle upon Tyne, United Kingdom*

Rearing dairy calves with the dam can alleviate some management challenges, making calf care more flexible and reduce workload. However, farmers face other challenges when adopting cow-calf contact, like decreased saleable milk yield and increased stress upon separating cow and calf. A suggested solution to some of these problems is to keep cow and calf together only part of the day. This study investigated whether the duration of maternal behaviour (nursing, grooming) and nursing in the inverse parallel position (IPP) are affected by daily contact duration. Cow-calf pairs were allocated to two contact treatments: full-time contact (23 h/day, 28 pairs) and part-time contact (10 h/day, 27 pairs). The 10 h contact took place during the day, and this was the only time calves had access to milk. Cows' nursing behaviour was recorded 28.4±6.6 d after calving using video cameras, and behaviours were continuously recorded for 24 h using focal animal sampling. Data was analysed using either linear or logistic mixed regressions. Compared to part-time cows, full-time cows spent more time grooming their own calf (23.5 vs. 11.0±1.7 min/d, $p<0.001$) and tended to spend more time nursing their own calf (31.8 vs. 21.4±4.0 min/d, $p=0.098$). However, frequency of nursing bouts did not differ between treatments (12.9 vs. 9.7±1.8 bouts/d, for full- and part-time, respectively). Similarly, there was no difference between treatments in proportion of nursing time spent in IPP (95.2 vs. 93.8±3.2%, for full- and part-time, respectively), nor in the probability of a cow nursing a calf other than her own (i.e. alien calf; 0.34 vs. 0.40±0.10, for full- and part-time, respectively). However, part-time cows tended to have a higher probability to nurse their own calf and one or more alien calves at the same time (0.45 vs. 0.19±0.11, $p=0.0725$); this may be due to part-time calves being hungry when the cows return from morning milking, motivating them to suckle any cow. Though part-time cows spent less time on maternal behaviours than full-time cows, the majority of nursing was performed in IPP, and there was a similar probability of nursing alien calves, on both treatments. This suggests that the maternal bond is not weakened by housing cow and calf together on a part-time schedule, at least within the first month. However, the maternal bond may grow weaker with repeated separations over time, leading to earlier independence between dam and calf; this deserves further research.

Do dairy cows change lying location according to the audibility of music and does music affect milk yield?

Wednesday, 2nd August - 10:05: Behaviours as Indicators of Positive Welfare (Ruminants) (Bolero hall) - Oral

Prof. Frank Tuyttens [1], ***Dr. Tim Van De Gucht*** [1], ***Dr. Bart Ampe*** [1], ***Ms. Anke Vermeulen*** [2], ***Mr. Lucas Gistelinck*** [2], ***Prof. Bart Sonck*** [1]

1. *Animal Sciences Unit, Flanders Research Institute for Agriculture, Fisheries and Food (ILVO), Melle,* ***2.*** *Faculty of Bioscience Engineering, Ghent University, Ghent*

Auditive enrichment is easy and cheap to provide to all animals of the group simultaneously, involves no hygiene risks, and is not prone to damage. As it is uncertain whether music qualifies as suitable enrichment for livestock, we investigated 1) whether music affects milk yield, and 2) whether cows change their preference for cubicles according to the audibility of the music. The experiment was conducted on 6 commercial dairy farms with cubicles and an automated milking system (AMS). By placing a speaker close to the AMS and directed towards the remainder of the barn, each herd was subjected to three treatments from 9 to 17h for 3 x 21d in a balanced order: classical, pop, or no music (control). The music was very well audible to humans in the cubicles nearest to the speaker but hardly audible in the cubicles furthest away. To determine music audibility per cubicle we averaged 10 measurements of the sound level of each cubicle when the music was on. The occupancy of each cubicle was recorded from video-images every two hours from 9 to 17h throughout the experiment. AMS milk production data from all cows present in the herd for the entire duration of the experiment (range: 49 - 107 cows/farm) were used to calculate weekly fat- and protein-corrected milk yield (FPCM) per cow. The first week of each treatment period was assumed an adaptation period and was excluded from analyses. Treatment effects of observed versus predicted milk yield (based on natural spline fitting of FPCM according to lactation stage and parity) were tested. To test whether cows changed their cubicle preference according to the audibility and type of music, we fitted linear mixed models with treatment, music audibility of the cubicle (<62, 62-64, 64-66, >66 dB) and their interaction as fixed effects, and cubicles nested within farms as random effects. Compared to the control, FCPM/cow/d was increased by 0.49 kg (1.5%) during the pop music and by 0.97 kg (3%) during the classical music period. The occupancy of cubicles where the music was the least audible (<62dB) was higher during pop music than during classical music (4%, $P<0.05$) or no music (3.1%, $P<0.05$). A 3w period of classical or pop music during daytime increased milk yield by 3 and 1.5% respectively, but there was no evidence that cows changed their preference of cubicles so that they can hear the music at a higher volume.

Daily behaviours of calves raised in a cow-driven cow-calf-contact system

Wednesday, 2nd August - 10:20: Behaviours as Indicators of Positive Welfare (Ruminants) (Bolero hall) - Oral

Dr. Laura Whalin [1], ***Dr. Stine G. Kischel*** [2], ***Dr. Kristian Ellingsen-Dalskau*** [1], ***Ms. Thea Løver*** [2], ***Dr. Julie F. Johnsen*** [1]

1. *Norwegian Veterinary Institute,* ***2.*** *TINE SA, Farm Advisory Services*

There is increasing interest in cow-calf-contact (CCC), but we know little about the behavioural opportunities for calves in CCC systems. We aimed to describe the behaviours of Norwegian Red calves raised in a cow-driven CCC system. Thirty cow-calf pairs were enrolled. Pairs remained in individual calving pens for 3-5 d postpartum. Calves were provided 4 L of colostrum within 1 h of birth, and could freely suckle. When moved to the research pen, calves were housed in a deep-bedded straw creep with *ad libitum* access to hay, water, and concentrates. Cows were housed in a pen with freestalls, automatic milking, and *ad libitum* access to water and roughage. In a meeting area, the cows could visit the calves via a smartgate system 24 h/d. This area was separated from the cows by a fence, and separated from the creep by a concrete wall with two openings where calves could freely exit. Animals could not lie, drink water, or eat roughage in the meeting area. Pairs experienced a gradual reduction in contact after 1 mo, and were fully separated by 62 d. Calves were provided 12 L/d of supplementary milk from an automatic feeder from approximately 1-2 mo of age. Calf behaviours were recorded continuously for 24 h before reduced contact (median batch age: 28 d), and after full separation (68 d) from video. Descriptive data are presented as medians (Quartile 1 – Quartile 3). At 28 d, calves appeared to spend 33 (27 – 46) min/24 h suckling and did not suckle from alien cows (0, 0 – 8 min/24 h). Allogrooming appeared to be a common behaviour between cows and their calves (17, 10 – 24 min/24 h) with one pair spending 57 min/24 h allogrooming. Calves frequently engaged in play bouts (34, 20 – 41 bouts/24 h), and occasionally elicited their mothers to play (2, 0 – 5 bouts/24 h), but did not play with alien cows (0, 0 – 1 bouts/24 h). During one (1 – 3) visit/24 h calves would not leave the creep when their mothers were in the meeting area; perhaps the calves received sufficient maternal contact despite the cow-driven system. At 68 d of age calves still engaged in play (16, 8 – 26 bouts/24 h), though they could no longer suckle, allogroom, or play with their mothers. When permitted some maternal contact, calf behavioural repertoire is diversified, perhaps indicating positive welfare.

Visual judgement bias of dairy cows housed with or without their calves

Wednesday, 2nd August - 10:35: Behaviours as Indicators of Positive Welfare (Ruminants) (Bolero hall) - Oral

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

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There is growing interest in managing dairy cows with their calves. Cow-calf contact is expected to promote positive affective states, but this requires empirical testing. Judgement bias (JB) is the gold-standard assessment of affective states in animals; visual JB tasks have been used in calves, but the type of visual cue may affect JB. This study aimed to assess the emotional state of dairy cows with full-time (23 h/d), part-time (10 h/d), or no calf contact (separated at birth), using a colour- or shape-based visual JB task. Fifty dairy cows were trained to approach a positive image on a screen (rewarded with food) and to avoid a negative image (else punished with waving bag). Once learned (>80% correct in 20 trials, over 2 consecutive days), cows were presented with 3 ambiguous images (each presented once among 4 positive and 3 negative images, repeated over 4 days), and their approach responses recorded. For colours (10 full-time, 9 part-time and 11 no-contact cows), positive and negative images were a solid red or white background; ambiguous images were shades of pink. For shapes (8 full-time, 6 part-time and 6 no-contact cows), positive and negative images were a white circle or cross on a black background; ambiguous images were overlayed circle and cross that were increasingly gray. Cows discriminated colours quicker than shapes (6.5 and 9.0 ± 0.7 days, respectively; $P < 0.01$). Approaches to ambiguous colours followed a generalization curve (81.0, 33.1 and 5.0 ± 3.7 % near-positive, middle and near-negative images, respectively) but not approaches to ambiguous shapes (31.9, 25.7 and 21.9 ± 4.8 %, respectively), suggesting colours over shapes should be used in visual JB tasks for cattle. Approaches did not change over days, indicating no learned responses. Part-time cows approached fewer ambiguous colours than full-time and no-contact cows (32.5, 45.8 and 41.5 ± 3.8%, respectively; $P = 0.05$), but there was no difference between full-time and no-contact cows, and no interaction between treatment and ambiguous colours. Our colour JB results show a pessimistic bias (negative affect) in cows with part-time calf contact, possibly due to daily calf separations. Conversely, cows with full-time or no calf contact may show an optimistic bias (positive affect) due to extended calf contact or no expectations for calf contact, respectively. Future research should explore how different cow-calf contact systems, such as dam- versus foster-cow contact, affect the emotional state of cattle.

Social interactions and play behaviour of dairy calves in a cow-calf contact system on pasture

Wednesday, 2nd August - 10:50: Behaviours as Indicators of Positive Welfare (Ruminants) (Bolero hall) - Oral

Ms. Romane Gillet [1], ***Dr. Isabelle Veissier*** [2], ***Prof. Susanne Waiblinger*** [3], ***Dr. Kerstin Barth*** [1]

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Cow-calf contact systems are gaining increasing interest in dairy farming. They must be evaluated in terms of animal welfare. Most of our knowledge about behaviour of dams and calves not influenced by human husbandry conditions is derived from studies of suckler herds under semi-natural conditions. To close this gap, we aimed to assess the development of social and play behaviour of dairy calves maintained with their dam in a pasture based dairy system.

We observed 26 German Holstein calves (age: 5 to 95 days), kept together with their dams in two dairy herds of a research farm. The two herds grazed in separate pastures and only went to the barn for milking. Direct observations were carried out during daylight on 16 days for 48h of scan sampling (every 10 min, localisation of the calf) and for 48h of focal sampling (social interactions and play behaviour of the focus calf with another animal). Accelerometers (Hobo Pendant G) on one hind leg of each calf recorded the activity on a 24h basis. Statistical analyses were done in R using generalized linear mixed-models. The baseline model contained calf age and sex as fixed effects and calf nested in herd as random variable. The frequency and duration of behaviours were the variables of interest. Behaviours of one□month-old (5–30 days) and three-month-old (61–95 days) calves were compared.

The calves suckled mainly on their dam (7 allosuckling were recorded out of 62 suckling bouts). Three-month-old calves were one hour more active per day than one-month-old calves (8.9±0.2h vs. 7.6±0.3h, $p<0.01$) and they were observed lying in a kindergarten more often than one-month-old calves (77% vs. 56% of the total lying scan, $p<0.001$). Social interactions (e.g. licking, sniffing) performed by three-month-old calves were less frequently oriented towards the dam than another calf (35% vs 65%, $p=0.03$). However, these interactions lasted longer with the dam than with another calf (3.8±0.5s vs. 2.5±0.3s per bout, $p<0.001$) for calves of all ages.

Social play behaviour (e.g. head play, bucking) as well as locomotor play duration were not affected by calf's age. Sex had no influence on all analysed behaviours.

Our study indicates that young calves engage regularly in affiliative interactions with their dam. Intensive contact between calf and dam seems thus needed during the first months of life. Further, older calves play as much as younger ones given that ample space such as on pasture is available.

Welfare assessment of working horses and their owners perceive: The case of South Darfur state, Sudan

Wednesday, 2nd August - 11:05: Behaviours as Indicators of Positive Welfare (Ruminants) (Bolero hall) - Oral

Dr. Saber Yagoub [1], ***Prof. Abdelkareem A. Ahmed*** [2], ***Prof. Hassan Musa*** [3], ***Prof. Demin Cai*** [4], ***Dr. Jaafar Fedail*** [3], ***Dr. Taha Musa*** [3]

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Scientific evidence derived from various geo-cultural situations should guide the development of appropriate interventions to enhance the working horse's welfare. The welfare state of these horses in Sudan is usually neglected and impacts directly their health and working capacity. The aims of this study was to assess the welfare status of working horses in the South Darfur region of Sudan and to determine how owners perceive their horses. The owner interview (indirect indicators) and physical (direct observation and clinical examination), and behaviour status of the horses were assessed. In a total of 400 horses and 400 owners were assessed. The results of the owner's interview showed that male owners were 95.8% and female were 4.2%, horses work all days per week were 61.8%, owners who do not practice shoeing in their horses were 95.5%, and 44.5% of them do not consult a veterinarian. The physical parameter results of the working horses showed that male working horses were 75.8% and female were 24.2%. Animals who had ideal, thin, and fat body condition score were 49.8%, 29.0% and 17.5%, respectively. Horses that had dirty coat conditions, an external parasite, skin scare, and wounds were 53.0%, 50.5%, 25.8%, and 21.7%, respectively. In addition, working horses had orifices discharge were 42.8%, inadequate hoof health were 25.0%, and gait abnormality were 24.5%. Moreover, in general behavior status, 34.5% of the working horses were depressed, 55.0% showed indifference approximation test, and 28.3% avoided the chin contact test. We conclude that indirect indicators (the shoeing practice of the horses and veterinary consultation), and physical parameter measures (thin body condition score, external parasite, inadequate hoof health and orifices discharge) were worse in working horses of study area. The result of this study could be given to owners in feedback by creating awareness and veterinary services. Further research are needed to improve the welfare of working horses in the study area.

Keywords: Animal welfare; direct indicators; indirect indicators; south Darfur; working horses

Miscellaneous section (Pigs)

Novel behavioral test in piglets using a laser pointer: a pilot study

Wednesday, 2nd August - 11:45: Miscellaneous Section (Pigs) (Grande Hall) - Oral

Mr. Gabriel Kioshi Cavalari Nakamura [1], Ms. Isabela Cristina Colaço Bez [1], Ms. Beatriz Suares de Souza [1], Prof. Leandro Batista Costa [1], Prof. Ruan Daros [1]

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Personality traits in pigs are often assessed using standardized behavioral tests that require moving animals out of their home pen. Here we aimed to develop a rapid in-pen behavioral test that can be used to assess personality traits in piglets. The test was performed with 84 piglets (40 days of age) group-housed in 28 suspended pens with semi-automatic feeders, water dispensers and plastic slatted floors; three piglets per pen. Animals were tested individually but in the presence of the pen mates as follows: a red laser pointer was aimed at the pen floor 10 cm from the piglet's snout, every time the piglet approached and "touched" the laser light, it moved 10 cm forward. This phase lasted 10 seconds per animal. After this phase, the laser pointer was turned off and the video recording continued for another 20 seconds, totaling 30 seconds per test. Duration of interaction with the laser in the first phase and exploration, interaction with stimuli and vigilance in the last phase of the test were assessed by video recordings. A week before the laser test, all piglets were subjected to an open field (OF) and novel object test (NOT), 2 min each. Descriptive results and Spearman correlation between the behaviors in the laser test and the OF and NOT test were performed in R. Only 4 piglets did not interact with the laser light. Piglets spent an average of 8.6 (±2.4 SD) seconds interacting with the laser. During the laser phase other behaviors than interacting with the laser were observed and showed variability among piglets: 'vigilance' (6.4±3.5), 'interaction with stimuli other than the laser' (5.1±1.4) and 'eating' (5.6±2.8). In the 20 seconds after the laser, the most observed behavior was 'lying' (13±5.8), followed by 'eating' (12.7±5.7) and 'exploring' (12±5.8). Time interacting with the laser light did not correlate with the behaviors evaluated in the OF and NOT sessions. The laser light test may not be useful to replace OF and NOT sessions, though the behavioral differences in the response to the laser test may indicate other personality traits than those usually assessed in these standardized tests. New data analyses are being performed to evaluate this hypothesis. In the future, new tests assessing consistency of behavioral responses to the laser pointer across ages and its potential effects on animal welfare will be evaluated.

The importance of carefully selecting vocalization parameters to quantify pain and stress in piglets

Wednesday, 2nd August - 12:00: Miscellaneous Section (Pigs) (Grande Hall) - Oral

Dr. Mathilde Coutant [1], ***Dr. Jens Malmkvist*** [1], ***Dr. Leslie Foldager*** [2], ***Dr. Mette Herskin*** [1]

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Vocalizations are a common tool to assess aspects of the welfare of farm animals, including during invasive procedures like castration. Multiple vocal parameters can be used to assess emotional states, from basic measures such as the number and duration of the calls to more advanced parameters such as the maximum energy or entropy of calls. Yet, these parameters present different specificities and sensitivities in relation to their emotional significance, and may lead to different interpretation of the piglet responses. To explore relationships among different types of vocal parameters, data from castration of 3 to 4 days old piglets (study approved ethically by the Danish Animal Experiments Inspectorate) were extracted and analysed. Audio recordings obtained during castration without anaesthesia (CC, n=43), castration under local procaine anaesthesia [with 0.5 mL (CA5, n=41) or 0.3 mL (CA3, n=43) of drug injected per testis] and sham handling in a castration bench (SH, n=41) were analysed with the software Raven Pro, and 15 vocal parameters including call count, duration, rate, as well as energy, power and entropy of the calls were extracted. Potential differences between treatments for each parameter were evaluated using a mixed model including piglet age and body weight as covariates. Additionally, Pearson's correlations (ρ) between parameters were evaluated exploratively across treatments. The type of procedure significantly impacted most vocal parameters, but the differences between treatments depended on the type of vocal parameter. For instance, CA3 and SH differed in terms of call proportion, max amplitude and aggregated entropy ($p < 0.01$), but not in terms of max power or average energy. CC and CA5 showed significantly different call proportion and max power ($p < 0.01$) but did not differ in terms of average call duration or max entropy. In addition, while certain parameters such as max power, max energy or max amplitude showed a relatively strong correlation among each other ($\rho > 0.8$), other parameters such as the number of calls per second or the aggregated entropy showed a relatively low correlation with the other parameters ($\rho < 0.4$). The results point towards a careful consideration of the differences among vocal parameters, highlighting that parameters are often not interchangeable. The results of this analysis, the basis of which is being applied to a larger array of indicators of pain and stress in an ongoing study, also support the use of a combination of parameters as opposed to the analysis of single parameters.

Veterinary functional music enhances variations in diurnal salivary cortisol concentrations in farm pigs

Wednesday, 2nd August - 12:15: Miscellaneous Section (Pigs) (Grande Hall) - Oral

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

1. *Grupo de Investigación QUIRON, Escuela de Medicina Veterinaria, Universidad de Antioquia,* ***2.*** *Faculty of Veterinary Medicine, University of Calgary, Calgary, AB, Canada.,* ***3.*** *Grupo de investigación BIOGEM. Departamento de producción animal, Facultad de ciencias agrarias, Universidad Nacional de Colombia, Sede Medellín.*

Intensive swine production systems can predispose pigs to chronic stress, with deleterious effects on the neuroendocrine system and diminished animal health and welfare. Consequently, there is an impetus to develop tools to reduce or eliminate chronic stress. Music is widely used as a therapeutic strategy for stress management in humans and may have similar benefits in non-human animals. “Veterinary functional music” is a concept that we propose to define as music that is specially composed or used for a specific purpose, that has been validated to ensure a specific effect on non-human animals, and that incorporates acoustic and musical adaptations appropriate to each species, taking into account its sensory and perceptual characteristics. Our objective was to evaluate effects of a veterinary functional music program, designed for pigs, on diurnal salivary cortisol concentrations. Forty pigs were allocated into two treatments: Enriched, n=20, exposed to the music program during nursery and growth periods; and Control, n=20, without musical stimulation. Cortisol concentrations were measured in saliva samples collected at 15, 16, and 17 wk of age. Sampling was performed on the last day of each week, with one sample taken every hour from 08:00 to 17:00 (10 samples per day). The area under the curve (AUC) for salivary cortisol concentrations were compared between treatments with a Student’s t-test. Furthermore, salivary cortisol concentrations were compared between treatments using a 3-way ANOVA, with treatment, hour and week as fixed effects. The AUC was higher in Enriched versus Control pigs (3.74 and 2.91, respectively; P= 0.01) and there was an effect of treatment (P= 0.01) on cortisol concentrations. The Enriched group had a consistent dynamic, with clear cortisol fluctuations (two peaks) in all weeks, with maximum and minimum values of 0.85 and 0.24 ug/dL, respectively and overall mean ± SD of 0.41 ± 0.16 ug/dL. Conversely, the Control group had a much flatter cortisol dynamic within weeks, without relevant peaks, with maximum and minimums of 0.5 and 0.21 ug/dL, respectively, and 0.33 ± 0.09 ug/dL overall. Diurnal fluctuations in cortisol have been associated with better neuroendocrine regulation, whereas blunt-flattened curves were associated with chronic stress in various species, including pigs and humans. In conclusion, veterinary functional music significantly enhanced dynamics of diurnal cortisol secretions, with the potential use as a therapeutic tool to reduce stress and enhance welfare of pigs under production conditions.

Do barren lives make pigs' time go by more slowly than enriched ones?

Wednesday, 2nd August - 12:30: Miscellaneous Section (Pigs) (Grande Hall) - Oral

Ms. Kristina Kull [1], ***Ms. Maria Franziska Bauer*** [1], ***Ms. Valerie Chorherr*** [1], ***Prof. Christoph Winckler*** [1], ***Dr. Sara Hintze*** [1]

1. *Institute of Livestock Sciences, Department of Sustainable Agricultural Systems, University of Natural Resources and Life Sciences (BOKU), Vienna*

Pigs are curious and playful animals, yet as intensively farmed species commonly kept in extremely barren husbandry conditions. The mismatch between the environment and the pigs' behavioural and cognitive needs may cause multiple welfare problems. Anecdotally, pig experts have named boredom as one of the main challenges that intensively farmed pigs face. We know from human research that when bored, time feels to go by very slowly. Is such time distortion occurring in pigs, too? We investigated this question by training 32 pigs across two batches to discriminate between a short (1 s) and a long (8 s) tone by choosing the correct goal-box on the right or left side of a test arena, respectively. In batch 1 we had 40 trials per session while we reduced to 20 trials per session in batch 2. Twenty-nine pigs reached the learning criterion (≥ 80% correct choices in short and long trials across two consecutive sessions; mean±sd batch 1: 883±185 trials, batch 2: 781±311 trials). These pigs were subsequently tested in sessions, where they were exposed to tones of intermediate durations (i.e. 2.75, 4.5 and 6.25 s), interspersed between the learned short and long tones. Pigs had to decide if the unlearned intermediate tone felt rather 'short' or 'long' by choosing the right or left goal-box. Half of the pigs lived in barren pens (no enrichment except for one hanging wood piece required by law) and the other half in enriched pens (with straw bedding, organic rooting materials and enrichment items renewed daily). Pigs were tested on two occasions: six test sessions directly after reaching the learning criterion (about 3 months old) and three test sessions after a break of three weeks. During the break between test 1 and 2 no testing took place to minimise its potential enriching effects. While the results show a gradual response pattern, we did not detect a difference in time perception between the treatment groups (test 1: x^2_1 =1.45, P=0.23; test 2: x^2_1=0.01, P=0.94). Since prior research in pig cognition indicates that pigs do experience time distortion due to acute arousing events such as play or isolation prior to being tested, this finding was surprising. Multiple reasons may explain why no difference in time perception was observed. For example, testing situation based on positive reinforcement may have caused barren pigs to feel excitement prior to testing and this may have accelerated the felt time during testing.

Using behaviour to detect gastric ulcers in pigs

Wednesday, 2nd August - 12:45: Miscellaneous Section (Pigs) (Grande Hall) - Oral

Ms. Laura Hartnett [1]***, Ms. Melanie McAuley*** [2]***, Prof. Niamh O'Connell*** [1]***, Dr. Ramon Muns*** [3]***, Dr. Stephanie Buijs*** [3]

1. *Queen's University Belfast,* ***2.*** *Queens University Belfast,* ***3.*** *Agrifood and Biosciences Institute (AFBI)*

Gastric ulceration is an important pathological condition in pigs: an estimated 20% of slaughtered pigs have mild ulcers, whilst another 10% have severe ulcers. Ulcers likely cause pain/discomfort and can cause anaemia and death. Both long- and short-term stressors (e.g., overnight lairage) can cause ulceration. Pre-mortem diagnosis is difficult and therefore ulceration is commonly overlooked during life. However, altered behaviour may allow ulcer detection in living pigs. To investigate this potential association, we compared the behaviour of pigs with different post-mortem ulceration scores, focusing on differences in posture and pen-mate manipulation (thought to be linked to ulceration and general ill-health, respectively). The pars oesophagea was scored visually post-slaughter (0=normal, 1=parakeratosis/thickening, 2=erosion, 3=developed ulcers). We then selected 7 pairs, each consisting of two similar pigs (same sex, diet, slaughter age and similar weaning and endweight) whose ulcer score was ≥2 points apart (2x 0vs2, 1x 0vs3, 4x 1vs3). Their behaviour was assessed using videos obtained 5- or 12-days pre-slaughter (as some pairs reached slaughterweight later than others). Associations between ulcer status and behaviour (as % of time observed) were evaluated using linear mixed models with ulcer status (high/low) as a fixed factor and pair and time-to-slaughter as random factors. Pigs with a higher ulcer status spent significantly (P=0.048) more time on left-sided lying (36 vs. 18%±6) and tended to spend less time on right-sided lying (P=0.053, 12 vs. 25%±5). Pigs with a higher ulcer status tended to walk more (P=0.057, 2.3 vs. 1.6%±0.3) and to show less tail-in-mouth behaviour (P=0.087, 0.04% vs. 0.12%±0.04). The positive association between ulceration and walking corroborates previous research. However, the positive association between ulceration and left-sided lying contrasts with the previously reported negative association. As we observed behaviour relatively early prior to ulcer scoring, it may have contributed to ulceration (due to the non-symmetrical positioning of the stomach, left-sided lying may expose the pars oesophagea to more gastric fluid), rather than being its consequence (which we had originally hypothesized). This could also explain why tail-in-mouth behaviour was affected in the opposite direction of what was expected (if performing this behaviour alleviated stress or reduced stomach pH by increasing salivation). Nonetheless, if side preferences are opposite in pigs developing ulcers and those with established ulcers, this greatly reduces their reliability as an early warning sign of ulceration. Further research on behaviour before, during and after development of gastric ulcers is required to develop a reliable diagnostic aid.

Laboratory Animal Behaviour

Using Chronic Unpredictable Stress to investigate 'inactive-but-awake' behaviour as a welfare indicator in laboratory rats

Wednesday, 2nd August - 11:45: Laboratory Animal Behaviour (Bolero hall) - Oral

Ms. Lauren Young [1], ***Mr. Ryan McCallum*** [2], ***Dr. Melissa Perreault*** [2], ***Prof. Georgia Mason*** [1]

1. *University of Guelph, Integrative Biology,* ***2.*** *University of Guelph, Biomedical Sciences*

Does chronic stress induce apathetic inactivity in animals, like it can in depressed humans? In mice for example, small barren cages cause animals to spend more time motionless in the active phase of their day, lying with their eyes open: a behaviour termed 'inactive-but-awake' (IBA). Here we investigated whether similar effects occur in rats already being studied at our animal facility. This allowed us to reduce animal numbers in alignment with the 3Rs. 20 single-housed female Wistar rats were undergoing 6 weeks of the Chronic Unpredictable Stress (CUS) protocol, which involved random daily administration of seven stressors, by a separate research group, to induce depression-like states. Half (Group A) were dosed with putative antidepressant dimethyl fumarate (25mg/kg daily) and housed higher on the rack: treatments possibly making them more resilient than subjects housed lower on the rack and dosed with saline (Group B). Although the drug/rack confound was accidental, predicted effects on negative affect were in the same direction. For our study, the same observer (blind to treatment and hypothesis) scanned these subjects in their homecages for IBA and a rat-specific stress indicator, chromodacryorrhea ('bloody tears'), for 6 consecutive days in Weeks 0, 2 and 4 of CUS. Using GLS linear models in R, we tested predictions that IBA would increase with sustained CUS, in Group B more than A, and covary with chromodacryorrhea. We recorded stereotypic behaviour: a response to negative states that may be an alternative to IBA, and facial/postural changes, that might distinguish IBA specific to negative states from normal resting.

As predicted, IBA levels increased over the course of CUS ($F_{1,54}$ = 32.23, P < 0.001), and covaried with chromodacryorrhea (pseudo R^2 = 0.896, x^2 = 136.1, P < 0.0001), though Groups A and B did not differ. IBA involving squinted eyes increased during CUS-induced IBA, and this was higher in Group B than A. By Week 4, Group B (3.05 ± 0.109) also showed higher chromodacryorrhea scores than Group A (2.47 ± 0.109; t = -3.79, p<0.001), supporting chromodacryorrhea as an easy-to-score cage-side indicator of negative affect . Stereotypic behaviour, however, decreased as IBA increased (pseudo R^2 = 0.276, x^2 = 19.4, P = 0.0007), suggesting this welfare indicator can be suppressed by certain forms of stress. This is the first study to investigate inactive-but-awake behaviour in laboratory rats, and results support IBA, especially with squinted eyes, as a potential new indicator of chronic stress.

Rat handling practices: what do rats want?

Wednesday, 2nd August - 12:00: Laboratory Animal Behaviour (Bolero hall) - Oral

Dr. Carly O'Malley [1], ***Dr. Jennifer Kylie*** [1], ***Dr. Sarah Thurston*** [1], ***Dr. Emilie Paterson*** [1], ***Dr. Patricia Turner*** [1]

1. *Charles River*

There is over a decade of evidence indicating that tail handling in mice is aversive, reflected through behavioral and physiological measures of welfare. However, fewer studies have investigated preferred handling methods of rats. The goal of this study was to determine if a preferred handling method for rats could be determined using minimal handling across four cage changes using four handling methods (tail, tunnel, body, paper towel). It was hypothesized that tail handling would be aversive compared to the other three methods, evidenced as reduced willingness to interact with humans and higher corticosterone and glucose blood levels in response to handling, but that there would be no difference between tunnel, body, and paper towel handling. A total of 96 Sprague Dawley rats (48 males, 48 females) were obtained at 42-48 d.o., and pair housed. Rats were randomly assigned to handling method, which was balanced across cage rack rows and columns. Rats were only handled at cage change every seven days over four weeks by the same handler. Human approach tests measured rat response to humans and were conducted on day of arrival, and twice on the last day of study before and after rats were restrained for blood collection. For the human approach test, the familiar handler placed a hand into the rat's home cage for 1 min. Latency to approach the hand and duration of time spent in contact with the hand were measured by an observer blinded to treatment. On day 35, rats were restrained by a novel handler for blood collection. Blood was collected via the sublingual vein and analyzed for hematology parameters, corticosterone, and glucose levels. Separate linear mixed models were fitted for response variables latency to touch human (s; $\log_{10}$+1 transformed), duration of time in contact with the human (s; square root transformed), and each blood parameter. Fixed effects were sex and treatment, with random effect of cage. Rats showed no difference in response to humans in latency (HAT1: $F_{3,5}$=2.043, P=0.122; HAT2: $F_{3,5}$=0.283, P=0.838; HAT3: $F_{3,5}$=0.455, P=0.715) or duration of contact (HAT1: $F_{3,5}$=0.582, P=0.630; HAT2: $F_{3,5}$=0.883, P=0.457; HAT3: $F_{3,5}$=1.688, P=0.184) based on handling method, and no physiological differences in response to handling based on blood parameters (P>0.053). These findings suggest that rats may not be as sensitive to handling methods as mice. Future studies will investigate different age groups and more frequent handling sessions to further understand best practices in handling rats.

Rat ultrasonic vocalisations during the “tickling” procedure are individually consistent and unaffected by previous intraspecific play experience

Wednesday, 2nd August - 12:15: Laboratory Animal Behaviour (Bolero hall) - Oral

Dr. Marek Špinka [1], ***Dr. Quanxiao Liu*** [1], ***Ms. Mariia Radchenko*** [1], ***Ms. Tereza Ilčíková*** [1]

1. *Czech University of Life Sciences Prague*

In the “tickling” procedure, a human experimenter imitates the rat social play by touching the nape of a rat, putting the rat on the back and tickling it on the belly. The procedure is considered affectively positive because the rats emit 50 kHz ultrasonic vocalisations (USV) when submitted to it. We hypothesized that rats will perceive this procedure differently, and thus emit USV at different rates, if they have had a different experience with intraspecific social play. Between 21 and 45 days of age, we submitted male Long-Evans rats to three treatments (n=18 or 17 per treatment). Control rats played with a Long-Evans partner, socially reduced rats played with a partner of the less playful Fischer-344 strain and kinematically reduced rats played with a Long-Evans partner in a low ceiling environment that prevented vertical play elements (wrestling, pinning, boxing). Starting at 35 days, rats were tickled for 2 minutes for 10 consecutive days and the USVs were recorded. Rats on average emitted 159 ± 75.7 USVs per session. The three treatments did not differ in the number of USV (linear mixed model, $p=0.20$). Rats increased USV emission at later testing days ($p<0.001$) and rats tested later in the order within a day had increased USV emission ($p=0.02$). The number of USVs per tickling session was highly variable between rats (range 0-360) yet highly repeatable in individual rats, regardless of treatments (repeatability = 0.648; CI = [0.532, 0.742]). The results indicate that previous ontogenetic experience with social play has little effect on how rats perceive the human-induced imitation of play. Assuming that 50 kHz USVs are indicators of positive affective valence, the results also indicate that the positive appraisal by rats increases with repeated exposure to the tickling procedure and that hearing other rats being tickled may enhance the positive appraisal by rats that are tickled later. Furthermore, rats are rather consistent in their USV emissions and there is large inter-individual difference in the emission. Further research could focus on this inter-individual variability, examining whether being more ticklish-vocal is correlated with other traits, including those that are important for the quality of life as perceived by animals.

Feel good songs: playback of 50-kHz ultrasonic vocalisations induces a positive affective state and increases play in juvenile male Wistar rats

Wednesday, 2nd August - 12:30: Laboratory Animal Behaviour (Bolero hall) - Oral

Dr. Tayla Hammond [1], ***Dr. Sarah Brown*** [2], ***Prof. Simone Meddle*** [2], ***Dr. Birte Nielsen*** [3], ***Prof. Alistair B Lawrence*** [1], ***Dr. Vincent Bombail*** [1]

1. *Animal Behaviour and Welfare, Animal and Veterinary Sciences Department, Scotland's Rural College (SRUC), Edinburgh; The Roslin Institute, Easter Bush Campus, Midlothian, EH25 9RG, Scotland, UK,* ***2.*** *The Roslin Institute, The Royal (Dick) School of Veterinary Studies, The University of Edinburgh, United Kingdom, UK,* ***3.*** *Universities Federation for Animal Welfare (UFAW), Wheathampstead, UK*

Across animal welfare science there is a lack of validated models of positive affective states. Previous work has shown that the presentation of contrastingly valenced ultrasonic vocalisations (USVs) to rats alters behaviour. However, the potential of using playback of USVs to induce a positive affective state and promote positive animal welfare has yet to be explored. The aim of this work was to develop a playback paradigm to induce a positive affective state in rats. Juvenile male Wistar rats (37 days old) were presented with either 50-kHz USVs (N = 14; 7 cages), White Noise (N = 14; 7 cages) or Background Noise acoustic stimuli (N = 12; 6 cages) as pairs in the home cage for five consecutive days. Affective state was measured through USV production and approach behaviour. There was a significant interaction between treatment and day on USV production during playback ($F_{2,479}$ = 3.03, p = 0.05). On day one, USV production was highest in response to both 50-kHz USVs and White Noise, compared with Background Noise (56.7 vs 62.0 vs 42.5 ± 6.7 USVs per minute). On day five, USV production further increased in rats exposed to 50-kHz acoustic stimuli and decreased in rats exposed to White Noise, with no change in response to Background Noise (63.2 vs 44.8 vs 42.5 ± 6.7 USVs per minute). On both days, rats exposed to 50-kHz USVs conducted the highest frequency and duration of approach behaviour, followed by those exposed to White Noise and then Background Noise (duration of approach behaviour: 12.9 vs 8.7 vs 7.2 ± 2.1 seconds per minute; $F_{2,479}$ = 10.55, p < 0.001). There was a significant interaction between treatment and day on social play during playback (frequency: $F_{2,479}$ = 4.22, p = 0.02 and duration: $F_{2,479}$ = 4.57, p = 0.01). On day one, play was lowest in response to 50-kHz stimuli, whilst play during White Noise was similar to that during Background Noise (duration of social play: 2.4 vs 4.9 vs 4.7 ± 4.2 seconds per minute). On day five, there was an increase in the expression of social play in rats exposed to 50-kHz stimuli, with a decrease in rats exposed to White Noise and Background Noise (duration of social play: 4.8 vs 3.8 vs 2.8 vs ± 3.4 seconds per minute). These results support the use of the home cage playback paradigm to induce a positive affective state in rats.

Emotional contagion in collateral and separated pens exposed to social challenge.

Wednesday, 2nd August - 12:45: Laboratory Animal Behaviour (Bolero hall) - Oral

Mr. Raúl David Guevara [1], ***Dr. Sergi López-Vergé*** [2], ***Dr. Jose Javier Pastor*** [2], ***Prof. Xavier Manteca*** [3], ***Dr. Gemma Tedo*** [2], ***Dr. Pol Llonch*** [3]

1. *AWEC Advisors S.L.,* ***2.*** *Lucta S.A., Innovation Division,* ***3.*** *Universitat Autònoma de Barcelona, Department of Animal and Food Science*

Regrouping practices are usual in pig production, altering groups' hierarchy and triggering aggression that affects animal welfare. The present study aimed to validate an experimental model to induce a stress response in piglets (protocol number CEEAH-5754-5755-CEEA-UAB). This experimental model will help to test nutritional or husbandry strategies to mitigate the impacts of social stress in pigs. Thus, two independent trials were performed. In Trial A, a total of 144 crossbred piglets (25 days postweaning) housed in one room within 36 pens (four piglets/pen) were used and randomly assigned to either a control group (piglets maintained in their pen, Ctrl-A) or a social challenge group (piglets deliberately mixed, SC-A). In Trial B the same number of animals (33 days postweaning) and crossbreed line was used, but each treatment was assigned either to a control group (Ctrl-B) or a social challenge group (SC-B) in two independent rooms (rooms Ctrl and SC, 12 pens/ room, six piglets/pen), respectively. The social challenge consisted of daily moves of three out of four pen mates and five out of six pen mates, for Trials A and B, respectively. While in the Ctrl groups, all piglets stayed in their original pen. Before the 1st mixing day and at the end of the 3rd mixing day, blood samples were collected from two random piglets per pen to measure the piglets' hemogram (immunologic activation), and fecal samples from all the piglets were collected to record the myeloperoxidase (MPO) activity (intestinal inflammation). Skin lesion scores of all piglets were also recorded on the front, middle, and rear body regions. Hematological markers and fecal MPO activity did not differ between treatments in both trials ($P>0.05$). In Trial A, the total skin lesions score was higher in the SC-A group compared to the Ctrl-A group after the social challenge (0.53 vs. 0.17; $P<0.05$), but unexpectedly increased between sampling days in the Ctrl-A piglets (0.06 vs. 0.17; $P<0.05$) suggesting that Ctrl-A pigs showed similar aggressivity levels to the SC-A group. Contrarily, in Trial B the lesions score only increased in the animals in room SC (0.08 vs. 0.34; $P<0.05$). Results suggest that stable groups may show aggressive behaviors if they are nearby (in the same room) pens with socially challenged pigs. This emotional contagion though was not observed when stable groups are in different rooms than the socially challenged piglets. Thus, the physical separation of treatment groups in social stress studies is recommendable.

Behaviours as indicators of positive welfare (Poultry)

Optimistic chickens? How environmental complexity impacts slow-growing broiler chickens in a social-pair judgment bias test

Wednesday, 2nd August - 14:00: Behaviours as Indicators of Positive Welfare (Poultry) (Grande Hall) - Oral

Mr. Marconi Italo Lourenco da Silva [1], ***Ms. Alexandra Ulans*** [2], ***Dr. Leonie Jacobs*** [2]

1. *Department of Animal Production and Preventive Veterinary Medicine, School of Veterinary Medicine and Animal Sciences (FMVZ), São Paulo State University "Júlio de Mesquita Filho" (UNESP), Botucatu, São Paulo, Brazil,* ***2.*** *School of Animal Sciences, Virginia Tech, Blacksburg, VA, 24061 USA.*

Judgment bias tests (JBT) can infer an animal's affective state through its responses to ambiguous cues. However, this test limits chickens' performance as they are tested individually. We aimed to apply a novel social-pair JBT to assess the effect of environmental complexity on slow-growing broilers' affective states. Six-hundred day-old male Hubbard Redbro chicks were housed in a randomized block design of two treatments with six replicates each. In the low-complexity treatment, chickens were raised similarly to commercial standards. In the high-complexity treatment, chickens were raised with permanent (platform perches, dustbath with sand) and temporary enrichments (oats, strings, cabbage, hay, mirrors, seeds). Chickens were trained in pairs (1 pair/pen; 6 pairs/treatment) using a multimodal approach (location and color), with reward and neutral (unrewarded) cues of opposing color and location. Pairs met the learning criteria when both pecked the reward cue and not the neutral cue 100% of the time. Pairs were tested 4 times. Each test included 7 one-minute attempts, with three unrewarded ambiguous cues (near-positive [NP], middle, and near-neutral cue [NN]) presented once, and the reward (2 or 3) and neutral (1 or 2). All cues were presented individually and pseudo-randomly. Latencies(s) to approach and proportion of chickens (%) pecking the cues were recorded at individual level. Data were analyzed in SAS using GLIMMIX with treatment, cue, and their interaction as predictors, and bird ID nested in pen, round, and cue side as random effects. Chickens discriminated between cues, approaching the reward cue faster than the NP, middle, NN, and neutral cues ($F_{4,287}$=78.16; P=0.001). Furthermore, they approached the NP cue faster than NN and neutral cues, and approached the middle cue faster than the NN and neutral cues ($F_{4,287}$=78.16; P=0.001). Similarly, more chickens pecked the reward cue than NP, middle, NN, and neutral cues, and more chickens pecked the middle cue than NN and neutral cues ($F_{4,287=}$46.33; P<0.001). An interaction effect was found between treatment and cue type ($F_{4,287}$=3.56; P=0.029), with chickens from the low-complexity treatment approaching the middle cue (LSmean±SEM: 20.9±3.8s) faster than chickens from the high-complexity treatment (39.7±4.1s). No interaction between complexity treatment and cue type was found for the proportion of chickens pecking ($F_{4,287}$=2.15; P=0.174). The shorter latencies in the low-complexity treatment suggest that these birds were more optimistic (positive affective state) than birds in the high-complexity treatment. The environmental complexity provided in this study did not improve affective states in slow-growing broilers compared to a control.

Do laying hens perceive a difference between enriched cages and deep litter pens?

Wednesday, 2nd August - 14:15: Behaviours as Indicators of Positive Welfare (Poultry) (Grande Hall) - Oral

Dr. Katarina Pichova [1], ***Mrs. Zuzana Skalná*** [1], ***Dr. Lubor Kostal*** [1]

1. *Centre of Biosciences, Slovak Academy of Sciences, Bratislava, Slovakia*

The series of experiments aimed to look at the widespread public opinion that *cage-free systems provide better welfare standards for laying hens than cage systems through the laying hens' eyes.* We tested whether hens kept in a cage-free system (deep litter pens) were more 'optimistic' than hens kept in enriched cages. The judgement bias tests (JBTs) were used to measure the valence of laying hens' affective states. Hens in all experiments were first trained to discriminate white and 80% grey circles as positive (PS - rewarded by mealworm) and negative (NS - punished by white noise) stimuli in the operant Go/NoGo task. Afterwards, they were subjected to the JBTs. In **Experiment 1** we tested the effects of short-term change in housing conditions (2-6 weeks) on judgment bias in 20 Dominant Black laying hens. In **Experiment 2** we tested the effects of long-term housing (3-9 months) on 20 Dekalb White hens. In both experiments, hens were in the JBTs confronted with PS, NS and three ambiguous stimuli (shades of grey between PS and NS). The ratio of rewarded/punished to ambiguous stimuli presentations was 2:3 (i. e. each stimulus was presented with the same frequency). There were no significant differences in the mean proportion of responses to ambiguous stimuli between housing conditions (except for a few inconsistent changes after frequent housing changes in Experiment 1). However, a problem with the loss of ambiguity, a decrease in responses to unrewarded ambiguous stimuli caused by repeated testing, emerged. Therefore, the goal of **Experiment 3** and **Experiment 4** was to optimize the JBTs to prevent the loss of ambiguity. In both, we tested the effects of long-term housing (7 months) using 20 White Leghorn hens in each. In Experiment 3, three ambiguous stimuli were presented in the JBTs as in previous experiments, while in Experiment 4 only one intermediate ambiguous stimulus. The ratio of rewarded/punished to ambiguous stimuli presentations was changed in both experiments to 2:1 and the number of test repetitions was reduced. Both protocols decreased the loss of ambiguity. Nevertheless, even using these optimized JBT protocols, housing in a cage system did not lead to the 'pessimistic' bias in laying hens (Experiment 3 - $F_{4,194}$=1.00; P=0.409; Experiment 4 - $F_{2,104}$=1.41; P=0.249). Nor differences in performance between lines were observed. The results indicate that used housing conditions did not induce large enough differences in affective states or that JBTs are not sensitive enough.

Probiotic supplement induces optimism in laying hen chicks

Wednesday, 2nd August - 14:30: Behaviours as Indicators of Positive Welfare (Poultry) (Grande Hall) - Oral

Dr. Louise Hedlund [1], ***Ms. Austeja Rutkauskaite*** [1], ***Prof. Per Jensen*** [1]

1. *Linköping University, IFM, S-58183 Linköping*

During the past years, more and more attention has been drawn to the relationship between the gut microbiota and the brain, the so-called microbiota-gut-brain axis. In several species, including for example humans, horses, mice and pigs, it has been shown that a poor gut microbiota flora is associated with depression- and anxiety-like behaviours. The research on fowl is limited, however, gut-microbiota in quails has been related to neophobia, cognitive abilities as well as responses to tonic immobility and social isolation. In the commercial hatchery for laying hens, the newly hatched chicks are facing several stressful events that we previously have shown have long-time effects on the animals' behaviour and welfare. When in the hatchery, chicks are also often exposed to formaldehyde evaporation – as eggs and/or during hatching. Since this may disrupt the microflora, we here investigated whether probiotic supplementation could buffer the stress encountered in the commercial hatchery. Four groups of chicks from the same parental stock and the same batch were tested. Two groups of control chicks (n=20+20) were hatched under calm circumstances, of which one was provided with probiotics (Bactocell, Lallemand) in the feed and in the drinking water from day 1. Additionally, two groups of chicks (n=20+20) from a commercial hatchery were used, one provided with probiotics and the other not. We then applied a cognitive judgement bias test, designed for assessing pessimism and optimism, after 14 days of probiotic supplementation. A generalized linear model with repeated measures showed that there was a significant effect of probiotics, where chicks that had received probiotic were generally more optimistic ($F_{(1, 313)=}5.377$; $p<0.05$). There was no significant difference in judgment bias between control chicks and chicks from the commercial hatchery ($F_{(1, 313)=}2.282$; $p=0.132$), however, probiotics seem to somewhat buffer the stress from the hatchery. Based on these results, we think that probiotics is a promising tool for buffering stress and increasing the animal welfare in poultry production.

Play stimulation in commercial hatchery hatched chicks as a potential buffering mechanism for early stress

Wednesday, 2nd August - 14:45: Behaviours as Indicators of Positive Welfare (Poultry) (Grande Hall) - Oral

Ms. Enya Van Poucke [1], ***Ms. Perrine Mitschler*** [1], ***Prof. Per Jensen*** [1]

1. *Linköping University, IFM, S-58183 Linköping*

Laying hen chicks hatched in commercial hatcheries are exposed to a highly industrialized process that elicits a stress response that has both short- and long-term effects on behavior. This exposure to early stress could potentially lead to future welfare issues. Although its functions are still unclear, play behaviors are generally seen as a positive indicator of animal welfare. There are scarcely any studies on play behavior in chickens, however, in a field where abnormal behaviors such as feather pecking are prevalent, play behavior as a positive welfare indicator could be used and potentially exploited. This study aims to assess the effects of play stimulation in commercial hatchery hatched chicks. Regardless of treatment, all 60 chicks were hatched in a commercial hatchery and housed in a similar manner in groups of 10. Thirty play chicks (PC) were given access to an arena with play-inducing objects in groups of five for 30 min three times per week. The play-inducing objects included rubber worms, red plastic bag strips, metal rings tied to twine, and green twine dispersed on the floor of the arena, additionally, there were parrot bells, CD-ROMs, and chains dangling from the celling at an appropriate height for the chicks. To control for handling effects, 30 control chicks (CC) were placed in a cardboard box in groups of five for 30 min three times a week. After a period of five weeks, behavioral tests such as tonic immobility (TI), open field (OF), novel object (NO), and restraint to measure corticosterone reactivity were conducted. TI, OF, NO, and restraint data were analyzed with a generalized linear model with treatment (PC/CC) as a factor, using the normal distribution function and the link function 'identity' following assessment of the suitability of the data. In the OF, CC were more active by performing significantly more quadrant changes ($W\chi2=4.013$, df=1, $P=0.045$). During the NO, PC spent significantly more time in physical contact with the novel object ($W\chi2=11.173$, df=1, $P<0.001$) and tended to perform more quadrant changes ($W\chi2=3.694$, df=1, $P=0.055$). In conclusion, play stimulation in commercially hatched chicks has the potential to reduce some later fear responses and could aid to prepare chicks for future challenges in their environment. Further research should be conducted on play behavior in chickens and its capacity to buffer stressful experiences incurred at commercial settings.

Affect (anxiety) in broiler chickens is impacted by strain, body weight, and environmental complexity

Wednesday, 2nd August - 15:00: Behaviours as Indicators of Positive Welfare (Poultry) (Grande Hall) - Oral

Ms. Alexandra Ulans [1], ***Dr. George Brooks*** [2], ***Dr. Leonie Jacobs*** [1]

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Fast-growing broiler chickens can experience poor welfare associated with rapid weight gain. To mitigate this, producers may use slower-growing strains or increase environmental complexity. Affective states (long-term mood state) such as anxiety (negative affective state) may differ between strains with different growth rates when raised with different environmental complexities. The objective was to assess the impact of environmental complexity on affective state in fast- and slow-growing broilers as they gain weight using a cognitive bias test.

All procedures complied with ISAE's ethical guidelines. Six hundred fast-growing broilers (Ross 708) and 600 slow-growing broilers (Hubbard Redbro) were raised in 24 pens with simple (standard; SE) or complex (permanent and temporary enrichments; CE) environments, resulting in 6 replicates per treatment/strain combination. Six birds/pen underwent the attention bias test (ABT) on day 23 (fast-growing only), 28-29, 35-36, 42-43, 56-57 (slow-growing only), with birds only tested once (n=576). Three birds were placed in an arena with shavings and a feeder with feed and mealworms. Positive (feed) and negative (8-s conspecific alarm call) stimuli were simultaneously presented and attention bias (indicative of anxiety) was quantified through time spent vigilant (state of heightened alertness), and latencies to step and eat. More vigilance and longer latencies indicate a greater bias towards the negative stimulus, more anxiety, thus a more negative affect. Data were analyzed in R using logistic and linear regression models, with strain, complexity, and weight (continuous) as predictors.

Regardless of weight or environment, the slow-growing strain fed more often than fast-growing strain ($p=0.001$). For both strains, the likelihood of feeding was unrelated to weight in SE, but decreased with increasing weight in CE ($p=0.048$). Slow-growing broilers stepped sooner than fast-growing broilers ($p=0.007$). Birds in CE stepped sooner than birds in SE ($p=0.030$). Slow-growing birds were less vigilant than fast-growing birds ($p=0.003$). Vigilance increased with body weight ($p=0.024$).

Slow-growing broilers' behavior (likelihood of feeding, latency to first step, level of vigilance) indicated reduced anxiety, thus a more positive affective state compared to fast-growing broilers. However, vigilance increased with weight gain in both strains. Birds housed in complex environments were less anxious (likelihood of feeding, latency to first step) at earlier weights. Therefore, producers may improve broiler chicken welfare by using slow-growing strains, processing broilers at lower weights, or increasing environmental complexity.

Unflappable: Wing Flapping of Aviary-Housed Laying Hens Following Spatial Restriction

Wednesday, 2nd August - 15:30: Behaviours as Indicators of Positive Welfare (Poultry) (Grande Hall) - Oral

Ms. Tessa Grebey [1]***, Dr. Janice Swanson*** [1]***, Dr. Tina Widowski*** [2]***, Dr. Robert Tempelman*** [1]***, Dr. Janice Siegford*** [1]

1. *Michigan State University, Animal Sciences,* ***2.*** *University of Guelph, Animal Biosciences*

Laying hens have a large behavioral repertoire to help them navigate their surroundings, interact with conspecifics and other organisms, and maintain biological health and functioning. On commercial egg farms, hens' performance of many behaviors, including comfort behaviors that may indicate positive welfare, is limited by restrictive housing design or management conditions. Commercial housing systems are becoming larger and more complex to accommodate more positive hen behaviors, including wing flapping. Though ethologists do not fully understand the motivations behind wing flapping, research indicates hens need substantial three-dimensional space to flap their wings and housing system configurations likely influence this behavior. This was a pilot study examining the timing and frequency of wing flapping among 4 laying hen strains (2 white-feathered: Hy-Line W36 and Dekalb White; 2 brown-feathered: Hy-Line Brown and Bovans Brown; 576 hens/strain) housed in commercial-style multi-tiered aviaries.

Hens were separated by strain into 16 Natura60 aviary units within 4 rooms (4 units/room, 1 unit/strain/room). Each unit contained a wire enclosure above a litter-covered floor. Wire enclosures were comprised of 3 tiers throughout which hens could access feed, water, perches, and nests; doors on the bottom tier opened and closed to determine when hens could access litter. To encourage egg-laying in nests, hens in each unit were confined within wire enclosures from 01:00-11:35 daily (~8.5 hours of litter access before lights turned off at 20:00). Ceiling-mounted cameras in each unit captured hen behavior on litter, where hens had unfettered three-dimensional space. Observers watched 1 day of video footage when hens were 28 weeks old and recorded every stationary wing flap when the hen was not locomoting.

For analysis, time of day (11:35-20:00) was broken into segments, A-F, each representing 85 minutes. A linear mixed model compared counts of wing flapping over the day among the 4 strains. Main effects were strain and time segment; random effects were room and location of unit within room. We found significant effects of strain ($P=0.0126$) and time ($P<0.001$) on performance of wing flapping. Brown-feathered hens flapped their wings more than white-feathered hens. More wing flapping events were counted in segment A (11:35-12:55) compared to any other time segment, suggesting hens' daily confinement within wire enclosures may have influenced their motivation to wing flap once they had room to do so. Research should further explore behavioral differences among strains and also circadian patterns, effects of hen management, and influence of group size on wing flapping.

Companion animal behaviour

Unwanted Scratching Behavior in Cats: Influence of Management Strategies and Cat and Owner Characteristics

Wednesday, 2nd August - 14:00: Companion Animal Behaviour (Bolero hall) - Oral

Ms. Alissa Cisneros [1], ***Ms. Dorothy Litwin*** [2], ***Dr. Lee Niel*** [2], ***Dr. Anastasia Stellato*** [1]

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Cat scratching is a natural and highly motivated behavior; however, when resulting in damage to household items, cat owners report unwanted scratching behavior in the home as problematic. To identify factors that influence the performance of unwanted scratching behavior in the household, an online cross-sectional survey (N=2,465) targeted to cat owners in the United States and Canada was distributed using virtual snowball sampling via social media. The survey explored relationships between owner demographics, cat demographics, and owner management and interventions techniques and unwanted scratching behavior. To avoid errors associated with large models, we developed three logistic regression models to examine associations between owner reports of unwanted scratching and cat demographic factors (e.g., age, sex, breed), provisions of enrichment (e.g., outdoor access, specific material and objects provided), and owner demographic and management factors (e.g., age, gender, response to unwanted scratching). Most participants resided in Canada (88%) and were female (94.3%), and participant mean (SD) age, in years, was 40.9 (14.1). Overall, though 58% of cat owners reported this behavior, most owners did not consider declawing (92.1%), surrendering (96.5%), or euthanizing (99.2%) their cats due to scratching behavior. Most cat owners who reported unwanted scratching agreed that unwanted scratching can be resolved through provision of appropriate scratching surfaces (84%) as well as through positive reinforcement training (87%). Results of the logistic regression models reveal lower odds (OR<1) of unwanted scratching with cats 7 years or older (OR=0.78, $p < 0.0001$) and rewarding the use of scratching objects (OR=0.78, $p = 0.007$), and higher odds (OR>1) of unwanted scratching was associated with punishment methods, such as physical (OR=1.29, $p = 0.007$) and verbal (OR=1.56, $p < 0.0001$) correction. These results suggest that owner management strategies can influence the performance of unwanted scratching behavior in companion cats and highlight the potential benefits of using positive reinforcement for modifying cat behavior to reduce unwanted scratching. Further longitudinal research is needed to understand how different types of management strategies and enrichment items influence the development of scratching behavior in domestic cats.

Domestic Cat Chronobiology: Diurnal, Lunar and Seasonal Rhythms

Wednesday, 2nd August - 14:15: Companion Animal Behaviour (Bolero hall) - Oral

Ms. Neva Merčnik [1], Prof. Maja Prevolnik Povše [1], Prof. Dejan Škorjanc [1], Dr. Janko Skok [1]

1. *University of Maribor, Faculty of Agriculture and Life Sciences, Department of Animal Science*

Among domestic animals, the domestic cat (*Felis silvetris catus*) probably has the highest proportion of free-ranging individuals in the population and as such represents an important part (i.e. predator) in ecosystems. Due to their potential impact on wildlife, the management of domestic cats is a hot topic today. However, studies on the chronobiology and activity of domestic cats in relation to natural cycles are scarce. Therefore, the aim of our research was to investigate their diurnal, lunar and seasonal rhythms. We monitored the activity of stray cats in a selected corridor within a ~800m^2 patch of shrubs and trees in an agricultural landscape regularly used by wildlife in the area. Monitoring was conducted for two consecutive years using a Bushnell E3 trail camera. Data collection was based on video analysis of all recorded video clips (n= 2081). We recorded the following data: identification of the individual cat, date, and time of occurrence (cat sighted), light conditions, occurrence singly or in a group/pair, occurrence with or without prey, notes on observed behaviours. A total of 15 individuals were recorded in the area. The preliminary results on the basic chronobiology of the occurrence of cats in the area are presented here. Regarding seasonal changes, cats were most frequently observed in summer and spring (together about 70 % of all observations). The highest activity of domestic cats was observed at night (Rayleigh Z = 90.114; $p < 0.0001$) with two peaks of activity, one in the late evening (~21.00 h) and another in the early morning (~5.30 h). Slight shifts in activity depending on day length (sunset/sunrise) were observed when comparing diurnal rhythms in relation to seasons, with an earlier activity peak in winter. When analysing cat activity in relation to lunar phase, we found no significant activity peaks overall, either in general or in relation to seasons; thus, occurrence was evenly distributed over the lunar cycle (Rayleigh Z = 1.176; $p > 0.05$). Understanding the diurnal, lunar and seasonal activity rhythms of domestic cats is an important prerequisite for developing an optimal cat management strategy that takes into account both welfare aspects and minimising the impact of domestic cats on wildlife.

The effect of altering the microbiome on aspects of equine sleep and emotional state and cognitive performance

Wednesday, 2nd August - 14:30: Companion Animal Behaviour (Bolero hall) - Oral

Ms. Hannah Mumford [1], Ms. Julia Rosiak [1], Ms. Emily Drury [1], Ms. Louise Greenwood [1], Ms. Aleksandra Pankiewicz [1], Dr. Sebastian McBride [1]

1. *Aberystwyth University*

The gut-brain axis is such that altering the microbiome can have a significant effect on sleep patterns, emotional states and cognitive function (Appleton, 2018). The diets of domesticated and captive animals are often formulated with little or no consideration of how this may impact the gut-brain axis and subsequently on factors that have the capacity to greatly affect the animal's welfare. The aim of this study was to examine the effects of altering the microbiome in the horse on sleep quantity/quality, emotional state and cognitive performance during a reward-prediction-error task and on blink rate (as a proxy measure for CNS dopaminergic activity). Eight horses were given two balanced diets of low and high starch that have previously been shown to produce a significant difference in the equine microbiome (Bulmer, 2020). Diets were given for 21 days within a balanced cross-over design. During days 19-21, the quantity and quality of sleep that the horses experienced were recorded using a previously defined sleep ethogram (Greening and McBride, 2022) as was blink rate (McBride et al., 2022). During days 20-21, horses were tested on the reward-prediction-error task. This operant task involved training horses to touch visual stimuli in order to gain a food reward. Horses were then placed under two consecutive extinction phases followed by one reinstatement phase. The number of trails to reach the extinction criterion (no response within 45secs for 3 consecutive trials) and trail latency were recorded as was the number of trials to reach the reinstatement criterion (3 correct consecutive responses). Facial expressions during the first 5 trials of each extinction and reinstatement phase were also recorded as a marker of emotional response to expected reward not given and unexpected reward given respectively. Results found that the high starch diet was associated with a significantly lower blink rate ($p=0.047$) compare to the low starch diet. The high starch diet was also associated with a significantly lower latency ($p=0.029$) and a significantly lower ($p=0.049$) number of extinction trials compared to the low starch diet. The effects of diet on equine CNS dopaminergic activity and cognition are discussed.

Does personality influence cognitive and emotional behaviours in dogs?

Wednesday, 2nd August - 14:45: Companion Animal Behaviour (Bolero hall) - Oral

Dr. Else Verbeek [1], ***Prof. Oliver Burman*** [2], ***Ms. Emma Roux*** [3], ***Ms. Anne Hamlaoui*** [4], ***Prof. Linda Keeling*** [5]

1. *Swedish University of Agricultural Sciences,* ***2.*** *Department of Life Sciences, University of Lincoln,* ***3.*** *Faculty of Veterinary Medicine, University of Calgary, Calgary, AB.,* ***4.*** *Swedish University of Agricultural Sciences, Department of animal environment and health, POBox 234, S-53223 Skara,* ***5.*** *Department of Animal Environment and Health, Swedish University of Agricultural Sciences*

In people, personality influences cognitive processes and emotional states. However, little is known about the interplay between personality, cognition and emotional state in animals. The purpose of this study was to determine whether dog personality was associated with behavioural responses towards a threat in a cognitive Attention Bias Test (ABT).

Fifteen dogs experienced an ABT on two separate occasions in a random order: after 5min of social isolation and after 5min of play with their owner. The ABT consisted of two periods: a baseline period (1.5min) and a threat period (1.5min), during which dogs were exposed to a 14s lion grow and were given food treats. One week prior to the ABT, dog personality was assessed indirectly by the Dog Personality Questionnaire (DPQ) and directly via behavioural tests (greeting, novel food, object and sound, play, food and social motivation tests). Data were analysed in r using a combination of univariate and multivariate approaches. First, the time spent performing behaviours in the ABT were analysed by a mixed model, with treatment (play/isolation), period (baseline/threat) and sex as fixed effects and dog ID as a random effect. Then, we normalized and aggregated the data, in order to obtain one value per dog per test and period, which we used to calculate spearman rank correlations, with p-values adjusted for multiple comparisons. Finally, we performed a principal component analysis (PCA).

After social isolation, dogs paid more attention to the threat sound (5.7±1.5 vs 1.6±1.5 s, $F_{(1,39.8)}$=6.5, P<0.05), were more vigilant (71.6±4.0 vs 57.0±6.7 s, $F_{(1,39.7)}$=7.3, P<0.01) and took longer to eat (24.9±6.4 vs 2.8±0.8s, $F_{(1,11.7)}$=7, P<0.05) compared to after playing with the owner. Furthermore, reactive behaviour (i.e., high attention to the threat and exit door, high latency to eat, high vigilance, and low exploration) at baseline after isolation was positively correlated to aggression towards people (DPQ: R=0.81, P<0.001). After the play treatment, reactive behaviour at baseline was negatively correlated with greeting behaviour (behavioural test: R=-0.63, P<0.01), fear of the novel object (behavioural test: R=-0.78, P<0.001) and activity/excitability (DPQ: R=-0.76, P<0.001). Finally, the first PCA component (explaining 22.7% of the variation) was influenced by high loadings of reactive behaviour after playing at baseline and aggression towards people, and low loadings of greeting behaviour and activity/excitability.

These results are a first suggestion that less social dogs may display more reactive behaviours in an attention bias test, which implies that personality may influence emotional behaviours.

The Effects of Weeklong Fostering on Shelter Dog Welfare

Wednesday, 2nd August - 15:00: Companion Animal Behaviour (Bolero hall) - Oral

Dr. Lisa Gunter [1], ***Ms. JoAnna Platzer*** [2], ***Ms. Jenifer Reed*** [2], ***Ms. Emily Blade*** [1], ***Ms. Rachel Gilchrist*** [1], ***Dr. Rebecca Barber*** [3], ***Dr. Erica Feuerbacher*** [2], ***Dr. Clive Wynne*** [1]

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Millions of dogs enter animal shelters each year, and a dog's time in the shelter is likely stressful when compared to life in a home. Previously, fostering stays of one and two nights have been shown to improve the welfare of dogs as they await adoption. Yet, little is known about the effects of longer durations of foster care.

In the present study, we explored whether seven days in a foster home would influence dogs' urinary cortisol:creatinine ratios as compared to ratios collected in the shelter five days before and after foster care. Additionally, dogs' physical activity was monitored to detect potential differences in activity intensity, which was measured from least (Q1) to most intensive (Q5).

In total, 84 dogs from two US animal shelters participated, yielding 1,385 cortisol values and 1,205 activity measurements. We found that dogs' cortisol:creatinine ratios changed across the study, F (16, 164.75) = 17.50, p < 0.001. In post hoc comparisons, dogs had significantly lower cortisol in the home as compared to days in the shelter prior to and after fostering. A main effect of shelter was also detected, F (1, 73.03) = 4.15, p = .045, signifying that the cortisol values at our two shelters differed.

Additionally, we found that dogs' activity changed during the study, F (10, 290) = 3.66, p < .001. In univariate tests, we found that dogs' lowest (Q1) and mid-intensity (Q3) activity were significantly different (p < .001). In post hoc comparisons, dogs' proportion of time in Q1 activity was greater during foster care (p < .001) while Q3 activity was less in foster care than before (p < .022) or after (p < .001) in the shelter. A significant effect of shelter was also found, F (5, 70) = 11.22, p < .001, indicating that the proportion of time dogs spent in these activity intensities differed between our shelters.

In total, the findings of this present study support previous research conducted about the effects of temporary fostering. Together, they provide compelling evidence that stays in foster homes, be it one, two, or seven days, are beneficial for shelter dogs and should be implemented as evidence-based interventions to improve canine welfare. When considering the differences we found between our shelters, both in dogs' cortisol and activity levels, it is likely that shelter design or daily husbandry procedures may also influence shelter dog welfare and require further investigation.

Cultural perspectives as central to dog rescue: Insights from interviews with Indian animal shelter staff and Canadian rescuers who import dogs

Wednesday, 2nd August - 15:15: Companion Animal Behaviour (Bolero hall) - Oral

Dr. Alexandra Protopopova [1], ***Mr. Kai von Rentzell*** [1], ***Ms. Deyvika Srinivasa*** [1], ***Dr. Rubina Mondal*** [2]

1. *Animal Welfare Program, Faculty of Land and Food Systems, The University of British Columbia,* ***2.*** *Department of Biological Sciences, Indian Institute of Science Education and Research Kolkata*

Research is increasingly showing the relevance of social science in understanding animal welfare problems. Animal sheltering is one societal enterprise that can benefit from additional research into cultural and social perspectives; specifically, how these perspectives drive both animal shelter scope (i.e., adoption, importation, rehabilitation) as well as individual animal care decisions (i.e., adoption into a pet home, release back to the street). The first study explores animal welfare decisions within a context of a large free-ranging dog population, in which Indian animal shelter workers (n = 10) were interviewed in their language on their perspectives on dog welfare and duties of staff towards dogs. Thematic analysis revealed that staff identified that unrestricted movement, autonomy, and community care as central dog needs. Additionally, staff reported differences between abandoned and free-ranging dog needs, and identified that people have a duty to not be in the way of dogs leading a good life. The second study explored the motivations of Canadian animal rescue directors (n = 9) who engage in importing dogs for purposes of subsequent adoption in Canada. Thematic analysis revealed that one of staffs' primary motivations are to protect dogs from harm in their origin country. Staff worked under the assumption of high levels of global dog overpopulation yet believed that true reform needs to come from the origin government. Finally, rescuers believed that Canadian pet homes result in very good dog welfare, but identified that this varies by individual dog origins. The comparison reveals interesting differences in the understanding of dog needs as well as differences in the understanding of the duties of people towards dogs. However, similarities were found in the perception of importance in determining individual care outcomes for dogs. The combined data suggest that cultural forces shape the understanding of what it means to be a "responsible caretaker" to a dog and suggest incorporating a multitude of cultural approaches when determining animal needs.

Investigating Inter-Observer Agreement and the Effectiveness of the Temperament Test using a Dog Socialization and Training Program

Wednesday, 2nd August - 15:30: Companion Animal Behaviour (Bolero hall) - Oral

Dr. Ana Catarina Vieira de Castro [1], Ms. Parizad Baria-Unwalla [1], Ms. Miriam Casaca [1], Ms. Urša Blenkuš [1], Ms. Mariah Malone [2], Ms. Lurdes Gomes [1], Dr. Anna Olsson [1]

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This study was conducted as a pilot for assessing the effects of a prison-based dog-training program on dog behaviour and welfare, to refine the methods for the main study (ongoing). We tested whether the validated Temperament Test (TT) developed by Valsecchi et al. in 2011, and refined by Barnard et al. in 2019, could detect changes imparted by the socialisation and training protocol to be applied in the program, and explored inter-observer agreement in the TT. The TT assesses behaviours associated with socialisation towards humans and other dogs, behaviour on leash, handling, cognitive skills, playfulness, resource guarding and reactivity to auditory and visual stimuli. The study was conducted at PATA, a Portuguese municipal shelter. Twelve dogs from the shelter were tested twice with the TT, in the week before (TT1) and the week after (TT2) the implementation of a 9-week socialisation and training protocol. One observer scored dog behaviour *in-situ* for both TTs. Four observers blind to the phase, and one non-blind observer scored the video recordings. Two observers had none to low experience in canine behaviour, whereas the other three had moderate to extensive experience. Results showed no statistically significant effect of phase (TT1: M=44.00, SD=15.38 vs TT2: M=48.33, SD=12.60) on TT score ($F_{1,11}=1.30$, $p=0.278$). Inter-observer agreement was excellent both between the five video observers (ICC=.985, $p<.001$) and between the average of the video observers and the observer scoring in-situ (ICC=.957, $p<.001$). The results suggest that TT scoring can be done reliably both in-situ and from video recordings, can be done by a single observer or split among several observers, and no experience in canine behaviour is required. We also discovered that some items (position in kennel, leash behaviour, play behaviour, and problem-solving) in the TT scale do not have adequate options, and we will propose alterations to overcome this for the main study. Whereas there was no general change in TT score after training, some dogs showed a substantial TT score increase. The dogs whose scores improved substantially in the present study did so mainly on 'sociability towards humans' and 'behaviour on leash'. We will discuss whether the TT actually assesses dog temperament traits, which are expected to remain stable across a dog's lifespan, or instead behavioural traits that can change with socialisation and training.

Workshops

How to overcome our challenges? Stimulating collaboration between ethologists and animal welfare scientists from different world regions

Wednesday, 2nd August - 16:30: (Grande Hall) - Workshop

Ms. Emeline Nogues [1], ***Ms. Bianca Vandresen*** [1], ***Prof. Marina A.G. von Keyserlingk*** [1]

1. *Animal Welfare Program, Faculty of Land and Food Systems, The University of British Columbia*

Scientists focusing on applied ethology and animal welfare share a common goal of generating science-based knowledge focused on improving the quality of life of animals under human care. However, the success of an individual researcher working in a specific region is dependent on overcoming challenges and barriers that may hinder their ability to achieve these goals, which likely differ greatly among the different parts of the world. This workshop will stimulate participants to embrace a community of practice to identify challenges they might share, solutions they might have found, and possible pathways of collaboration with each other. We also hope to identify how international scientific organizations such as ISAE could help promote those connections and collaboration networks among its members. We will start the workshop by asking participants to select a coloured ribbon identifying which of the 6 regions (Africa, Asia, Europe, Latin America, North America, Oceania) they are most familiar with; each region being represented by a different colour. After describing the goals of the workshop, we will initiate conversation by highlighting differences and similarities in our respective journeys as an example. We all grew up in different regions (Europe – France, Latin America – Brazil, North America - Canada). In the case of the first two authors, we are currently both engaged in research as graduate students in a third region (North America – Canada). Workshop participants will then be instructed to form small focus groups with each group having representation from different world regions. Participants will be guided through a discussion where they will be encouraged to discuss the main challenges they have encountered while carrying out their research, and whether these challenges are shared by others from different regions or appear to be unique to a specific region. Groups will also be encouraged to reflect on what they have learned from each other's experiences and perspectives. During the last portion of the workshop, all participants will come together and a spokesperson for each group will share their main findings, culminating with a general discussion. Data from the discussions will be collected for thematic analysis and used in a research project exploring the challenges faced by ethologists and animal welfare scientists from across the globe, and potential solutions. All data collection methods used in this workshop will be submitted for ethics approval of The University of British Columbia Behaviour Research Ethics Board and follow ISAE Ethical Guidelines.

The challenges of animal-centered farming

Wednesday, 2nd August - 16:30: (Bolero hall) - Workshop

Ms. Fleur Hoorweg [1]

1. *Department Animal Welfare and Health, Wageningen Livestock Research, Wageningen University and research, De Elst 1, 6700 AH Wageningen, The Netherlands*

Historically, animal welfare has often been approached from the perspective of preventing unnecessary suffering and mitigating negative influences on the wellbeing of animals. In contrast, we currently see a shift towards focussing more on positive experiences in the lives of animals including animals kept for production. This shift towards positive welfare is seen in society, research and policy.
In the Netherlands, policy aims for a livestock farming system that is animal-centered with the goal to create higher welfare standards. The concept of animal-centered farming is defined by the council of animal affairs (RDA, 2021) and is based on 6 guiding principles; 1) recognition of the animal's intrinsic value, 2) good nutrition, 3) good environment, 4) good health, 5) natural behaviour and 6) positive mental states. The concept of animal-centered farming is included in the coalition agreement of the government as a part of circular agriculture goals. The inclusion of the concept in policy creates opportunities to improve the lives of production animals, but is also creates challenges. A first challenge is that animal welfare is a term used to describe a broad concept and various definitions are used by the general public, scientists and politicians. When talking about animal welfare and doing research on this topic it is therefore of great importance to establish what we use as a definition and what goal we aim for. This definition is reflected in how we view and design an animal-centered production system. Secondly, it has to be established what animal-centered is at minimum; what behaviours are essential for creating positive mental states and what elements in farming need to be added or removed from husbandry? How do we measure positive states and how much positive states are needed for a life worth living?
During a workshop I would like to start with establishing some common vocabulary followed by an interactive session. Participants are challenged to define what elements of animal husbandry are needed to facilitate positive states in animals and to come up with research questions that need to be answered in the coming years in order to move towards animal-centered farming.

The Cumulative Pain Framework: how to use it to measure suffering in animals

Wednesday, 2nd August - 17:30: (Grande Hall) - Workshop

Dr. Wladimir Alonso [1], ***Dr. Cynthia Shuck Paim*** [1]

1. *welfarefootprint.org*

Of the following practices, which is associated with more suffering: the surgical castration of piglets without pain control, or the extreme confinement of their mothers in gestation crates? And how do these practices compare with the pain associated with the highly prevalent fractures of the keel bone in egg-laying hens, or the chronic state of hunger that breeders of many species in intensive systems typically endure? More than scientific curiosities, these questions are relevant for the effective allocation of time and resources to policies and reforms aimed at improving farm animal welfare. In this workshop, we introduce the Cumulative Pain framework, an innovative approach for quantifying animal welfare loss. The approach has been successfully applied to quantify the welfare of laying hens in indoor housing systems, the impact of the adoption of slower-growing breeds on the welfare of broiler chickens, and the welfare impacts of different methods for the commercial slaughter of poultry. Briefly, it quantifies the cumulative load of negative affective experiences endured over any period of time using a meaningful metric: time in pain (where pain is used as a shorthand for 'any negative affective state'). To this end, it translates evidence on the duration and intensity of the pain associated with each of multiple welfare challenges typically experienced by a population into time spent in four categories of pain intensity (Annoying, Hurtful, Disabling and Excruciating), as grounded on neurological, physiological, behavioral, pharmacological and evolutionary evidence. The method is transparent, brings important knowledge gaps into light and incorporates uncertainty about all parameters into the final estimates. Importantly, since the method is based on a universal metric at the heart of how sentient organisms experience life (time in felt states), it enables comparing and combining the impact of experiences of very different nature over any period and provides the basis for the development of welfare footprints of animal-sourced products. At the end of the workshop participants will be familiarized with the method and how to apply it to their own data. A hands-on segment will guide participants through the process of using Artificial Intelligence to help generate Cumulative Pain analyses. This practical module aims to equip participants with the essential tools for critically assessing, comparing, and improving animal welfare in a variety of contexts.

Designing an Undergraduate Animal Science Course Using Kolb's Cycle of Experiential Learning

Wednesday, 2nd August - 17:30: (Bolero hall) - Workshop

Mx. Melissa Elischer [1], ***Dr. Cara Robison*** [2], ***Mr. Alisson Da Mota Santos*** [2], ***Ms. Madison Sokacz*** [2], ***Ms. Thaina Minela*** [2], ***Dr. Tasia Taxis*** [2]

1. *Michigan State University Extension,* ***2.*** *Michigan State University, Department of Animal Sciences*

The background of undergraduate animal science students is changing. Most are entering the university with companion animal experience, but fewer come in with familiarity working with livestock, like dairy cattle. This trend, coupled with almost two years of remote learning due to the covid-19 pandemic, has created a knowledge and experience gap for students that needs to be addressed. To this end, a new course was designed and piloted to provide students with an experiential learning environment combining traditional lecture, course labs/demonstrations, teaching farm activities, and research project engagement. These four components align with Kolb's Cycle of Experiential Learning: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Practical knowledge and skills related to dairy cattle were taught, including introduction to dairy cattle behavior and welfare, low stress handling techniques, tail and jugular vein blood collection, aseptic milk sampling, bench skills, and more. Students were introduced to a topic with a short lecture, then transitioned into the barns to observe demonstrations, and finally practice the skills and techniques themselves with immediate instructor feedback. For example, the lesson on low stress cattle handling, provided a short lecture introducing the topic and then allowed students to directly observe and experience cattle reactions to humans in their pen. Soft skills, such as adaptive leadership, communication, time management, organization, and teamwork, were also assessed in order to help students reengage and reintegrate after an extended period of remote learning. The combination of practical knowledge, practical skills, and soft skills is lacking in many undergraduate courses, leaving students unprepared to enter the workforce, graduate school, veterinary school, or other paths they may choose. This is supported by both students reporting they feel ill-prepared for future careers and employers noting the difficulty in hiring well-rounded students. The workshop will detail the inception, creation, execution, lessons learned, and overall student outcomes for the course to assist teaching faculty in considering how a similar course may benefit them, their students, and their departments or programs. The importance and application of Kolb's Cycle of Experiential Learning in animal science courses will be discussed. Course syllabus and schedules, as well as example assessments, will be presented. Time will be allotted for discussion and brainstorming with participants to begin designing their own course as well as suggestions for improvement in the presented course.

Survival of the tamest - rewinding domestication of chickens

Survival of the tamest - rewinding domestication of chickens

Thursday, 3rd August - 09:00: Survival of the tamest - rewinding domestication of chickens (Grande Hall) - Plenary

Prof. Per Jensen [1]

1. *Linköping University, IFM, S-58183 Linköping*

Domestication can be viewed as the evolutionary process whereby a species adapts to a life under human auspice. It has been suggested that one of the major forces driving phenotypic responses to domestication is the reduced fear of humans that inevitably must have been a defining aspect of the early history. Starting from an outbred population of captive Red Junglefowl, ancestors of all domesticated chickens, we selected birds for diverging fear of humans during 12 generations and recorded various correlated traits over time. The fear score, assessed during a standardized fear-of-human test applied at 12 weeks of age in every generation, decreased with 30% from the parental generation to generation 12. Most interesting, a range of traits, commonly associated with the “domestication syndrome”, developed over generations in the tame selection line. This includes increased egg size, hatch weight and growth, increased basal metabolic rate, increased feed conversion and several behavioural effects. Among the behavioural changes, modifications in social behaviour (increased dominance, less social coherence), increased foraging and exploration, and less fearfulness in non-human related contexts were recorded. Interestingly, despite being raised in the same environment and with the same feed, the gut microbiota was significantly different in the two lines, largely related to microbial pathways interacting with the nervous system. Furthermore, similarly to what is found in domesticated chickens compared to ancestral Red Junglefowl, tame birds had a reduced brain size relative to body weight, but an increased cerebellum size. Larger cerebellum was found to correlate with improved fear consolidation memory. We used microarrays to analyze gene expression in thalamus/hypothalamus and found that a set of genes related to reproduction and immunology were differentially expressed between the selection lines, possibly linked to the phenotypic effects observed in egg size and growth. In line with these results, we also analyzed DNA-methylation in the same brain regions and found 22 regions that were differentially methylated between the lines. These regions contained genes with known functions in metabolic and signaling pathways, corroborating the effects observed in gene expression and suggesting that epigenetic regulation of central genetic pathways may have been important for the correlated selection responses. Overall, our results indicate that selection for tameness in chickens has caused a cascade of correlated selection responses on several phenotypic levels. This indicates that tameness may have been an important driver of the domestication syndrome, mediated partly by epigenetic mechanisms.

Linking behaviour and genetics

Play ontogeny in young chickens is affected by domestication

Thursday, 3rd August - 09:50: Linking Behaviour and Genetics (Grande Hall) - Oral

Ms. Rebecca Oscarsson [1], ***Mrs. Johanna Gjøen*** [1], ***Prof. Per Jensen*** [1]

1. *Linköping University, IFM, S-58183 Linköping*

Play often indicates positive affective states and therefore has the potential of acting as an indicator of positive welfare. It is known that young chickens display different play behaviours, however, their ontogenetic pattern has previously not been described. This knowledge is important when designing studies about, for instance, the play-welfare relationship in this species. Moreover, play is believed to have increased in frequency in multiple species during domestication, as part of the domestication syndrome. Therefore, the aim of the present study was to investigate the effects of domestication on play ontogeny in young chickens, by comparing its occurrence in ancestral Red Junglefowl (RJF) and a domesticated commercial hybrid of White Leghorn (WL). Forty chicks from each strain were hatched in the same incubator and then housed in breed-separated groups of 20 each. Ten groups of four chicks were randomly created for each strain, and the same four chicks were then moved to enriched play arenas twice per week, from day 8 until day 53 post hatch. The frequency of 14 different play behaviours, categorized as locomotor play, social play and object play were recorded during 30 min. Every group of four birds constituted the independent statistical replicates and measures were averaged within the groups. Generalized Linear Mixed Models with a repeated measures design were used to analyse the effects of age, breed and their interactions. Play behaviour peaked between 25-40 days of age and all 14 behaviours were recorded in both breeds. Total play and object play (the dominant category) were significantly more frequent in WL (total play: $F_{1, 252} = 106.1$, $P < 0.001$ (total play was about 2.5 times more frequent in WL); object play: $F_{1, 252} = 5.9$, $P = 0.016$), whilst locomotor and social play were significantly more frequent in RJF (locomotor play: $F_{1, 252} = 8.9$, $P = 0.003$; social play: $F_{1, 252} = 25.4$, $P < 0.001$). Hence, domestication has affected the occurrence of play in young chickens, in the sense that domesticated chicks play more and that this higher occurrence of play is mainly directed towards objects. The information of when the frequency of play peaks is useful for future studies on the play-welfare relationship in young chickens.

Association between thyroid stimulating hormone receptor gene and fear behaviour in FUNAAB Alpha broiler chickens

Thursday, 3rd August - 10:05: Linking Behaviour and Genetics (Grande Hall) - Oral

Dr. Samuel Durosaro [1], ***Dr. Oluwaseun Iyasere*** [2], ***Mr. Taye Eniafe*** [1], ***Mr. Samuel Adu*** [1], ***Mr. Victor Oyeniran*** [3], ***Prof. Michael Ozoje*** [1]

1. *Department of Animal Breeding and Genetics, Federal University of Agriculture, Abeokuta,* ***2.*** *Department of Animal Physiology, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria; Animal Husbandry Systems and Ethology, Humboldt University, Berlin, Germany,* ***3.*** *Department of Animal Physiology, Federal University of Agriculture, Abeokuta*

Thyroid stimulating hormone receptor (*TSHR*) gene is one of the candidate genes under extensive selection pressure during domestication, so the gene is an important domestication-related locus in chickens. Since domestication affects chicken behaviour such as fearfulness, this study investigated the association between polymorphisms in exon 10 of *TSHR* gene and fear behaviour in 66 FUNAAB Alpha broiler chickens. Three different fear tests were conducted on the birds at different ages. The fear tests conducted on the birds were tonic immobility, emergence, and inversion tests on days 21, 24 and 27, respectively to measure predator, dark-light contrast, and handling fear, respectively. The number of inductions (IND) and duration of tonic immobility (DUR) were recorded during the tonic immobility test. The latency to emerge (EMG) from a dark box during the emergence test and the duration of wing flapping (DWFLAP) during the inversion test were also recorded. The maximum allotted time for the tonic immobility, inversion and emergence tests were 300 seconds, 30 seconds, and 300 seconds, respectively. Blood samples were collected from all the birds and the *TSHR* gene (exon 10) of the birds was amplified and sequenced. The single nucleotide polymorphisms (SNP) present in the gene were identified using CodonCode Aligner software (v.10.0.2 DEMO) while the association between the SNP and the fear behaviour was analysed using a Mixed Procedure of SAS v9. Seven SNPs were identified in *TSHR* gene (exon 10) of FUNAAB Alpha broiler chickens. Six of the SNPs were singleton polymorphisms which cannot be used for association study. The only parsimony SNP identified (Chr5:41019498G/A) was used for the association study. The mutation Chr5:41019498G/A had a minor allele frequency of 0.18, heterozygosity of 0.30 and was consistent with Hardy Weinberg law. There was no association between Chr5:41019498G/A and IND (p=0.76), DUR (p=0.60) and DWFLAP (p=0.21). There was a significant association between mutation Chr5:41019498G/A and EMG (p=0.04). The FUNAAB Alpha broiler chickens with *AA* genotype emerged faster (10.75±4.79 seconds) from the dark box compared with the birds with *AG* genotype (160.00±32.13 seconds). It can be concluded that the FUNAAB Alpha broiler chickens with *AA* genotype for mutation Chr5:41019498G/A are less fearful of dark-light contrast than the ones with *AG* genotype. The FUNAAB Alpha broiler chickens with *AA* genotype for mutation Chr5:41019498G/A at *TSHR* locus could be selected for less fearfulness of dark-light contrast, while the ones with *AG* genotype should be provided with environments with reduced dark-light contrast.

Genetic influences on the use of resources in cage-free housing of laying hens

Thursday, 3rd August - 10:20: Linking Behaviour and Genetics (Grande Hall) - Oral

Dr. Sabine G. Gebhardt-Henrich [1], ***Dr. Matthew Petelle*** [1], ***Dr. Michael J. Toscano*** [1]

1. *ZTHZ, Division of Animal Welfare, University of Bern*

Laying hens in aviaries have the freedom to move between several vertical tiers, the litter area, and, sometimes, an outdoor area. The aim of this study was to shift the focus from the availability of resources to the use of these resources by individual hens in a semi-commercial aviary barn with access to a covered veranda, while focusing on genetic and environmental factors. Dekalb White laying hens from 25 sires were raised in 8 pens of a rearing aviary barn and allocated to 5 pens in a production barn (1150 hens, 225 per pen). All hens wore an RFID tag during production and their locations on the different tiers of the aviary, the litter, and the veranda were tracked until 60 WOA (weeks of age). Data were analyzed with general(ized) linear models with sire, age, and pens of both barns as fixed effects. For the number of transitions, the first 50 days in the production barn were considered and the hen was taken as a random effect. For the duration in the veranda and litter, the daily duration in those areas between 36 and 42 WOA, when movements were stable and undisturbed by experimental procedures, was averaged per individual. The number of transitions between locations (tiers, litter, veranda) increased during the first 50 days after transfer to the production barn at 18 WOA ($F_{24,40359}$ = 35.3, P < 0.0001, estimate = 1.26±0.04) and this increase differed among sires ($F_{7, 40359}$ = 17.9, P < 0.0001, estimate of sires x days = -0.13±0.19) and pens in both barns (interactions with days after transfer: $F_{4, 40359}$ = 169.7, P < 0.0001). However, use of the veranda was influenced only by the sire ($F_{24,967}$ = 7.51, P < 0.0001, estimate: -0.95±0.66), while rearing barn pen had no influence. Duration on the litter was associated with the sire ($F_{24,1028}$ = 5.34, P < 0.0001, estimate 1.30±2.1) and rearing barn pen ($F_{7,1028}$ = 5.14, P < 0.0001, estimate 1.28±1.16). In conclusion, although all laying hens had access to different resources in the aviary barn, use of these resources was related to genetic and non-genetic factors like familiarity with the aviary (days after transfer) and pens of both the production and the rearing barns.

Under pressure - Effects of early social mixing and genetic line on agonistic interactions and skin wounds in young sows in a paired interaction test after weaning of their first litter

Thursday, 3rd August - 10:35: Linking Behaviour and Genetics (Grande Hall) - Oral

Mrs. Linda Marie Backeman Hannius [1], ***Prof. Linda Keeling*** [1], ***Dr. Claes Anderson*** [1], ***Dr. Daiana de Oliveira*** [1], ***Dr. Anna Wallenbeck*** [1]

1. *Department of Animal Environment and Health, Swedish University of Agricultural Sciences*

Group housing of sows involves mixing of unfamiliar individuals and challenging social situations. Developing management and breeding strategies to prepare gilts for group housing later in life is crucial for sow welfare and performance. This study assessed effects of first parity sows (FPS) genetic line and social mixing experience early in life on agonistic behaviours in a 1-hour paired interaction test (PIT) carried out after weaning of their first litter. The test was conducted in a commercial deep straw group-housing pen with an unfamiliar multiparous sow. Gilts of two Yorkshire lines, either indirectly selected for single (Dutch Yorkshire (DY), n=43) or group (Swedish Yorkshire (SY), n=38) housing were used in the study. The gilts had experienced different social environments during two phases of their rearing, giving four different combinations of social experience (balanced across genetic lines). From 2 to 5 weeks of age, half of the gilts had access to the piglets and sows in the neighbouring pen (n=39 gilts) or not (n=42 gilts). At 10 weeks of age, half of the gilts were mixed into groups with unfamiliar gilts (n=39 gilts) or kept in groups with familiar gilts (n=42 gilts). The number of performed and received aggressive interactions (bites and head knocks) during the first 20 minutes of the PIT (observation time selected based on a pilot study) were recorded using continuous observations from videos. Skin wounds before and after the PIT were assessed on-site. Statistical analyses were performed using SASv9.4, PROC GLM, with models including genetic line, social experience (and all possible interactions between these) and batch as fixed factors. Preliminary results show positive residual correlations between wounds and both aggressive interactions FPS performed ($r=0.51$, $p<0.001$) and received ($r=0.43$, $p<0.001$). Moreover, FPS of the genetic line SY performed more aggressive interactions (SY: 24.7±4.81; DY: 8.9±4.43; (LSM±SE) $p=0.021$) and had more wounds (SY: 14.7±2.41; DY: 7.7±2.21; (LSM±SE) $p=0.040$) than DY. The results indicate no long-term effects of social mixing experience early in life on agonistic interactions. However, the differences in aggressive behaviour between genetic lines are of practical importance in commercial pig production. The next important step in this research area and in this project is to characterise favourable social behaviour in group housed FPS, both at mixing (as assessed in this paper) and later, during the more long-term development of social dynamics in sow groups.

Does coat color in Holstein heifers predict behavioral and physiological reactivity?

Thursday, 3rd August - 10:50: Linking Behaviour and Genetics (Grande Hall) - Oral

Ms. JoAnna Platzer [1]***, Dr. Erica Feuerbacher*** [1]

1. *Department of Animal Sciences, Virginia Tech, United States of America*

Pigmentation in animals has previously been shown to correlate with behavior in many species. Holstein dairy cattle phenotypically vary in the amount of depigmentation (white spotting) present on their coats. Anecdotal lore and limited empirical evidence suggest that within Holstein cattle, white spotting may correlate with an individual's behavioral reactivity to stimuli.

To explore whether pigmentation does indeed correlate with reactivity in our sample of Holstein cattle, we first used an image processing program to determine the amount of white depigmentation and black pigmentation present on the faces and sides of 18 Holstein heifers and then collected avoidance distance scores, salivary cortisol levels before and after an acute stressor, and rates of stress-related behaviors during the acute stressor from those individuals. We utilized a palpation exam as our acute stressor as it is a routine procedure for heifers and cows on many commercial dairy farms and prior research has shown that it functions as an acute stressor for cattle. During our university dairy herd's scheduled palpations, we video recorded our study heifers and later coded their rates of head movement, vocalization, and stepping while they were being palpated by the veterinarian. We also collected two saliva samples from the heifers: one before the veterinarian arrived (our pre-stressor sample) and one approximately 20-30 minutes after the palpation event ended (our post-stressor sample) and analyzed these samples for cortisol. At a later date we approached the heifers while they were in their pasture with their herd and recorded how close we could get to the heifers (or, if they did not move away, the extent to which they allowed contact) before they took two or more steps away as a measure of avoidance distance. We found that mean cortisol values did increase following palpation (Wilcoxon Signed-Ranks Matched Pairs Test, $p = 0.02$, $Z = -2.29$, $r = -0.38$), but that the change in cortisol did not correlate with the amount of white spotting on an individual (Simple Linear Regression, $F(1,16) < 0.001$, $p = 0.99$). The amount of white spotting also did not correlate with behavior during palpation (Simple Linear Regression, $F(1, 12) = 0.05$, $p = 0.82$) or avoidance distance (Simple Linear Regression, $F(1,16) = 0.11$, $p = 0.74$). Our results suggest that white spotting does not correlate with behavioral or physiological reactivity in Holstein cattle, but due to the small sample size further research is needed.

Abnormal Animal Behaviour

The incidence of tail biting in pigs reared under commercial conditions in Australia

Thursday, 3rd August - 09:50: Abnormal Animal Behaviour (Bolero hall) - Oral

Mrs. Rutu Galea [1], ***Dr. Lauren Hemsworth*** [2], ***Dr. Megan Lucas*** [1], ***Dr. Kate Plush*** [3], ***Dr. Rebecca Morrison*** [4], ***Dr. Maria Jorquera-Chavez*** [4], ***Ms. Jessica Zemitis*** [3], ***Prof. Paul Hemsworth*** [5], ***Prof. Alan Tilbrook*** [6], ***Prof. Mark Stevenson*** [7]

1. *Animal Welfare Science Centre, The University of Melbourne,* ***2.*** *Animal Welfare Science Centre, University of Melbourne,* ***3.*** *SunPork Group, Eagle Farm, Australia,* ***4.*** *Rivalea Australia,* ***5.*** *Animal Welfare Science Centre, The University of Melbourne,,* ***6.*** *Centre for Animal Science, QAAFI and School of Veterinary Science, The University of Queensland,* ***7.*** *Asia Pacific Centre for Animal Health, The University of Melbourne*

Tail biting is a welfare-reducing abnormal behaviour commonly seen in indoor group-housed pigs, with potentially serious health and productivity consequences. Managing tail damage victims and controlling tail biting outbreaks can be distressing for pig producers. Although tail docking is routinely used to reduce tail biting, it does not eliminate the risk completely. A successful transition away from tail docking requires a better understanding of the risk of tail biting in different commercial conditions. Our understanding of the incidence of and risk factors for tail biting comes largely from experimental studies, cross-sectional surveys, and abattoir records which all fail to properly capture the complexity of commercial conditions. To address this knowledge gap, we are conducting a large observational study of tail biting in docked pigs across multiple production sites in Australia.

Over 2 years, data are being collected for ~100,000 individual pigs from birth to selection/slaughter, across eight pig production sites in Australia. Data pertaining to environmental factors (e.g., shed and pen features, daily shed temperature and humidity, ammonia concentrations, weather conditions), animal-level factors (e.g., growth, tail injury scores and disease and treatment events) and management factors (e.g., shed activity, the movement of pigs through different production pens husbandry procedures and feed composition) are being collected. Preliminary analysis on six months of data (= 15,043), showed the overall incidence of tail biting to be 3.2% (0.9% to 3.9%). The time to event (survival) analysis showed the incidence risk of tail biting to be 1.1 per 1000 pigs, and this varied between sites, and the risk was highest at around 16 weeks of age. We also found a strong location effect on the incidence of tail biting with tail biting cases isolated to 16% of the 648 unique locations (pens) in the study. As the study is ongoing, future survival analyses will focus on identifying environmental, animal and management factors associated with an incident of tail biting. Identified risk factors will be used to develop a Cox proportional hazards regression model to estimate the relative importance of each identified factor, adjusting for the effect of confounders (e.g., company, site and shed) and accounting for risk factors that change over time (e.g., environmental conditions and stocking density). The outcomes of the current project will enable us to manage the risk of tail biting in Australian commercial conditions, thereby eliminating the need for tail docking and improving the welfare standards of pig production.

Performance in a reversal learning task predicts the outcome of aggressive interactions in pigs

Thursday, 3rd August - 10:05: Abnormal Animal Behaviour (Bolero hall) - Oral

Dr. Victoria Lee [1], ***Ms. Lucy Oldham*** [1], ***Ms. Agnieszka Futro*** [1], ***Mr. Mark Brims*** [1], ***Dr. Gareth Arnott*** [2], ***Prof. Simon Turner*** [1]

1. *Animal Behaviour and Welfare, Animal and Veterinary Sciences Department, Scotland's Rural College (SRUC), Edinburgh,* ***2.*** *Institute for Global Food Security, School of Biological Sciences, Queen's University, Belfast, United Kingdom*

On intensive pig farms, mixing unfamiliar pigs for management purposes can result in damaging aggression and chronic social stress. However, individuals and groups vary in the extent and duration of aggression. Explaining the causes and consequences of this variation is important to identify the decision-making skills that allow pigs to navigate dominance interactions with fewer welfare costs. Specifically, behavioural flexibility is hypothesised to be useful in animal contests by allowing individuals to update prior knowledge and adjust behaviour in light of new information. We investigated whether pigs' performance in a reversal learning task predicted their likelihood of winning a dyadic contest.

As part of a wider study investigating the effects of cognition on aggressive behaviour, pigs took part in a reversal learning task and a staged dyadic contest with an unfamiliar individual. Grower pigs were initially trained to associate a location on one side of a test arena with a food reward, and the opposite location with a mild punishment (no reward and a fan, maximum 36 trials). In the reversal learning stage, the previously learned rewarded and punished locations were reversed (20 trials/pig). Pigs were considered to have successfully learned the reversal if they chose the new rewarded location in 6/6 or 10/12 consecutive trials. Pigs that completed the 20 trials but did not reach these criteria were considered to have failed the task. For contests, pigs were sex-matched and opponents were variable according to weight. While sex and weight did not predict reversal learning performance, both are known to influence contest dynamics and outcomes.

Data were analysed from pigs with both a reversal learning score (pass/fail) and a clear contest outcome (winner/loser), yielding a sample size of 101 pigs from 76 dyads. As expected, weight difference between opponents was the strongest predictor of contest outcome (GLMM: $X^2_1=14.2$, $p<0.001$). However, pigs that succeeded in the reversal learning task were also more likely to win the contest than pigs that failed to learn the reversal (GLMM: $X^2_1=4.9$, $p=0.03$). This suggests that behavioural flexibility may help pigs to win contests unless they already have a substantial size advantage over their opponent. Further analysis will determine whether behavioural flexibility confers additional benefits by reducing the welfare costs associated with aggressive interactions.

This study was conducted with approval from the UK Home Office and the SRUC Animal Experiments Committee. Dyadic contests were short-lived (maximum 15 minutes) ended earlier if ethical endpoints were reached.

Are re-directed oral behaviours associated with gastric ulcers in pigs?

Thursday, 3rd August - 10:20: Abnormal Animal Behaviour (Bolero hall) - Oral

Ms. Laura C Salazar [1], ***Ms. Marianne Farish*** [1], ***Dr. Emma M Baxter*** [1], ***Prof. Alistair B Lawrence*** [2], ***Prof. Rick B D'Eath*** [1]

1. *Animal Behaviour and Welfare, Animal and Veterinary Sciences Department, Scotland's Rural College (SRUC), Edinburgh,* ***2.*** *Animal Behaviour and Welfare, Animal and Veterinary Sciences Department, Scotland's Rural College (SRUC), Edinburgh; The Roslin Institute, Easter Bush Campus, Midlothian, EH25 9RG, Scotland, UK*

Re-directed oral behaviours normally observed in gestating sows have been observed in *ad lib* fed gilts and sows, as well as in finishing pigs. We hypothesised that some of these re-directed oral behaviours could be related to health problems affecting the upper digestive system such as the stomach. This is because oral behaviours and gastric ulcers are associated in horses and there is an association between gastric ulcers and general behaviour in pigs. To investigate the relationship between re-directed oral behaviours and gastric ulcers videos from a previous study were used [more details: Rutherford et al, (2018)]. Seventeen finishing pigs (male=6, female=11) were housed in small groups (2 to 5 pigs/pen) on straw with *ad libitum* access to water and commercial finishing diets. They were scored for chewing movements, wind sucking and tongue playing by using continuous behaviour sampling. Visibility, activity and disturbed behaviour were scored to adjust for the total observation time. Gastric ulceration had been assessed post-mortem by a ten-point scale in the aforementioned study. The adjusted rate of re-directed oral behaviours was compared between pigs with healthy (n=10) and pigs with ulcerated (n=7) stomachs (*pars oesophagea*) by using GLMM (REML procedure, Genstat 19). Chewing movements ($Wald_{(1)}$ = 0.02, p = 0.901), tongue playing ($F_{(1.13)}$=0.03, p=0.861) and wind sucking ($Wald_{(1)}$=1.3, p=0.254) were the same between groups. However, the percentage of pigs performing wind sucking (42 vs 20%) and tongue playing (71 vs 50%) at least once was numerically higher within pigs with ulcerated stomachs as compared to pigs with healthy stomachs. Notwithstanding, the study shows that there is no relationship between gastric ulceration and the oral behaviours studied here. These results are limited by the quality of the videos and the location of the cameras making it difficult to identify other re-directed oral behaviours such as jaw-stretching and snout twitching. There was also no information on the health of mouth and oesophagus which could have had an impact on behaviour. Possible explanations for the occurrence of re-directed oral behaviours in finishing pigs are: an insufficiently enriched housing environment; inadequate diet and feeding practices; having a learning component; and/or being related to different ill-conditions of the upper digestive system. Future steps should investigate how oral behaviours develop and whether the number of pigs performing these increases with age; how oral behaviours relate to other conditions affecting the upper digestive system; and the relationship between other behaviours and gastric ulcers.

Exploring the effects of dietary amino acids levels on the social behaviour of pigs

Thursday, 3rd August - 10:35: Abnormal Animal Behaviour (Bolero hall) - Oral

Ms. Eleanor Hewett [1], ***Dr. Luis Zaragoza*** [2], ***Dr. Uislei Orlando*** [2], ***Dr. Craig Lewis*** [2], ***Prof. Jos Houdijk*** [1], ***Prof. Andrea Wilson*** [3], ***Prof. Simon Turner*** [1]

1. *Animal Behaviour and Welfare, Animal and Veterinary Sciences Department, Scotland's Rural College (SRUC), Edinburgh,* ***2.*** *PIC,* ***3.*** *The Roslin Institute, The Royal (Dick) School of Veterinary Studies, The University of Edinburgh, United Kingdom, UK*

Negative social behaviours between pigs, such as ear biting, can cause acute and chronic stress and often result in lesions that are likely to be painful. Stress, however caused, compromises pig welfare. There is significant interest in the manipulation of amino acid levels in pig diets as a nutritional strategy to affect behaviour. In the current study, we focused on lysine (Lys) and tryptophan (Trp). Lysine is the first limiting amino acid in the majority of pig diets and tryptophan is the primary precursor of serotonin and melatonin. Here, we determined effects of varying dietary Lys and Trp levels on the social behaviour of pigs. 2,293 PIC Camborough® barrows with a mean starting weight of 11.87 ± 1.35 Kg were used in a randomised complete block design (block = wean date and weight) with a 2×3 factorial arrangement of the following feeding treatments: 1) Standardised ileal digestible (SID) Lys levels: 100% Lys = diets with 100% PIC requirement at the average point of the growth phase, vs 80% Lys = diets with 80% PIC requirement at the beginning of the growth phase; and 2) Trp to Lys ratio of 0.210, 0.185 or 0.160. Pigs were randomly allocated across the 6 treatments over 3 starting dates (wean dates). The number of pigs showing signs of ear, tail and flank lesions and the severity of those lesions were recorded weekly for 8 weeks for a total of 7 recording events. Only ear lesions occurred sufficiently frequently for analysis through GLMM. Feeding treatment affected both the number of pigs with ear lesions and severity of ear lesions (both $p<0.001$). Analysis of LSD between pairs of diets indicated that diets with 80% Lys were associated with more ear damage than diets with 100% Lys. Average predicted mean number of affected pigs per pen on 100% and 80% Lys diets was 0.85 and 3.28, respectively (initial inventory average 23.88 pigs per pen). We found no effect of Trp:Lys ratio on number of pigs with ear lesions or severity of ear lesions. The results suggest that dietary Lys levels affect the behaviour of pigs. Tail and flank biting were not common in this population, but the potential remains for Lys levels to affect this behaviour in other populations. The effect of diet on lesions from fighting behaviour and expression of other negative and positive social behaviours is ongoing and will be presented at the ISAE meeting.

Effects of provision of softwood planks on behaviour and performance of growing pigs

Thursday, 3rd August - 10:50: Abnormal Animal Behaviour (Bolero hall) - Oral

Dr. Ayoola Oluyemi [1], ***Dr. Olufemi Adebiyi*** [2], ***Mr. Temitope Bankole*** [2]

1. *Department of Animal Science, University of Ibadan and Institute of Drug Research and Development Afe Babalola University,* ***2.*** *Department of Animal Science, University of Ibadan*

For pigs, the lack of stimulus to perform innate behavioural activities such as exploration and foraging in barren housing, can lead to an increased incidence of pen-mate and pen-manipulation, despite the provision of food and shelter. These can be curtailed by providing enrichment objects. Hence, this study was carried out to determine the effects of a different number of softwood planks as enrichment on behaviour and growth performance of growing pigs. Thirty-six pigs were distributed into four treatments with three replicates each. Each replicate included three pigs in a completely randomized design. Pigs were provided different amount of softwood planks as enrichment while the control (CT) had no enrichment. The experiment lasted for 8 weeks. The size of softwoods used was 40.0 x 4.0 x 4.5 cm. The planks were suspended from 6 mm blue ropes on both sides and the treatments were: Control (CT, without enrichment), SW1 (one softwood plank), SW2 (two planks) and SW3 (three planks). Behavioural observations were conducted from video images using CCTV and recordings were made for 6 hours/day for 3 days/week throughout the 8 weeks of experiment. At the end of the experiment, weight gain in kg (WG), final weight in kg (FW) and feed conversion ratio (FCR) were calculated and analysed using ANOVA. Behavioural observations focused on enrichment use (nosing, chewing or rooting the enrichment object provided), pen manipulation (snout or mouth in contact with pen sides or floor) and pen-mate manipulation (nosing, biting, rubbing or chasing other pigs). Behavioural data was obtained for 1 minute per 10 minutes as the percentage of total observation and analyzed using repeated measures. There were significant differences ($p<0.05$) across the treatments in the performance of the pigs in this study with pigs in SW2 having a greater FW (19.90Kg) and WG (9.62Kg) compared SW1 and SW3 and consequently, SW2 had a better FCR (3.33). From the behavioural data, it was observed that as the number of softwood planks increased from 1 to 3, pen-mate and pen manipulation decreased significantly ($p<0.05$) across the treatments while enrichment use increased (SW1: 17.61%, SW2: 36.51%, SW3: 50.75%). These results indicate that, provision of different amounts of softwood planks affected the behaviour of pigs towards pen-mates and pen components. Hence, to elicit the appropriate stimulus that will divert the inherent manipulatory behaviour of pigs from pen-mate and pen components, multiple enrichment objects should be provided.

Behaviours as indicators of positive welfare

The effects of amount of peat bedding on horses' recumbency and sleep-like-behavior - Preliminary results

Thursday, 3rd August - 11:30: Behaviours as Indicators of Positive Welfare - Oral

Ms. Heli Suomala [1], ***Dr. Laura Hanninen*** [2], ***Ms. Michelle Lüscher*** [3], ***Dr. Marianna Norring*** [2], ***Mrs. Anna-Mari Olbricht*** [4], ***Dr. Emma Ternman*** [5], ***Dr. Anna Mykkänen*** [3]

__1.__ Department of Equine and Small Animal Medicine, Faculty of Veterinary Medicine, University of Helsinki and Equine Information Center, Finland, __2.__ Research Centre for Animal Welfare, Department of Production Animal Medicine, Faculty of Veterinary Medicine, University of Helsinki, __3.__ Department of Equine and Small Animal Medicine, Faculty of Veterinary Medicine, University of Helsinki, __4.__ Equine Information Center, Finland, __5.__ Animal Science, Production and Welfare Division; Faculty of Biosciences and Aquaculture; Nord University; Norway

Adequate sleep and rest can be considered a cornerstone to equine welfare. Suboptimal habitat may interfere with horses' sleep. Recumbency and muscle atony is required to gain sufficient REM-sleep in horses. We hypothesized that a hard lying area surface would reduce horses´ daily lying duration and REM-like behaviors compared to a softer surface. Sixteen horses of which mean±SD age and height were 15±5 years and 160±4 cm were kept in 9 m^2-pens either on a 15 cm (PEAT15) or 5 cm thick (PEAT5) peat bedding in a 3-week crossover design. Their night-time resting behaviors were filmed and scored (numbers of bouts, total and bout durations for resting, sleep-like resting postures (head still) and REM-sleep-like resting neck postures (head not supported by the neck) for 2 nights at the beginning and end of each period. The differences between beddings during the 4 nights/period were compared with Kruskal-Wallis test and Spearman correlations calculated for associations between withers height and behaviors.

During PEAT5 the median (Interquartile range) time the horses spent lying down was less than during PEAT15; 18.0 (29.1) min vs. 27.3 (35.8) min, ($Z=-2,5$, $p<0.05$), and went down less often 1 (2) times vs. 2 (2) times, ($Z=-3,1$, $p=0,001$). Also the sleep-like resting duration was shorter for PEAT5 than PEAT15; 17.4 (28.1) min vs. 25.9 (35.8) min, ($Z=3.1$, $p<0.05$). Respectively, REM-sleep-like resting occurred less often in PEAT5 than PEAT15; 3 (3) times vs. 4 (4) times, for shorter daily total duration; 8.1 (15.2) min vs. 10.5 (17.5) min, and for shorter bout durations; 1.5 (2.5) min vs. 3.0 (2.5) min, ($p<0,05$ for all). The proportion from resting duration spent in sleep-like resting postures did not differ between PEAT5 and PEAT15 (6.4% vs. 5.5%). Withers height was negatively associated with the number of lying bouts in PEAT5 $r(14)=-0,51$ ($p<0.05$) but not in PEAT15.

A thinner bedding and consequently harder floor surface reduces both the number of bouts the horse lies down and the duration spent lying down. Furthermore, behaviors indicating sleep and REM-sleep were shorter. It appears taller horses are less willing to lie down in 9 m^2-pens if the amount of bedding is reduced. Horse height should be considered when interpreting the results.

Intraspecific social behavior in donkeys (Equus asinus): Circadian distribution and characterization

Thursday, 3rd August - 11:45: Behaviours as Indicators of Positive Welfare - Oral

Dr. Miina Lõoke [1], ***Dr. Simona Normando*** [1], ***Ms. Cécile Guérineau*** [1], ***Ms. Anna Broseghini*** [1], ***Prof. Paolo Mongillo*** [1], ***Prof. Lieta Marinelli*** [1]

1. *University of Padova*

The interest in keeping and breeding domestic donkeys has increased in recent years. However, the scientific literature regarding donkeys' behavior is still scarce. To shed light to this topic, we investigated the intraspecific social behavior of a group of 13 donkeys (3 geldings and 10 females, aged 3-13 years), stabled in an Animal Assisted Interventions facility in Northern Italy. Six donkeys had been born in the facility, whereas the remaining had arrived at the facility from different locations. The study was divided in two phases. The first phase aimed to define the circadian distribution of donkeys' social behavior. The data for the first phase was collected from videos of three non-consecutive days using scan sampling. The second phase aimed to characterize social interactions between donkeys, by building a sociogram of affiliative interactions and a dyadic matrix of agonistic interactions. This phase concentrated on the hour of the day when the social behaviors were mostly expressed (based on results of first phase), and the data were collected on four days using a continuous sampling method. The results indicated that intraspecific social behaviors were mostly expressed between 8:00 and 9:00 am, when donkeys expressed affiliative behaviors (N=188) more often than agonistic ones (N=102). The most expressed affiliative behaviors were proximity (55%) and following (29.2%) while the most expressed agonistic behaviors were threat (51%), displacement (18.5%) and bite (18.5%). The sociogram highlighted donkeys' tendency to choose one preferred social partner *i.e.*, to form pair-bonds. Seven most interacting pairs were identified based on the number of affiliative interactions (ranking in the highest 10% of all possible pairs). Three of such pairs were composed of unrelated females, two of sub-adults born in temporary vicinity and the remaining two of a mother and offspring. Different dyads were identified based on the expression of agonistic interactions; these were mainly composed of adult donkeys lacking an exclusive pair-bond (N=3 pairs), subadult individuals (N=2 pairs), or a combination of the two characteristics (N=3 pairs). Landau's linearity index excluded a strong linear hierarchy (h = 0.44) within the group. Taken together, the pattern of results highlights that pair-bonds are an important aspect of donkeys' well-being and raise the possibility that exclusive pair-bonds reduce agonistic interactions among individuals.

Diversity and novelty in environmental enrichment increases enrichment use in juvenile American mink (Neovison vison)

Thursday, 3rd August - 12:00: Behaviours as Indicators of Positive Welfare - Oral

Ms. Gabrielle Clark [1], ***Dr. María Díez-León*** [2], ***Dr. Rebecca Meagher*** [1]

1. *Department of Animal Science and Aquaculture, Dalhousie University,* ***2.*** *Royal Veterinary College*

It is standard practice on mink farms in Canada to provide one manipulable environmental enrichment (EE) per cage, and once enrichment is introduced, it must remain in the cage for the duration of that animal's life. One goal of EE provision in mink is to reduce the occurrence or development of stereotypic behaviour (SB). However, with enrichments that are permanently present, a habituation effect can reduce long-term interaction with these items, in turn impacting their effectiveness. In the present study, EE use of 'enriched' mink kits with access to multiple EEs exchanged bi-weekly or monthly from 4-14 weeks post-whelping (n = 34 litters) was compared to that of two standard-housed groups with access to one constant enrichment item (n = 70 litters; individual groups relevant to another paper). EE use was also compared between objects to investigate the effects of different item properties; items included golf balls, wiffle balls, hockey balls, pig's ears, and hanging chains or ropes. Roughly one year following removal of additional EEs for the enriched group, SB in the kits as adults (~16 months of age) was observed. During juvenile observations, enriched housing significantly increased interaction with EEs compared to the standard-housed conditions (back-transformed average proportion of observations in use: 0.042, 95% CI [0.036, 0.050] and 0.006, 95% CI [0.005, 0.007], respectively; one-way ANOVA, $p_{games\text{-}howell}<0.001$). EE type was also found to influence item use; objects with greater manipulability or malleability (pig's ears and rope) were used more often by kits (average proportion of observations in use: 0.050±0.033 and 0.014±0.012, respectively) than other mobile EEs (ring, 0.006±0.004; golf ball, 0.002±0.003; wiffle ball, 0.006±0.006; and hockey ball, 0.002±0.005; Kruskal-Wallis ANOVA $p<0.05$ or $p<0.001$ depending on item) or hanging EEs (chain, 0.005±0.004; Kruskal-Wallis ANOVA $p<0.001$), so these items may be more effective than others. However, SB development did not differ between enriched and standard-housed kits as adults (average proportion of observations where SBs were present: 0.214±0.198 and 0.184±0.230, respectively; Kruskal-Wallis ANOVA $p=0.134$). Therefore, the timing and/or duration of EE provision in this study was not effective at preventing SB development. Further research is required to determine if this method of EE provision (namely, access to enhanced EE only as juveniles) has a positive or negative impact on SB development and mink welfare in general.

Does environmental enrichment impact the behaviour and welfare of bearded dragons (Pogona vitticeps)?

Thursday, 3rd August - 12:15: Behaviours as Indicators of Positive Welfare - Oral

Ms. Agnese Crisante [1]***, Dr. Anna Wilkinson*** [1]***, Prof. Oliver Burman*** [1]

1. *Department of Life Sciences, University of Lincoln*

Environmental enrichment has been shown to be an effective way to improve the welfare of captive animals. Although many studies have investigated the effects of enrichment on mammalian and avian species, there is comparatively little known about this in reptiles. Reptiles are now frequently kept as pets, with bearded dragons being one of the most commonly owned species - it is therefore critical to understand how housing conditions affect their welfare. In the current study, we investigated the impact of three different housing conditions (standard (i.e. newspaper substrate, one hiding/basking spot, small water bowl and food bowl), enriched (i.e. a mixture of topsoil and sand (1:1) as substrate, two hiding/basking spots, humid hide spot, food bowl, bigger water bowl, fake plants, hammock, elevated platforms) and bioactive (i.e. same as the enriched but more 'naturalistic' due to the bioactive substrate, real plants and invertebrates living in the soil (i.e. mealworms, spring tails, etc.)) on bearded dragon (*Pogona vitticeps*) welfare, as assessed by a series of preference tests. Bearded dragons (n = 12) individually experienced each housing condition for a period of 4wks (balanced for order) before being tested. At the end of the study, having experienced each of the three housing conditions, all animals were given a series of pair-wise preference tests (e.g. standard vs. enriched, standard vs. bioactive, enriched vs. bioactive) to determine which housing condition they preferred. During each 2hr preference test, the animals had free access to two enclosures, replicating two of the different housing conditions, and could choose where to spend their time. The lizard's location was recorded every minute and analysed using a Chi Squared test. Our results revealed that, when given the choice, bearded dragons preferred to spend their time in the bioactive over both enriched ($X^2(1, N = 11) = 13.1, p = 0.0003$) and standard ($X^2(1, N = 11) = 42.3, p \leq 0.0001$) conditions, as well as enriched over standard ($X^2(1, N = 11) = 59.9, p \leq 0.0001$) conditions. These findings suggests that captive bearded dragons have a clear preference for enriched over standard housing conditions, with a bioactive environment being the most preferred. Housing bearded dragons in bioactive enclosures is therefore likely to improve the welfare of this commonly kept pet reptile.

Play behavior as a positive welfare indicator for farmed paca (Cuniculus paca)

Thursday, 3rd August - 12:30: Behaviours as Indicators of Positive Welfare - Oral

Prof. Selene Nogueira [1], ***Dr. Stella Lima*** [1], ***Dr. Allison Lima*** [1], ***Prof. Sérgio Nogueira-Filho*** [1], ***Prof. Suzanne Held*** [2], ***Prof. Michael Mendl*** [2]

1. *State University of Santa Cruz,* ***2.*** *Animal Welfare and Behaviour Research Group, Bristol Veterinary School, University of Bristol, UK*

We aimed to assess whether play behavior is a positive welfare indicator in farmed paca (*Cuniculus paca*) by investigating its associations with other markers of good welfare including affiliative behavior and vocalizations. We submitted six groups of pacas (one male/two females per group) (N=18) to an ABA experimental design (A1/A2: without treat dispenser toys; B: with three ball-shaped treat dispenser toys). We chose this manipulation because a previous study showed that balls promote play behavior in pacas. Individuals were recognized by natural marks on their pelage. We compared the time spent on play, affiliative and agonistic behavioral patterns and the calls' acoustic parameters among phases using linear mixed models. Play behavior occurred only during phase B (mean=35.5s, SE=6.4), without a difference between females and males (female: mean=13.3s, SE=1.4, N=7 and male: mean=24.0s; SE=1.4, N=5; paired *t*-test = 1.29; *P*=0.207). The experimental phases affected the amount of time pacas spent on affiliative ($F_{1,83}$ = 23.49; *P*<0.001), exploratory ($F_{1,92}$ = 18.48; *P*<0.001) and agonistic behaviors ($F_{2,24}$ = 3.93; *P*<0.033). *Post hoc* Tukey tests showed that pacas spent more time on affiliative and exploratory behaviors, while they spent less time on agonistic interactions during B than in A1and A2 (*P*<0.05). We also found differences in the emissions of snorts and barks according to phase (Chi-square = 9.06, *P*=0.011). The pacas emitted more barks than snorts during phase B than in A1 (Chi-square = 6.25, *P*=0.012), while there was no difference in the emission of snorts and barks during A2 (Chi-square = 2.81, *P*=0.094). The phases affected the mean amplitude of snort ($F_{2,1.88}$ = 71.66, *P*=0.017) and bark calls ($F_{2,204.64}$ = 9.03, *P*<0.001) as well. *Post hoc* Tukey tests showed that pacas emitted snorts and barks with lower mean amplitude in phase B than in A1 and A2 (*P*<0.05). The emission of snort calls with higher mean amplitude is, on the basis of previous studies, indicative of a negative affective state in pacas, while the emission of bark calls with lower mean amplitude is indicative of a positive affective state, including in non-play situations. Because expression of play was associated with a decrease in aggression, an increase in affiliative behavior, and changes in the structure of snort and bark calls that indicate a positive state, we suggest that play behavior is a valuable marker of positive welfare in pacas.

Successive Negative Contrast: An Appropriate Approach to Measure Affective State in Dogs?

Thursday, 3rd August - 12:45: Behaviours as Indicators of Positive Welfare - Oral

Dr. Ana Catarina Vieira de Castro [1], Mrs. Parizad Baria-Unwalla [2], Ms. Margarida Guedes [3], Ms. Joana Guilherme-Fernandes [3], Ms. Miriam Casaca [1], Dr. Ana Margarida Pereira [3], Prof. António Mira da Fonseca [3], Prof. Ana Rita Cabrita [3], Dr. Anna Olsson [1]

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Tools to assess animals' affective states are important for animal welfare research. Many studies use the cognitive bias task, but an alternative is needed for research requiring repeated testing. One such alternative is the unexpected reward loss task, based on the rationale that an unexpected change in reward quantity or quality elicits a negative emotional state and consequently a decrease of consummatory or instrumental behavior, the Successive Negative Contrast (SNC) phenomenon. Animals in more positive affective states are expected to be less sensitive to the sudden decrease in reward value and thus show a less pronounced response reduction.

While well established in other species (e.g., rats, sheep, monkeys), SNC has been difficult to demonstrate in dogs, with conflicting results from previous studies with family and shelter dogs. It has been proposed that as SNC is usually studied within laboratory conditions, the phenomenon may not be robust enough to be reproduced in other environmental contexts and populations.

We aimed to demonstrate the SNC with a more standardized population of laboratory beagles (n=12). First their preference among two types of food was determined, to establish the high and low value rewards. The unexpected reward loss task was done on a subsequent day, and following previously published protocols comprised a *pre-shift phase* (5 trials), where the animals had to solve a dog puzzle where removing plastic cones provided access to high-value rewards, followed by a *post-shift phase* (3 trials), where the rewards were changed to the low value ones. The number of rewards successfully retrieved was measured in each trial of each phase. Dogs were not deprived for any of the tasks.

Results showed a significant increase in the number of cones removed across the different trials [$F(7)=15.56$, $p=.029$], regardless of the type of reward, revealing no SNC phenomenon.

One possible explanation is that the dogs valued more the activity in itself than the food rewards. In order to further explore the potential use of the unexpected reward loss task for dog welfare research, we are currently replicating the task with three other populations: military, shelter, and family dogs (n=12/population). Comparing dogs with different genetic and socialization backgrounds, exposed to different housing and husbandry, and with different degrees of environmental enrichment and problem solving experience will help to enlighten the reasons underlying the conflicting results and inform on whether it is worth pursuing the unexpected reward loss task in dogs.

PLF and other new techniques for measuring animal behaviour (Ruminants)

Computer vision to measure 3D kinematics in dairy cows: evaluating variability in ease of movement in free-stalls.

Thursday, 3rd August - 11:30: PLF and Other New Techniques for Measuring Animal Behaviour (Ruminants) (Bolero hall) - Oral

Mr. Adrien Kroese [1], ***Dr. Moudud Alam*** [2], ***Mr. David Berthet*** [3], ***Dr. Lena-Mari Tamminen*** [1], ***Prof. Nils Fall*** [1], ***Dr. Niclas Högberg*** [1]

1. *Swedish University of Agricultural Sciences,* ***2.*** *Dalarna University,* ***3.*** *Sony Nordic*

Dairy cow free-stalls are designed to compromise between animal comfort, lying time and hygiene. While all stalls are usually identical in a pen, a natural variability exists between individual animals, in size, preferences, and motion patterns. Precision livestock farming offers possibilities to monitor how each animal displays different movements. The purpose of this study was to use computer vision to track the movements of dairy cows throughout rising bouts, and to quantify the variability of selected motions.

A multi-view camera system was installed at the Swedish livestock research centre, covering 13 lying stalls. The frames captured by the cameras were processed with successive convolutional neural networks to detect the location of cows and anatomical features pertaining to each animal (head at the poll, withers, back at the 13th vertebra, and sacrum). Triangulating the location of each feature on synchronized frames from several cameras enabled to obtain the coordinates of corresponding key-points in a three dimensional space. The study comprised 503 sequences of cows performing a rising bout. In each sequence, the X, Y and Z coordinates of the anatomical features were tracked with a sampling rate of 30 Hz. We measured duration of the rising movement, head lunge room and neck angle while lunging. As the system did not yet report coordinates in metres, averages and ranges of spatial use are not meaningful, and only their variability is reported.

Results showed that rising motions lasted on average 11.5 ± 4.1s (μ ± σ), giving a coefficient of variation (CV) of 36%. Lunge room had a CV of 55% indicating high variability within the group. Its distribution was skewed to the right by a Pearson skewness coefficient of 1.22 and had a kurtosis of 2.24 . These indicates that in a majority of bouts, lunge room was within shorter values of its distribution. The angle between the neck and back during head lunge was 162.8 ± 6.5°. The slight skewness to the left by -0.75 indicates a mode close to the right, meaning that a majority of cows lunged closer to a straight line (close to 180°).

In conclusion, the results highlight the range of individual variability in cows' rising motions, albeit occurring in a single stall design. Furthermore, they showcase opportunities offered by computer vision as a practical way of measuring kinematics, although validation of the tools against a gold standard is still required.

Effects of cow reproductive status, parity and lactation stage on behaviour and heavy breathing indications of a commercial accelerometer during hot weather conditions

Thursday, 3rd August - 11:45: PLF and Other New Techniques for Measuring Animal Behaviour (Ruminants) (Bolero hall) - Oral

Dr. Lisette Leliveld [1], ***Dr. Daniela Lovarelli*** [2], ***Dr. Alberto Finzi*** [1], ***Dr. Elisabetta Riva*** [1], ***Prof. Giorgio Provolo*** [1]

1. *Department of Agricultural and Environmental Sciences, University of Milan,* ***2.*** *Department of Environmental Science and Policy, University of Milan*

Heat stress presents an urgent challenge to modern dairy farming, having detrimental impacts on cow welfare, health and production. Understanding the effect of cow factors (reproductive status, parity and lactation stage) on physiological and behavioural responses to hot weather is essential for an accurate detection and effective application of heat abatement strategies. To study this, collars with commercial accelerometer-based sensors were fitted on 48 lactating dairy cows, on a commercial farm with loose housing, free stalls and solid digestate as bedding, from May to August. These sensors recorded the time (per hour) each cow spent in 6 behavioural categories (ruminating, eating, heavy breathing, low activity, mid activity or high activity). The temperature-humidity index (THI = (1.8 x ambient temperature + 32) - (0.55 -0.0055*relative humidity) x (1.8 x ambient temperature -26)) was calculated from measurements of 8 sensors, which were placed at different locations in the barn at 3m high. General linear mixed models were run with THI level, parity, reproductive status, lactation stage and their interactions as main effects, daylight hours as covariate and with pairwise comparisons (Tukey–Kramer). At higher THI levels, advanced pregnant cows showed more heavy breathing (all $t \leq -2.77$; all $p < 0.001$) and less low activity (all $t \geq 2.47$; all $p \leq 0.036$) than non-pregnant and early pregnant cows and less eating than early pregnant cows ($t = 2.58$; $p = 0.027$). In contrast, early pregnant cows ruminated more than non-pregnant cows or advanced pregnant cows (all $t \geq 2.70$; all $p \leq 0.019$). Cows with 3+ lactations showed less heavy breathing (all $t \geq 4.13$; all $p < 0.001$), low activity (all $t \geq 3.16$; all $p \leq 0.005$) and more rumination than cows with fewer lactations (all $t \leq -4.22$; all $p \leq 0.038$). In contrast, primiparous cows showed more eating (all $t \geq 2.38$; all $p \leq 0.046$) and high activity (all $t \geq 2.68$; all $p \leq 0.020$) than cows with more lactations. Although lactation stage interacted significantly with THI on heavy breathing, ruminating, eating and low activity, the effect was not easily interpretable. Overall, the results suggest that primiparous and advanced pregnant cows are more susceptible to heat. These findings show that cow factors affect the cow's physiological and behavioural response to heat, which could be used to provide group-specific heat abatement strategies, thereby improving heat stress management and reducing the negative effects of heat on cow welfare.

Binary classification of dairy cow behaviour using vision transformers

Thursday, 3rd August - 12:00: PLF and Other New Techniques for Measuring Animal Behaviour (Ruminants) (Bolero hall) - Oral

Mr. Luke Byrne [1], ***Mr. Brian Lee*** [2], ***Mr. Aalexander Ulrichsen*** [1], ***Dr. Paul Murray*** [1], ***Prof. Stephen Marshall*** [1]

1. *Strathclyde University,* ***2.*** *Peacock Technology Ltd*

Automated systems which monitor and record the behaviour of dairy cows are of interest both commercially and scientifically. Records of behaviours such as walking, lying, eating etc could be used to infer conditions such as oestrus, lameness, or illness. In this study we developed a purely visual system for behaviour recognition using RGB video and a vision transformer (ViT) neural network. Two model sizes were tested: a small model with 22 million parameters and a large model with 304 million parameters. The study achieved promising results, with a validation accuracy of 91.61% for the large model and 86.67% for the small model, on a custom dataset. The dataset consisted of 22,233 clips of dairy cows in a commercial barn, with 560 clips labelled for eating behaviour. To create the dataset, raw camera footage was processed by a YOLOv3 model trained to detect cows, then cropped such that each video was 224x224 pixels and contained 1 detected cow. Pretraining with the unlabelled videos was performed using video masked auto-encoding (VMAE) following the method of Tong et al. (2022). Fine-tuning was then performed using the labelled data. During pretraining 16 frames of the videos were sampled at a rate of 3.75 frames per second and spatio-temporally patch embedded with a patch size of 16x16x2. Frames were randomly tube masked, discarding 90% of the patches, then fed through a ViT encoder. The encoder output was passed to a small decoder which reproduced the masked patches. The pretraining loss was the mean squared error of the unmasked input patches minus the reproduced output patches. During fine-tuning masking was ceased and the decoder was replaced by a multi-layer perceptron (MLP) which produced a binary class confidence. Inference time for the large and small models was 93.45ms per cow and 11.99ms per cow respectively on an RTX3090 GPU. These results suggest that real-time behaviour monitoring of dairy cows is possible using cameras and advanced video analytics such as those presented here. However, further study is needed to evaluate scalability and accuracy for multiple behaviour classes.

Automatic detection of atypical head lunge movements of dairy cows in free-stall cubicles using accelerometers and machine learning

Thursday, 3rd August - 12:15: PLF and Other New Techniques for Measuring Animal Behaviour (Ruminants) (Bolero hall) - Oral

Mr. Stijn Brouwers [1], ***Dr. Michael Simmler*** [2], ***Dr. Pascal Savary*** [1], ***Dr. Madeleine Scriba*** [1]

1. *Centre for Proper Housing of Ruminants and Pigs, Federal Food Safety and Veterinary Office (FSVO), Agroscope, Tänikon 1, 8356 Ettenhausen, Switzerland,* ***2.*** *Digital Production, Agroscope, Tänikon 1, 8356 Ettenhausen, Switzerland*

Dairy cows stand up by thrusting their head forwards and using it as a counterweight to gain enough momentum to rise up. In confined spaces like lying cubicles, cows may not be able to perform the head lunge in a natural manner and can have difficulties standing up. Current free stalls where head space cannot be increased may be improved by installing cubicle partitions that facilitate space sharing to the side, so the head lunge can be performed sideways. However, the only method to assess the effect of partition shape on cow welfare is through direct observations. Not only is this labour intensive, assessors can also be influenced by other factors, such as stable cleanliness. Since motion sensors are now commonly used to detect dairy cow behaviours, we aimed to investigate how well the direction and fluency of the head lunge can be detected using accelerometers and machine learning. Data was collected using triaxial accelerometers recording at 20 Hz attached to the left side of the head of 48 lactating cows (Brown Swiss and Holstein × Swiss Fleckvieh). A total of 569 standing up events were recorded. We used a recently proposed time series classification algorithm, MiniRocket, for machine learning model development and employed a cross-validation strategy. Balanced accuracy was used as primary performance metric as it is insensitive to class imbalances. We considered video observations as the ground truth. Head lunge direction (right/left/straight) and head lunge fluency (repeated movements/one fluent motion) were predicted with balanced accuracies of 0.67 and 0.69, respectively. Although this is not yet satisfactory for standalone use, it is a clear increase over a baseline classifier always predicting the most frequent class in the training dataset (0.33 and 0.50, respectively). Plotting learning curves indicated that the performances of these classification models are likely to improve with additional data. The results of this study suggest that the use of motion sensors and machine learning could improve the efficiency and objectivity of assessing dairy cow housing installations by regulatory authorities. Further research is needed to collect more data and improve the reliability and generalisability of these models.

Developing an easy-to-use mobile application for weight and health assessment in dairy cattle: could AI help?

Thursday, 3rd August - 12:30: PLF and Other New Techniques for Measuring Animal Behaviour (Ruminants) (Bolero hall) - Oral

Dr. Oleksiy Guzhva [1]***, Dr. Evgenij Telezhenko*** [1]***, Dr. Emma Ternman*** [2]***, Dr. Mikaela Lindberg*** [3]***, Dr. Cecilia Kronqvist*** [4]

1. *Swedish University of Agricultural Sciences, Department of Biosystems and Technology,* ***2.*** *Faculty of Biosciences and Aquaculture, Nord University,* ***3.*** *wedish University of Agricultural Sciences, Department of Animal Nutrition and Management,* ***4.*** *Swedish University of Agricultural Sciences, Department of Animal Nutrition and Management*

Data on body weight and objective measures of body condition are essential for appropriate decision-making on the farm level, e.g. for calculations of nutrient requirements and health control. Cows with suboptimal body condition scores are at higher risk for transition diseases (e.g. metritis, subclinical ketosis, retained placenta) and lameness. Weighing dairy cattle is laborious and often not performed on farms as frequently as desired for the best production results. Despite recent research findings advocating a strong potential for using computer vision and image analysis for automated estimation of dairy cows' weight, body condition score (BCS) and conformation, current technologies are still not widely applied in everyday practice. Most methods used for BCS or weight estimation in cattle utilize multi-camera stationary setups or 3D cameras, leading to high preparatory and computational costs. We propose a new, two-step, AI-based framework for easy live weight estimation. The first step includes a Mask R-CNN segmentation network trained on 565 unique cow images collected at distances varying from 1.90 meters to 2.10 meters under different lighting conditions and at different time points. To investigate the practical limitations of the proposed approach, all the photos were taken from either the left or right side in situations where the cow's head was both visible or occluded by barn structures. The distance and angle were measured using two laser range meters aimed at the cow's rear and front ends. A total of 70 cows were included in the training dataset. The final segmentation accuracy of Mask R-CNN was 0.99 when tested on images not used during training or testing of the algorithm. In the second step, a Random Forest (RF) classifier, utilizing six features derived from the segmentation results produced by Mask R-CNN, resulted in an overall F1 score (harmonic mean of precision and recall**)** of 0.89 for exact weight classification. As input for the RF classifier, a set of 453 new images was collected on four different occasions. The idea is to streamline the algorithm further to allow its downscaling and transition into a smartphone application to be used on-farm as an open-source assessment and decision-support tool. In the long term, a more precise estimation of cow weight would increase the opportunities for farmers to have an overall healthier herd while minimizing risks for animal caretakers to be injured during routine procedures.

Automatic behavior assessment of young bulls in pen using machine vision technology

Thursday, 3rd August - 12:45: PLF and Other New Techniques for Measuring Animal Behaviour (Ruminants) (Bolero hall) - Oral

Ms. Agathe Cheype [1], ***Mr. Jerome Manceau*** [2], ***Mr. Vincent Gauthier*** [2], ***Ms. Claire Dugue*** [3], ***Ms. Laure-Anne Merle*** [4], ***Mr. Xavier Boivin*** [5], ***Ms. Claire Mindus*** [1]

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Changes in animal's behavior may be good indicators of health and welfare. However, human observation is time-consuming and labour-intensive. Development of video technology and image processing represents a complementary tool to human observation. This non-invasive method may offer the opportunity for a better prevention by detecting behavioral and welfare issues continuously and automatically at an early stage. We are developing a tool using video recordings and "deep learning" algorithms to analyze routinely the behavior of young bulls reared in a fattening station and a qualifying station. In the present work, performances of this deep-learning algorithm developed to automatically detect the different activities of bulls from images were evaluated. Bulls originating from two different breeds (Limousine, 6 bulls/pen; Charolais, 13 ± 1 bulls/pen) were housed in groups according to the standard management conditions of their respective stations (Pôle de Lanaud, Ferme des Etablières). Two cameras (2 D color) were installed above each pen with different angular views. Video recordings were carried out every third day during daylight hours for the entire fattening and qualifying period in 12 different pens. To construct an image and video database, video sequences were manually annotated by a trained animal behaviour observer using an established ethogram. Nine postures (standing, lying) and behaviors (eating, drinking, moving, autogrooming, fighting, standing up and lying down) were labelled on 1108 images extracted from the videos. Annotations were evenly distributed with an average of 123 sequences per type of posture or activity and a standard deviation of 37.0. Lying down represented 20% of labelled activities in the dataset, "eating" and "fighting" 9%. This annotated set of images was used to train the algorithm, an object detection model that uses convolutional neural networks to detect and classify objects in an image. Preliminary training of the algorithm with 419 standing and 373 lying bull pictures are promising with 88% sensitivity and 79% precision. The complementary results of the algorithm's performance will be presented by valuing the full dataset. This project BeBoP will contribute to the current need for on-farm, operational behavioral welfare indicators that can be easily used to assess not only the individual welfare but also the welfare of the whole group.

Miscellaneous Section (Pigs) 2

An analysis of livestock welfare investigations in extensive farming systems in Victoria

Thursday, 3rd August - 14:00: (Grande Hall) - Oral

Ms. Natarsha Williams [1], ***Dr. Sarah Chaplin*** [2], ***Dr. Lauren Hemsworth*** [1], ***Dr. Richard Shephard*** [3], ***Dr. Andrew Fisher*** [1]

1. *Animal Welfare Science Centre, University of Melbourne,* ***2.*** *Agriculture Victoria, Department of Energy, Environment and Climate Action,* ***3.*** *Herd Health Pty Ltd*

Substantiated incidents of poor welfare affecting non-dairy cattle, sheep and goats in extensive farming systems continue to occur. Through analysis of 39 years of de-identified, electronic, historical animal welfare investigation records from Agriculture Victoria, this study sought to describe the common causes of poor welfare and the circumstances associated with them. There were a total of 2179 cases (individuals or group of individuals that had an incident of poor welfare affecting key livestock on at least one occasion), each described by up to 66 variables. The majority of livestock welfare incidents in this study were associated with neglect, more specifically due to inadequate nutrition (56%), treatment (65%), and management/husbandry (83%). Malicious acts were rare (1%). Twenty-seven percent of cases reoffended and 2% of cases were ongoing, taking more than 6 weeks to show any improvement. The majority of cases were on properties with only cattle (39%) or sheep (38%), followed by mixed livestock farms (21%) and just goats (2%). The cases were divided into 10 welfare categories based on the number of incidents and visits, if the case reoffended or was ongoing and whether the welfare issue was likely to affect the whole mob or herd. Comparing the least severe welfare category (n=412) to the most severe category (n=49), factors that were more commonly associated with severe welfare were identified. Both commercial and noncommercial farms were found to have poor welfare, with the number of livestock present ranging from 10-12500 dry sheep equivalent (DSE), with an average of 546 DSE. The average DSE in the most severe category (2389) was 14 times that in the least severe (165). The farmer did not live at the property where poor welfare occurred in 49% of cases and this did not differ significantly between the least and most severe welfare categories. Ordinal regression was used to identify factors that were predictors of increasing welfare severity. Factors with a regression coefficient (z value) ≤ -12 were considered good predictors of increasing welfare severity in this study. Some of these factors included farms where there was a failure to: draft (z=-17.3), dip/drench (z=-13.1), mark (z=-11%) provide proper and sufficient nutrition (z=-16.8) or when there was unsuitable use of males (z=-11.1) or overstocking (z=-17.2). Through a better understanding, instances of poor welfare may be avoided or reduced through improved extension, education, intervention and potentially the ability to predict such outcomes.

The history of animal welfare and its connection to ethics

Thursday, 3rd August - 14:15: (Grande Hall) - Oral

Dr. Jes Lynning Harfeld [1]

1. *Department of Culture and Learning, Aalborg University*

Animal welfare is a concept and as such it is a framework of thought. When we work with animal welfare we are not only working within traditions of scientific methods but also within such frameworks of conceptual thought. These frameworks – these concepts – are not rarely inventions of our own. They are, like so much other knowledge, inherited. In order to reveal parts of this heritage I will, with a focus on European conceptual history, pursue two objectives in this talk.

First, I will show how thoughts about animals, their inner lives, and their welfare has been an ongoing human process from the most ancient times to our modern day. Beginning with the Rhind Mathematical Papyrus (1550 BCE) and its calculations on how to measure food for geese, contrasting between geese kept in cages and free-range geese, I present a number of historical conceptual epistemologies that have shaped the way that we today talk about animal welfare. One of the key components of this will be the varying connection throughout history between animal welfare (or similar concepts) and ethics. Although, this connection's clear example in the case of the utilitarianist Jeremy Bentham (1748-1832) is well known among animal welfare scientists, it is less known that such a clear-cut linkage was not an established norm in ancient, medieval, and early modern thinking.

Second, I will show how the modern scientific concept of animal welfare was born out of a clear connection to animal ethics in the beginning of the 20th Century. I will here use the example of the founding of The University of London Animal Welfare Society (ULAWS and today known as Universities Federation for Animal Welfare, UFAW) in the 1920s. This part of the talk will draw on archival material from the UFAW archives as well as early writings by the founder of ULAWS/UFAW, Charles Westley Hume as well as other key figures in the early days of this movement.

One welfare? Animal welfare views regarding conservation translocations

Thursday, 3rd August - 14:30: (Grande Hall) - Oral

Ms. Karmel Ritson [1], ***Dr. María Díez-León*** [2], ***Dr. Lauren Harrington*** [3], ***Dr. John Ewen*** [4], ***Dr. Axel Moehrenschlager*** [5], ***Dr. Tiit Maran*** [6], ***Ms. Natasha Lloyd*** [7]

1. *Estonian University of Life Sciences,* ***2.*** *Royal Veterinary College,* ***3.*** *Wildlife Conservation Research Unit,* ***4.*** *Institute of Zoology,* ***5.*** *IUCN SSC Conservation Translocation Specialist Group,* ***6.*** *Conservation Research Centre, Tallinn Zoo, Estonia,* ***7.*** *Calgary Zoo*

Conservation translocations, where wild and/or captive-bred individuals are moved to re-establish or reinforce wild populations, can raise welfare concerns due to potential negative impacts on both the translocated individuals (e.g. captivity and transport stress, mortality rates upon reintroduction) and individuals in the receiving populations (e.g. increased predation risk). While the IUCN guidelines for conservation translocations explicitly include animal welfare as a factor that needs considering within these programmes, few reintroduction projects report on how or to what extent they considered animal welfare in the planning stages or in practice. Further, although animals in a positive welfare state clearly benefit the population, conflicts between individual and population-level considerations are genuine, and trade-offs between individual welfare and population conservation goals are not straight-forward and need to be taken into account by managers of these programmes. A potential barrier to effective implementation of animal welfare in decision making might be the diversity of views within the conservation community as to what animal welfare means. Therefore, we surveyed conservation practitioners - as well as welfare researchers and ethicists for comparison purposes - to investigate their views on animal welfare and their perceptions on what hinders consideration of welfare in decision making within these programmes. The on-line survey was created on SurveyMonkey and distributed through relevant networks (e.g. Wild Animal Initiative, Wildlife Health Bridge Newsletter) between November 2022 and February 2023. We collected a total of 129 responses, most (>60%) from within the conservation community. Preliminary results show that all sectors believe that current translocations consider welfare sometimes or very often in decision making stages with no statistically significant differences among sectors ($\chi 2$ (4, n=91)=3.7, p=0.45), but conservation practitioners are more uncertain than the non-conservation community on whether the current focus on welfare is sufficient, with the non-conservation respondents disagreeing and conservation practitioners neither agreeing nor disagreeing on this point ($\chi 2$ (4, n=91)=9,14, p=0.05). In terms of welfare views held on what animal welfare means, we did not detect any statistically significant differences among sectors, with conservation practitioners being equally likely to make reference to affective states as the non-conservation respondents ($\chi 2$ (5, n= 59) = 4.86, p =0.302). On-going analyses will identify common welfare metrics currently used, as well as perceived needs to effectively consider and measure welfare in conservation translocations. These results indicate that although there are different ways of understanding animal welfare, there is common ground to be found among different sectors.

The effects of a molasses block enrichment on behavior and welfare of sows post-mixing

Thursday, 3rd August - 14:45: (Grande Hall) - Oral

Dr. Jeremy Marchant [1], ***Dr. Charles Rikard-Bell*** [2], ***Dr. Ellen Jongman*** [3]

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Environmental enrichment is not routinely used in many intensive pig industries in the world. Producers using fully-slatted systems are hesitant to introduce 'optimal' enrichments (straw, hay, silage) due to manure system and biosecurity concerns. There remains a need to develop enrichments for pigs that are biologically relevant, safe for use in existing systems, biosecure, sustainable and cost effective. The study aim was to determine the effects of a suspended molasses block (B - Ridley Enrich SowBlock™) or a metal chain (C), on the behavior and welfare of sows over 2 weeks post-mixing. Three replicates of 36 LW × Yorkshire sows, balanced by parity, were mixed in groups of 4, 6 or 8, with one of each group size per treatment, at d42 post service. Groups were formed with equal numbers of sows from 2 group pens, i.e. a group of 4 was formed using 2 sows from one pen, mixed with 2 sows from a second pen, and so on. Sow behavior and animal-based welfare measures were recorded 3 days before mixing, and d1, 6 and 13 post-mixing. Welfare measures included tear stains, lesion scores, bursitis, shoulder sores, respiratory and cleanliness scores. Behavior included passive and active human-approach tests. Data were analyzed using 2-way ANOVA with treatment and group size as factors. There were no treatment differences in bursitis, shoulder sores and respiratory scores, and no differences in time to approach and touch the human. However, B sows had smaller tear stains (d6 and d13, $p<0.001$), lower body lesion scores (d1 and d6, $p<0.05$), and better body cleanliness scores (d1, $p<0.05$). Human approach test measures showed habituation over time, but B sows responded less to a human approaching and touching their head than C sows (d6, $p<0.05$). Groups of 6 had lowest tear stain scores (d1, d6 and d13, $p<0.05$) and were cleanest (d13, $p<0.05$). There was also a Group size*treatment interaction with groups of 6 having the lowest lesion scores in the C treatment, but the highest in the B treatment (G*T interaction - d1, d6, and d13, $p<0.05$). The skin lesions scores may indicate that aggression was lower in the pens with the blocks. Overall, the nutritional and physical enrichment provided by the blocks appeared to confer welfare benefits over the immediate 2-week post-mixing period compared to the physical only enrichment of the chains, though group size may impact this. The group size effects need further research.

Effects of sow grouping practices on piglet development and behaviour in relation to prenatal stress

Thursday, 3rd August - 15:00: (Grande Hall) - Oral

Dr. Karen F. Mancera [1], ***Ms. Jessica Vehof*** [1], ***Dr. Yolande Seddon*** [1], ***Dr. Nicolas Devillers*** [2], ***Dr. Jennifer Brown*** [3]

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The North American swine industry is transitioning to group gestation. Grouping practices include Static and Dynamic groups. Dynamic grouping can accommodate larger groups; however, a higher prevalence of sow aggression and prenatal stress for the offspring is possible. We compared the effects of Dynamic (multiple mixing events, mixing 8 animals/month) vs Static (one mixing event after insemination) grouping and social status on piglets' developmental measures, cortisol levels and behaviour after tail docking. Sows were categorized as Dominant (Dom), Intermediate (Int) or Subordinate (Sub) using two feed competition tests performed 3 days after mixing and in mid-gestation. From each grouping treatment, 12 Dom, 12 Sub and 12 Int were selected. At birth, 6 piglets/litter were chosen. The crown-rump length (CRL), anogenital distance (AGD) and birth weight (BW) were recorded as measures of body development. Ponderal index (PI = BW/CRL2) and body mass index (BMI = BW/CRL3) were calculated. Despite animal welfare recommendations, tail docking is still widely practised in farms in North America; thus, this procedure was chosen to test the effect of prenatal stress on the acute pain responses in piglets. After tail docking (day 2) behaviour was observed for 10 minutes, and blood was collected from the preorbital sinus for serum cortisol after observations. Weaning weight (WW) was recorded 24 h before and 48 h after weaning. Statistical analyses were performed using IBM SPSS v20. Mixed Linear Models evaluated the effects of factors grouping style and sow social status, including sow parity, piglet weight category and sex. The subject 'piglets' was nested within 'sow' to account for litter and sow effects, such as sow weight. Interactions between factors were also evaluated. Behaviour after tail docking was analyzed using Kruskal Wallis or Mann-Whitney tests. Preliminary results indicate that following tail docking piglets from Dynamic sows were observed sitting and lying more than those from Static ($p<0.0001$), whereas piglets from Static sows performed more vocalizations ($p=0.01$) and freezing behaviour ($p=0.002$). Regardless of grouping style, piglets from Dom sows had higher cortisol levels ($p=0.035$) following tail docking. Dom sows had greater PI ($p=0.027$), BMI ($p=0.032$) and a larger female AGD ($p=0.006$), regardless of grouping style. Piglets from Dom sows had higher weaning weights ($p=0.006$) only in Static treatments. Results indicate that sow grouping style may influence the behavioural responses to acute pain in the offspring. Rather than grouping style, sow social status had a greater impact on piglet development and cortisol levels.

Effects of Sow Grouping Practices on Mixing Aggression and Productivity

Thursday, 3rd August - 15:15: (Grande Hall) - Oral

Dr. Jennifer Brown [1], ***Ms. Jessica Vehof*** [2], ***Dr. Karen F. Mancera*** [3], ***Dr. Nicolas Devillers*** [4], ***Dr. Yolande Seddon*** [2]

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Gestating sows can be managed in either static groups (one mixing event) or dynamic groups (multiple mixing events), with group formation occurring soon after insemination (early mixing) or after embryo implantation is complete (late mixing). Many producers are implementing dynamic groups with early mixing using precision feeding systems. However, there is increased potential for chronic stress due to repeated mixing and the consequences for reproduction are poorly understood. This study compared the effects of three grouping treatments: Control: sows housed in stalls for four weeks after insemination, then moved to static groups; Static: sows mixed in static groups 1-8 days after insemination; and Dynamic: sows mixed in dynamic groups 1-8 days after insemination with monthly mixing (8-10 sows removed and replaced). Gilts and mixed parity sows were housed in groups of 25 per pen in three replicates (total: 225 sows). Front, middle and hind lesions were scored before and 24 h after mixing, using a scale of 0-3 (0: no injures; 3: > 10 injuries). Behaviour was video recorded with presence of reciprocal aggression observed for 30 min following mixing using one minute scan sampling. Performance parameters included litter characteristics and farrowing rate. Statistical analysis was performed in SAS 9.4 using GLM and Chi-squared analysis including parity and social status effects with sow as the experimental unit. At mixing, sows in the Control treatment received more lesions in the hind region and in total than did Static or Dynamic sows, with total lesion scores for Control: 11.20 ±0.39; Dynamic: 9.22 ±0.35; and Static: 9.13 ±0.35 (LSMeans ±SEM, $p<0.001$). Static sows participated in more reciprocal aggression at mixing (percent of observations where fighting was observed: Control: 11.7%; Static: 36.7%; Dynamic: 10.4%, Chi sq $p<0.001$). Litter performance was similar across treatments but the farrowing rate of Static sows was significantly reduced (Control: 81.1%; Dynamic: 88.5%; Static: 62.2%, Chi sq $p<0.001$).

In conclusion, Control sows received more lesions at mixing, particularly in the hind region, suggesting that Control sows were injured more frequently while avoiding their aggressor. Static sows engaged in more aggression immediately after mixing which may be related to their reduced farrowing rate. Mixing aggression in Dynamic groups appeared to be moderated due to smaller sub-groups of sows being introduced at each mixing event. Future studies should explore dynamic mixing in larger group sizes, looking at the timing of mixing events and ratio of sows added.

PLF and other new techniques for measuring animal behaviour

The relationship between reticulorumen pH and feeding behaviour of finishing steers fed a high-concentrate ration

Thursday, 3rd August - 14:00: PLF and Other New Techniques for Measuring Animal Behaviour (Bolero hall) - Oral

Ms. Rachael Coon [1], ***Dr. Cassandra Tucker*** [1]

1. *Center for Animal Welfare, Department of Animal Science, University of California, Davis*

Persistent low rumen pH (<5.8) is the most reliable indicator of Sub-Acute Ruminal Acidosis (SARA), a disorder in cattle caused by rapid consumption of a high-concentrate diet. Animals may ruminate less and select for dietary options like forages to slow acid accumulation when available, but there are no other signs of SARA that can be detected easily. The objective was to evaluate whether feeding behaviour is correlated to daily time spent below reticulorumen pH 5.8. We predicted that the severity of daily fluctuation in pH below 5.8 would be negatively correlated to daily intake, the number of visits to the feed bin, and time spent eating, as decreases in these are indicative of sickness behaviour. We note that these aspects of feeding behaviour are moderately, positively correlated to each other (r≥0.3), thus do not represent 3 independent tests of our hypothesis, but rather, together create an overall picture of how animals interacted with feed. Twenty-six steers were fed a high-concentrate finishing ration ad-libitum, with delivery twice daily into automated feed bins that measured feeding behaviour. Wireless boluses were administered that measured reticulorumen pH in 10-min intervals. Each animal was monitored continuously for 10.9±3.3 d (mean±SD). The mean daily pH was 6.1±0.3, the mean daily maximum pH was 6.7±0.2, the mean daily minimum pH was 5.4±0.3, and the range of all pH values was 4.6-7.2. The area-under-the-curve (AUC) for pH below 5.8 for each 24-h day was calculated for each animal (AUC: 94.0±138.8 units/d, range: 0.0-752.2 units/d). Repeated-measures correlation analyses were used to investigate the relationship between AUC and each of the behavioural variables. There was no evidence of a correlation between dry matter intake (9.7±0.1 kg/d; mean±SE; range: 3.2-14.4 kg/d) and AUC (r=0.02; *P*=0.7). The number of visits (26.8±0.7 no./d, range: 3-81 no./d) to the feed bins was not correlated to AUC (r=0.07; *P*=0.2). Finally, there was a tendency for a weak positive correlation between the daily time spent eating (72.7±1.1 min/d, range: 17.1-131.2 min/d) and AUC (r=0.12; *P*=0.06). Based on these results, the feeding behaviours measured alone were not adequate to describe the severity of reticulorumen pH depression in finishing cattle. Having previously been fed the finishing ration for a minimum of 30 d, it is possible that these animals were acclimated to a low concentrate diet and thus, did not alter these aspects of their feeding behaviour in response to low pH.

An ecologically meaningful multi-choice system to assess animal wanting

Thursday, 3rd August - 14:15: PLF and Other New Techniques for Measuring Animal Behaviour (Bolero hall) - Oral

Dr. Lorenz Gygax [1], ***Mrs. Fiona Garbisch*** [1], ***Mrs. Louisa-Mae Kosin*** [1]

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Providing animals with what they want is viewed as an important component for welfare. Many studies on animal preferences have been restricted however in that only two choice options were presented in an artificial test environment. Here, an extended system, the “Small World” is presented, in which the choices of animals between eight ecologically relevant resources can be observed in a long-term test. In this sense, the system offers a semi-natural environment. The aim of the system is allowing to draw conclusions in respect to everyday moment-to-moment decisions of the animals reflecting their wants.

The system was tested in two pilot studies with four groups at three individuals of rats and chickens each. Based on videos of days 1, 3, and 6, the exact time of each entry and exit to the resources was recorded on the level of the individual. We qualitatively evaluated the weight development of the animals, the soiling of the different cages, and the frequency of the changes between resources. Based on generalized mixed-effects models, we quantitatively assessed the general activity of the animals, the daily number and duration of visits to each resource, the sequence of visits to the different resources, the duration between visits to the resources (corresponding to the decision-making process), and the synchrony within the groups.

The animals habituated to the system quickly and it was possible to collect multifaceted data on the use of the different resources. For example, we found, that the number of visits to the resources decreased on average over the days in rats ($p = 0.05$; estimate [CI], day 1: 5.53 [4.24, 7.23], day 6: 3.97 [2.97, 5.19]). The resources running wheel, feed, and novel object were visited most often, whereas the resources offering a predator stimulus or an empty control were visited rarely (but consistently over time; $p = 0.001$). The hens did not show a consistent pattern in their number of visits across days ($p = 0.78$; day 1: 3.74 [2.30, 6.25], day 6: 3.62 [2.16, 6.14]). They visited the resources feed, water, and natural ground most often, but only rarely visited other resources provided ($p = 0.001$).

All in all, the use of the system seems to be highly promising. To reflect the subjective value of the different uses of the resources from the point of view of the animals even more directly, the distances between the resources shall be manipulated in future forming a semi-virtual landscape.

The effect of non-steroidal anti-inflammatory drug on the distance travelled by reindeer in the wilderness after castration

Thursday, 3rd August - 14:30: PLF and Other New Techniques for Measuring Animal Behaviour (Bolero hall) - Oral

Mrs. Hanna Nurmi [1], ***Dr. Sauli Laaksonen*** [2], ***Prof. Anna Valros*** [1], ***Dr. Laura Hanninen*** [1]

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Free-grazing reindeer herds are gathered from the Finnish wilderness into seasonal round-up enclosures. During round-ups old males, no longer wanted for breeding, are clamp castrated, mostly without pain relief, and then released back to the wild. In lambs non-treated castration pain has been shown to increase restlessness and locomotor activity. We have recently shown that a single dose of the non-steroidal anti-inflammatory drug meloxicam has the potential to maintain therapeutic plasma concentrations determined in other species for 2-3 days in reindeer. However, no studies have been conducted on the effect of meloxicam on the behavior of castrated reindeer in the wild after the procedure. We installed GPS collars on 16 male reindeer (5-6 years old, weight approx. 130-160 kg), which the reindeer owners chose to be castrated as a standard procedure in the round-up in October. Of these, 8 were randomly selected to receive approximately 0.5 mg/kg of meloxicam subcutaneously (NSAID) and the remaining 8 served as a traditional non-medicated control (TRAD). We calculated from the GPS data the daily distances the reindeer travelled during the three days after castration and analyzed the differences between the treatments using a GEE model. Fixed factors were treatment (NSAID or TRAD), days (1-3) and the interaction between these. Overall, the mean ± sem daily distances of NSAID and TRAD reindeer did not differ (6.60 ± 0.67 km vs. 8.60 ± 1.54 km, $p > 0.1$). We found a significant interaction between treatment and day ($p=0.01$): TRAD travelled longer distances than NSAID during the first and second days after castration (11.67 ± 2.25 km vs. 7.08 ± 0.61 km and 10.19 ± 3.87 km vs. 6.59 ± 0.85 km, $p<0.05$ for both, respectively), with no difference on the 3rd day (5.35 ± 0.39 km vs. 6.17 ± 0.70 m, respectively). Our results may indicate that meloxicam may reduce restlessness in castrated reindeer in the wild for two days after castration. Although, we did not unfortunately have a non-castrated control group, the distance our meloxicam treated reindeer travelled correlate with reports on reindeer GPS follow-ups on regular daily distances during late autumn. Further studies are needed for the use of GPS collars for pain monitoring in freely moving reindeer.

Piling characteristics of individual laying hens in small experimental flocks.

Thursday, 3rd August - 14:45: PLF and Other New Techniques for Measuring Animal Behaviour (Bolero hall) - Oral

Dr. Ariane Stratmann [1], ***Ms. Maxine Rice*** [2], ***Dr. Michael J. Toscano*** [3]

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Piling behaviour (PB) is a common yet not well-understood behaviour that has been reported to occur in non-cage commercial laying hen flocks. During piling, birds press together tightly for an extended period, which may lead to smothering, a problem regarding welfare and production. To understand PB characteristics on the individual hen-level, we conducted a study in an experimental barn equipped with eight pens, where each held between 67 - 73 laying hens (569 birds in total) of a commercial white hybrid between 17 and 33 weeks of age (woa). Pens were equipped with nest boxes, perches, drinkers and feeders in the pen center. On both sides of each pen, six antennas of a radio frequency identification system (RFID) were placed to cover the pen floor between the two corners. Each bird was equipped with a RFID transponder that registered whenever it stepped onto an antenna. Recording cameras were positioned in a manner that allowed a full view of the areas where RFID antennae were placed to confirm piles (defined as three or more hens pressed together for a minimum of one minute) on one day each at 20 and 27 woa. Based on the pile time and location detected by video, the associated RFID data were used to extract information on the individual hens involved per pile. For each hen, piling frequency, the average latency to join a pile, and the average arrival order per pile (i.e., order of a hen joining a pile) were extracted. Data were analysed descriptively and using Pearson correlation coefficients. More piles occurred at 27 compared to 20 woa (woa 20: Ø 5.6 piles per pen [min. 2, max. 10] vs. woa 27: Ø 14.5 piles per pen [min. 12, max. 18]). Piles lasted on average 5.4 ± 2.8 min and 4.1 ± 2.5 min in woa 20 and 27, respectively. On average 10.3 ± 3.9 and 10.8 ± 5.6 hens were involved per pile in woa 20 and 27, respectively. Across the two days, 28 out of 569 birds (4.9 %) never engaged in piling and each hen piled on average 7.25 times, with one hen engaging in a maximum of 19 piles. Average latency to join a pile correlated with pile frequency ($r = -0.216$, $p < 0.001$) as well as average arrival order in the pile ($r = 0.125$, $p = 0.0036$). Further analysis will provide insight into hen-individual differences in PB.

The individual assessment of responses of laying hens to a human stimulus and a novel object in relation to piling behaviour

Thursday, 3rd August - 15:00: PLF and Other New Techniques for Measuring Animal Behaviour (Bolero hall) - Oral

Ms. Maxine Rice [1], ***Dr. Peta Taylor*** [1], ***Prof. Paul Hemsworth*** [2], ***Dr. Ariane Stratmann*** [3], ***Dr. Michael J. Toscano*** [4]

1. *Animal Welfare Science Centre, Faculty of Science, University of Melbourne, Australia,* ***2.*** *Animal Welfare Science Centre, The University of Melbourne, Parkville, VIC 3010, Australia,* ***3.*** *Center for proper housing: poultry and rabbits (ZTHZ), Division of Animal Welfare, VPH Institute, University of Bern, Switzerland,* ***4.*** *ZTHZ, Division of Animal Welfare, University of Bern*

Piling in laying hens is a relatively common behaviour whereby hens press together in a tight group which can lead to mortality from smothering. Previous research has demonstrated relationships between smothering risk and curiosity or fearfulness of novel and human stimuli at a flock level. Piling occurs more frequently than smothering, and in a smothering event not all hens in the pile are smothered. This raises the question of smothering risk on an individual level. This study investigated individual behavioural responses of laying hens to different stimuli and explored relationships between those responses and the individual's piling behaviour. Eight flocks of 67-73 hens (n = 569 hens) of a commercial white hybrid were housed from 17 weeks of age (WOA) under experimental conditions in furnished pens with nest boxes, perches and dustbathing substrate. Individual hens were tagged with radio frequency identification (RFID) tags that registered with antennas on the floor where piling was most likely to occur (in corners) to record the identity of the hens in those areas. Video observations were used to detect the start and finish times of piles (defined as 3 or more hens pressed together for a minimum of 1 minute) occurring on the antennae on one day each at 20 and 27 WOA, respectively (161 piles). Two behavioural tests conducted in the same area as the RFID antennae from 26 WOA investigated the response to an unfamiliar human walking through the pen (stopping for 30 s in each corner) and a novel object (NO), one tall and one short blue coloured bucket. The RFID data were used to calculate the number of piles each hen was involved in, this information was compared with the RFID output from the behavioural tests. Data were analysed using Pearson correlation coefficients. Hens more frequently detected in or close to a piling incident were more frequently detected near the human ($r = 0.282$, $p<0.001$) and were quicker to approach the tall ($r=-0.264$, $p<0.001$) and the short NO ($r = -0.247$, $p<0.001$). A weak negative relationship was found between the order of the hen's arrival at the pile and the latency to approach the human ($r=-0.139$, $p=0.034$). Piling and smothering are likely to be multi-factorial aberrant behaviours and while further research is required, these results suggest that curiosity and fear may be implicated in piling, thus behavioural tests may be useful in the identification of individual hens at risk of smothering.

Walking well or waddling: automated assessment of broiler leg health

Thursday, 3rd August - 15:15: PLF and Other New Techniques for Measuring Animal Behaviour (Bolero hall) - Oral

Dr. Malou van der Sluis [1], ***Dr. István Fodor*** [1], ***Dr. Britt de Klerk*** [2], ***Dr. Marc Jacobs*** [3], ***Dr. Esther Ellen*** [1]

1. *Animal Breeding and Genomics, Wageningen University & Research,* ***2.*** *Cobb Europe, Boxmeer,* ***3.*** *FR Analytics B.V., Wierden*

Leg health is an important trait in broiler breeding programs, but is difficult and time consuming to record. Therefore, there would be great added value to an automated approach for scoring leg health. Here, it was investigated whether computer-vision derived pose features are linked to manually-determined broiler gait scores (**GS**) as the gold standard. Broilers were filmed from behind while walking through a corridor at 33 days old and the resulting videos were used for pose estimation of seven features that describe angles and distances between different anatomical parts of the legs. The computer-vision derived pose features were obtained using DeepLabCut software and subsequent analysis in R. In total, data were available for 83 male birds from the same commercial cross, housed in an experimental setting. The birds were grouped into two classes based on their manually determined GS, with GS0-2 classified as 'good gait' and GS3-5 as 'suboptimal gait'. This resulted in 64% of the birds being classified as having a good gait and 36% as having a suboptimal gait. The different pose features were compared between these two groups, and, as a relationship between gait and body weight has been observed earlier, individual body weight was accounted for. We observed that on average, at 33 days old, birds with a suboptimal gait were 85.3 g (95% CI: 8.1-162.5 g , P=0.030) heavier than birds with a good gait. In terms of walking characteristics, we observed that, compared to birds with a good gait, birds with a suboptimal gait showed sharper hock joint angles (-1.9%, 95% CI: -3.4 – -0.5%, P=0.009), smaller hock-feet distance ratios (-3.6%, 95% CI: -6.6 – -0.6%, P=0.021) and lower maximum relative step heights (-14.0%, 95% CI: -21.8 – -6.3%, P<0.001). This shows that the walking characteristics of broilers with a good versus a suboptimal gait differ, and indicates potential for automation of gait scoring. To further examine how these leg health problems develop over the production period and how this is linked to body weight gain and locomotor activity levels, additional data will be collected on broiler activity, body weight and leg health simultaneously. This will allow examination of whether and when 1) early indicators of leg health problems can be observed and 2) potential interventions can be effective in reducing leg health problems. Overall, this can contribute to improved broiler health and welfare.

Behaviours as indicators of positive welfare (Livestock)

Effects of enriched environment on behaviour, growth and health of goat kids before weaning

Thursday, 3rd August - 16:15: Behaviours as Indicators of Positive Welfare (Livestock) (Grande Hall) - Oral

Ms. Marianne Berthelot [1], ***Ms. Ariane Andrade*** [1], ***Ms. Manon Delalande*** [2], ***Dr. Raphaëlle Botreau*** [3], ***Dr. Veronique Deiss*** [3], ***Dr. Marie-Madeleine Mialon*** [3], ***Mr. Christian Baudry*** [1], ***Dr. Carine Paraud*** [1]

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Goat kid-rearing environment in farming system tend to be barren. Safety concerns may be expressed by farmers concerning the addition of enrichments, especially concerning hanging objects in the pens. However, providing adapted enrichments seem important to allow kids to promote their natural behaviors and behavioral flexibility. The first aim of this study was to assess the effect of an enriched environment on goat kids' behavior, growth and health. The second was to determine which enrichment were the most used, how, and if this evolved over time. The experiment took place in a commercial farm. Forty kids artificially reared were divided in 2 groups and followed from 1 week to 8 weeks of age. One group had only access to a plastic can, whereas the other group had access to a plastic can, a platform, a seesaw, a chewing disk, a brush and a plastic ball. Once a week, kids were weighted, inspected for sanitary issues and injuries. Behavioral observations were also realized once a week, during two periods (morning and afternoon) of 3 hours through instantaneous scans at 5-min intervals for posture and activity by two observers. During the same period a third observer performed all occurrences observation to count play behaviors, agonistic-like interaction and fight. These periods were also filmed to analyze the use of enrichment, using instantaneous scans at 2-min intervals. Two-way mixed Anova as well as non-parametric test were used to analyze the data. The treatment had no effect on the average daily gain of kids between week 1 and 8. No injuries due to the enrichments were observed. Over the trial, kids in the enriched environment spent more time exploring and showed a higher occurrence of plays behavior (p-value <0.001). All enrichments were used. Over the experimentation, the most used object was the platform (46.2% of the scans in mean; p<0.001) due to the possibility to climb above and rest under and above at several. The second most used object was the seesaw (4.69%), then the plastic can (2.67%), in fourth position the brush (2.24%) and the chewing disk (1.45%) and finally the plastic ball (0.67%). This work showed that enrichments are a way to improve kids' rearing condition. Some precautions have to be taken. The seesaw had to be repaired during the essay. Solid, secured and adapted enrichments have to be imagined in order to last over time and resist to the use.

Genetic and environmental influences on the assessment of positive experiences in laying hens

Thursday, 3rd August - 16:30: Behaviours as Indicators of Positive Welfare (Livestock) (Grande Hall) - Oral

Dr. Manja Zupan Šemrov [1]

1. *University of Ljubljana, Biotechnical Faculty, Department of Animal Science*

Allowing chickens to explore novel stimuli may promote curiosity and have positive effects on physiological and psychological well-being, as well as cognitive abilities such as learning performance and working memory. In this study, we investigated the relationship between cognitive performance, genotype, and housing systems in laying hens. We are unique in that we have used tests that include aspects to promote positive experiences, such as colour discrimination, walking on perches, and pecking. The speed (how quickly the task is successfully completed; in sek) and success (whether or not a hen completes the task) of associative learning were studied in two tests assessing positive experiences in laying hens at 7.5 months of age. Hens (n=90) were raised either in enriched cages (n=60) or on the floor (n=30) and belonged to three breeds (Slovenian bar hen: Ba; brown hen: Br; silver hen, S; n=30 hens/breed). They were subjected (10 floor and 20 cage hens per breed) to a target following test (TF) and a colour discrimination test (CD). A clicker was used as a predictor signal, and successive approaches to the desired behaviour were rewarded with food. The tests took place in the test room of the facility where both housing systems were located. At TF, the desired behaviour was to follow a target, a purple ball on a stick, from one perch to another over a distance of 5 cm and peck it at the end of the perch. At CD, the hen completed the task by confirming the correct choice of colour magnet (discrimination between yellow, red, and blue colours) by pecking only a yellow magnet. The main results of the hens associating the signal with food were that the Ba hens learned the fastest (Ba=308.61±20.86; Br=375.91±23.96, S=437.02±23.61; F-value=8.48; P=0.005) and showed the highest success rate at CD (Ba=28, Br and S=23; F-value=3.22; P=0.04). Floor hens took less time (485.08±78.68) to complete the TF than the caged hens (651.36±42.5; F-value=4.76; P=0.03). These results suggest that Ba hens and floor hens had better positive experiences. Speed and success of associative learning could be considered as potential animal-based indicators of positive experience for hens.

Use of qualitative behavioural assessment to investigate affective states of housed dairy cows under different environmental conditions.

Thursday, 3rd August - 16:45: Behaviours as Indicators of Positive Welfare (Livestock) (Grande Hall) - Oral

Ms. Alison Russell [1], ***Prof. Laura Randall*** [1], ***Prof. Jasmeet Kaler*** [1], ***Mrs. Nikki Eyre*** [1], ***Prof. Martin Green*** [2]

1. *The University of Nottingham,* ***2.*** *University of Nottingham*

There is now a need to provide farmed animals with positive opportunities to provide confidence that they have experienced a life worth living. Environmental enrichment strategies are one suggested avenue for providing animals with opportunities for positive experiences. Enrichment has been widely implemented in other animal production industries, however, its uptake on dairy farms is limited. One specific welfare benefit of enrichment strategies which has been observed in other species, is increased affective wellbeing. This study investigated whether the provision of different forms of environmental enrichment would impact the affective states of housed dairy cows measured by Qualitative Behavioural Assessment (QBA).

Two groups of 48 adult dairy cows of mixed age and stage of lactation were recruited. Cows experienced three treatment periods; i) access to an indoor novel object for two weeks, ii) access to an outdoor concrete yard for two weeks and iii) simultaneous access to both resources for 9 weeks. Three qualitative behavioural assessments were completed per week, per group during a baseline period when cows were housed in standard conditions and during all treatment periods. The QBA assessment protocol used was taken from the Welfare Quality Network Assessment Protocols for dairy cows and was conducted by one trained assessor. The 20 terms used for every QBA were: active, relaxed, fearful, agitated, calm, content, indifferent, frustrated, friendly, bored, playful, positively occupied, lively, inquisitive, irritable, uneasy, sociable, apathetic, happy, distressed. Enrichment use was quantified using continuous sampling of five 24-hour video recordings. Principal component analysis was used to analyse qualitative behavioural assessment scores.

QBA results yielded two principal components. The first was most positively associated with the terms 'content/relaxed/positively occupied' and had the most negative associations with the terms 'fearful/bored'. A second principal component was most positively associated with the terms 'lively/inquisitive/playful' and was most negatively associated with the terms 'apathetic/bored'. Treatment period had a significant effect on both principal components, with cows being assessed as more content, relaxed and positively occupied and less fearful and bored, during periods of access to either both additional environmental resources ($P<0.01$) or just the outdoor yard ($P=0.03$). Similarly, cows were scored as livelier, more inquisitive and less bored and apathetic, during all treatment periods, when cows had access to additional environmental resources compared to standard housing conditions ($P<0.01$).

Concurrent with research in other species, these results suggest that the provision of additional environmental resources facilitates enhanced affective states for housed dairy cows.

Laboratory Animal Behaviour/Fish Behavior

Effect of simulated road transport on the behaviour and welfare of largemouth bass (Micropterus salmoides)

Thursday, 3rd August - 16:15: Laboratory Animal Behaviour/Fish Behavior (Bolero hall) - Oral

Ms. Yifei Yang [1], ***Dr. Edward Narayan*** [2], ***Prof. Clive Phillips*** [3], ***Dr. Sonia Rey Planellas*** [4], ***Ms. Lu Zheng*** [5], ***Ms. Xiaofang Ruan*** [6], ***Dr. Fabrice Arnaud Tegomo*** [7], ***Prof. Qingjun Shao*** [7], ***Dr. Kris Descovich*** [1]

1. *School of Veterinary Science, The University of Queensland, Gatton, QLD 4343, Australia,* ***2.*** *School of Agriculture and Food Sciences, The University of Queensland, Gatton, QLD 4343, Australia,* ***3.*** *Institute of Veterinary Medicine and Animal Sciences, Estonian University of Life Sciences, Kreutzwaldi 1, 51014 Tartu, Estonia,* ***4.*** *Faculty of Natural Sciences, Institute of Aquaculture, University of Stirling, Stirling FK9 4LA, UK,* ***5.*** *College of Animal Sciences, Zhejiang University, Hangzhou, China,* ***6.*** *Hangzhou Changqiao Polar Ocean Park, Hangzhou, China,* ***7.*** *Ocean Academy, Zhejiang University, Zhoushan, China*

Farmed fish are commonly transported by vehicle, resulting in exposure to uncontrolled and oscillatory movements. Motion sickness is a common and unpleasant experience for farm livestock during transport, but the impact of motion has been rarely studied with fish. This study aimed to investigate the effect of different intensities of motion related to road quality on the behaviour and physiology of largemouth bass (*Micropterus salmoides*). Three motion intensities were examined in this study using a non-transported control, a 'rough' transported treatment, and a 'smooth' transported treatment (8 groups of 18 fish per treatment). Farmed fish were captured using dipnets from open, large aquaculture ponds and acclimated for two days in 600L tanks. Live 'transport' was performed on-farm for 3h using a motion simulation platform with a movement frequency of 1.0 and 1.8 Hz for the smooth and rough treatments, respectively. Behaviour and physiology sampling was carried out before transport (baseline), as well as 0h and 24h post-transport (PT0 and PT24) and data analysis used a Friedman's test or two-way repeated measures ANOVAs with Bonferroni adjustments. In the control groups, biting (P = 0.025), chasing (P = 0.010) and threating (P = 0.003) increased over time while erratic swimming (P = 0.007) decreased. Smooth transported fish showed more freezing behaviour than the control fish at PT24 (P = 0.021), but no difference was found between the two transported treatments at this timepoint. Mean biting rates were higher in the control (93.0 ± 28.6 events/h) and rough transported groups (91.1 ± 19.8 events/h) at PT24 compared with PT0. Mean threat rates increased by more than three times in smooth and rough transported fish between PT0 and PT24, while no difference was observed among the three treatments at PT24. No differences were found in plasma cortisol, glucose and lactate between treatments in this study. Water ammonia nitrogen increased in all treatments over time. Our study did not find rough transport to impact welfare more than smooth transport, but results suggested an effect of confinement with transport over time. Additionally, increased levels of freezing behaviour and aggression in the transported groups during the recovery period indicated that adult bass are unlikely to recover from transport stress within 24h. Future research is encouraged to study the effects of unpredictable motions and longer recovery times on fish welfare, particularly for species that require multiple transport events.

The effects of environmental enrichment on behaviour and welfare of juvenile Atlantic Salmon (Salmo salar) housed for Aquaculture research

Thursday, 3rd August - 16:30: Laboratory Animal Behaviour/Fish Behavior (Bolero hall) - Oral

Dr. Pamela Prentice [1], ***Dr. Sonia Rey Planellas*** [1]

1. *Faculty of Natural Science, Institute of Aquaculture, University of Stirling, Stirling FK9 4LA, UK*

Aquaculture is a rapidly expanding industry that relies on farming fish species. As fish are housed in artificial environments, there is an increasing need to address potential negative effects on behaviour and welfare. Fish used for research experience similar welfare concerns to commercial species. Optimising welfare in aquaculture species used for research is fundamental for ensuring scientific quality, relevance, reproducibility and for producing robust, resilient fish. It also addresses ethical considerations concerning live animal use in scientific research. One approach to improve welfare of fish used for research is offering environmental enrichment (EE) which can increase cognitive stimulation in response to increased environmental complexity, promoting natural behaviours and improving positive emotional states. EE may also reduce vulnerability to chronic stress, and negative welfare states such as disease susceptibility and mortality.

Here we focus on effects of structural enrichment on behaviour and welfare in juvenile Atlantic salmon (*Salmo* salar), through the addition of artificial plants to four of eight Recirculating Aquaculture System (RAS) tanks (n=375 fish per tank). Parameters were compared over 12 weeks between fish housed in EE vs non-enriched (NE) barren tanks. Behavioural observations of enrichment occupation, movement patterns and tank activity were recorded. Enrichment can increase behavioural repertoire in response to environmental challenges, such as exploratory behaviour, so responses to novelty were compared amongst treatments. Physiological samples were taken to measure the effects of EE on hormone expression and cognitive function. To assess the effects of enrichment on the acute stress response, blood plasma cortisol (considered a reliable indicator of the acute stress response in salmon) was compared 3 days prior to, and 30 minutes after a stressor event (chasing with a net for 5 minutes; a familiar husbandry practice known to induce stress in fish). Lastly, common morphological indicators of poor welfare were recorded to assess the effects of EE on physical condition. Preliminary results indicate non-significant effect of treatment on cortisol (LMM; $F1, 6 = 0.475$, $p = 0.516$). Morphological welfare indicators did not differ between EE vs NE (GLM; treatment coefficient (SE) = -0.080 (0.09), $p = 0.409$). Further analysis of behavioural responses may reveal movement patterns between treatment groups and whether EE creates specific stress coping behavioural profiles. These results will add to the growing literature on the effects of EE on animal behaviour and welfare, highlighting whether there is potential for EE to improve the welfare of captive fish used for aquaculture research.

Conventional laboratory housing reduces sociability in mice which is predicted by life-long poor welfare

Thursday, 3rd August - 16:45: Laboratory Animal Behaviour/Fish Behavior (Bolero hall) - Oral

Ms. Lindsey Kitchenham [1], ***Ms. Basma Nazal*** [2], ***Ms. Emma Nip*** [2], ***Ms. Aimee Adcock*** [2], ***Ms. Aileen MacLellan*** [1], ***Prof. Georgia Mason*** [1]

1. *University of Guelph, Integrative Biology,* ***2.*** *University of Guelph, Animal Biosciences*

Compared to peers raised in 'enriched', well-resourced housing, female mice from conventional barren cages are more aggressive to cage-mates, and less sociable with familiar non-cage-mates (especially if they too are from conventional cages). But how do such effects occur? Using Social Approach Tests, and middle-aged mice with well-documented lifelong behavioural time budgets, we tested the hypotheses that conventionally-caged C57/BL6 ('C57') subjects presented with non-cage-mate 'stimulus mice' (C57 or BALB/c 'BALB') would be less sociable, less socially attractive, and more agonistic to unfamiliar conspecifics, compared to well-resourced C57 subjects. We also assessed whether any effects reflected that subject mice had, over their lifespans, been more agonistic with cage-mates, and/or spent much of their time inactive but awake ('IBA' – a depressive-like behaviour) or performing stereotypic behaviour ('SB'). C57 'subjects' (N = 15: 8 well-resourced, 7 conventionally-caged) were presented with two BALB (n = 16) or two C57 (n = 16) 'stimulus' mice: one from well-resourced housing (n = 15) and one from conventional cages (n = 15). We measured subjects' sniffing, proximity, and aggression towards each stimulus mouse while controlling for general exploration by measuring investigation of novel objects. Generalized linear mixed models then tested the hypotheses. Results replicated previous findings: conventionally-caged C57s were less sociable with non-cage-mates than were well-resourced C57s. Results also revealed that this reduced sociability was best explained by conventionally-caged subjects' agonistic interactions in their home cages. Additional, albeit less robust, roles were also played by displaying lifelong high levels of IBA and SB. Furthermore, although conventionally-caged subjects were no more aggressive than well-resourced subjects towards stimulus mice, BALB stimulus mice were much more agonistic to conventionally-caged subjects than to well-resourced ones. Housing also affected BALBs' social attractiveness: subject mice tended to prefer well-resourced BALBs over conventionally-caged BALBs. Mice can therefore discriminate between conventionally-caged and well-resourced conspecifics. Overall, lifelong poor welfare in barren housing can thus negatively impact social behaviour in middle-aged female mice. Results broadly suggest that the individuals most adversely affected by conventional cages also show the most reduced sociability. Better-resourced 'enriched' cages may therefore enhance welfare, not only by physically enabling natural behaviours, but also by promoting positive social interactions. How mice discriminate between well-resourced and conventionally-caged conspecifics now needs investigating.

Depressed, dysphoric or merely stressed: Do conventional laboratory cages induce affective disorders in mice?

Thursday, 3rd August - 17:00: Laboratory Animal Behaviour/Fish Behavior (Bolero hall) - Oral

Ms. Aileen MacLellan [1], ***Prof. Georgia Mason*** [1]

1. *University of Guelph, Integrative Biology*

Conventional mouse cages are small, barren, and compromise welfare. Certain responses to these conditions– e.g. low activity and reduced sucrose consumption (interpreted as anhedonia) – have been labelled 'depression-like'. But do they truly indicate clinical depression? Diagnosing human clinical depression requires co-occurrence of five or more Diagnostic and Statistical Manual of Mental Disorders (DSM-V) signs/symptoms, though subclinical depression or 'dysphoria' (e.g., four signs present) may also be identified, and commonly requires treatment. Clinical depression has never been demonstrated in animals, in part because detecting some DSM-V signs requires self-report (e.g. suicidal thoughts). But six signs are measurable: low mood, assessable through pessimism in judgement bias tasks; anhedonia (sucrose preference); weight changes; inability to think/concentrate (assessable via cognitive tasks); and altered sleep and psychomotor activity (assessable via home cage observations). Here, we raised female mice (n=79) from three strains in conventional or large, well-resourced cages: C56BL/6 (n=8 conventional; 15 well-resourced), BALB/c (n=12 conventional; 16 well-resourced) and DBA/2 (n= 12 conventional; 16 well-resourced). Over 10 months of their adult lives, we assessed all six measurable DSM-V signs. To determine the presence/absence of each sign in individual mice, we first assumed that well-resourced animals model the general human population (where lifetime prevalence of depression for women is 20%). We designated mice as showing each sign by identifying thresholds based on the most extreme N% of the well-resourced group: systematically varying N and checking for co-occurrence of DSM-V signs until 20% of well-resourced mice were classified as 'depressed'. For individual mice, each sign was then scored as 'present' if its value was equal to, or more extreme, than the threshold. The first prediction tested was that conventionally-caged mice show more diagnostic criteria than well-resourced controls. Preliminary logistic regressions show that this was met (ChiSquare=2.89, p=0.001; conventionally-caged mice averaged 3.97 signs while well-resourced mice averaged 3.53). When testing the prediction that more conventionally-caged mice meet criteria for clinical depression (five or more signs), preliminary analyses revealed a trend for a housing effect (ChiSquare=1.93, p=0.08; conventional=31%, well-resourced=19%). Further, prevalence of subclinical depression was significantly higher in conventionally-caged animals (ChiSquare=2.56, p=0.05; conventional=71.88%, well-resourced=55%). Conventional cages therefore increase the risk of depressive signs and induce dysphoria. Yet, low power (plus immeasurable DSM-V signs) prevented us from confirming or ruling out clinical levels of the disorder. Still, given knowledge from human literature that even subclinical depression compromises wellbeing, these findings raise ethical concerns regarding conventional laboratory practices.

Automated monitoring of animal behaviour in infectious disease studies: a case study with sheep infected with Toxoplasma gondii

Thursday, 3rd August - 17:15: Laboratory Animal Behaviour/Fish Behavior (Bolero hall) - Oral

Dr. Harmen Doekes [1]***, Dr. Ronald Petie*** [2]***, Ms. Rineke de Jong*** [2]***, Dr. Ines Adriaens*** [1]***, Dr. Henk Wisselink*** [2]***, Dr. Norbert Stockhofe-Zurwieden*** [2]

1. *Animal Breeding and Genomics, Wageningen University & Research,* ***2.*** *Wageningen Bioveterinary Research, Wageningen University & Research*

Automated monitoring of animal behaviour is a promising method to improve the understanding of treatments' effects in animal experiments, by maximising the data per individual and improving data quality. In addition, it allows for continuous and objective monitoring which helps to timely intervene if needed, thereby facilitating refinement of experiments. We aim to develop a real-time automated monitoring system, initially focussed on animal activity, that can be implemented in (particularly) infectious disease studies. We face various challenges, including how such a system can be generalised to multiple species (pigs, sheep, chickens, ferrets, cats, etc.), the group-housing of animals, and the high containment conditions (biosafety level 2 and 3). We currently focus on accelerometers (7-11 grams) for activity monitoring, and computer vision for additional behaviours. Recently, we used these tools to track activity and drinking behaviour in three group-housed rams from 5 days before until 21 days after infection with *Toxoplasma gondii* (which were housed in the context of another study). We equipped the three rams with two 25 Hz accelerometers, one on the ear and one on the back, and an Aruco-marker (simple QR-code) for video analysis. An activity index (AI) was calculated from accelerometer data, and individual drinking behaviour was quantified with pixel changes from video above the drinker. The ear-based AI was three- to fourfold higher than the back-based AI, but both showed similar patterns over time. Three days after infection, the AI for each ram decreased during daytime (= active period) by more than 40%, while it increased slightly (by 10-20%) during nighttime. These data supported a partial disappearance of the circadian rhythm. Time spent drinking also decreased for each individual ram. At 9-11 days after infection, the AI and drinking time returned to similar patterns as before infection. These trends corresponded well to increased body temperatures from day 3 to day 9-11, and to a reduced water consumption of the group from day 4 to day 10 measured with a flow meter. As the animal caretakers scored the rams as 'inactive' only during days 5-7 after infection, our analyses provided additional insights as compared to observations by the caretakers. In March 2023, we will implement a similar methodology in an experiment with chickens infected with avian influenza, also exploring accelerometers that transfer data for near real-time analysis.

Improved animal welfare and valid animal-based research: what are the links

Improved animal welfare and valid animal-based research: what are the links?

Friday, 4th August - 09:00: Improved animal welfare and valid animal-based research: what are the links (Grande Hall) - Plenary

Prof. Georgia Mason [1], ***Ms. Jessica Cait*** [1]

1. *University of Guelph, Integrative Biology*

Here, we assess the role of poor animal welfare, especially that caused by sub-optimal housing, in the replicability and translatability of animal-based biomedical research. We also consider what welfare scientists should learn from some of the criticisms levelled at biomedical research.

Animals are commonly used in biomedical studies (e.g. > 120 million mice and rats p.a.). However, such usage typically does not benefit humans, thanks to crises in replicability (> 50% of studies being non-replicable) and translatability (even replicable studies typically failing to 'work' in humans). Reasons seem complex, including species-differences in biology, and methodological shortcomings (e.g. not blinding or randomising; hypothesising after results are known ['HARK'-ing]; and multiple testing to find significant p-values ['P-hacking']). Applied ethologists have long suspected that poor welfare plays a role too: the idea tested here.

Research rodents are conventionally housed in small, barren cages that reduce welfare. Our recent meta-analysis of 214 studies (Cait et al. 2022, BMC Biology) showed that compared to larger, well-resourced, 'enriched' cages, these reduce animals' lifespans, and increase susceptibility to experimentally-induced, stress-sensitive diseases (e.g. cancer, stroke). Here, we build on this evidence of chronic stress to test the hypothesis that rodent housing affects data replicability and translatability, by generating animals that differ between laboratories and are too abnormal to model most humans. Our new systematic review compiled studies investigating effects of "disease modifiers" (e.g. therapeutic drugs, age, sex) in rodents in conventional versus well-resourced cages. If housing qualitatively alters results, significant statistical interactions between housing and disease modifiers should be evident. For 70 relevant articles using 64 different disease modifiers (e.g. chemotherapy, anxiolytics), we calculated interaction-term effect sizes. In 23/64 cases, these disease modifiers statistically interacted with housing to alter results. Thus about a third of the findings from chronically stressed rodents differed from those generated by healthier, happier animals. Altered housing can therefore reduce replicability between laboratories. The relevance to most humans of c. one third of the results from housing-stressed animals may also be questionable.

Nevertheless, poor animal welfare clearly only partially contributes to such problems, and methodological issues are still prevalent concerns. What can welfare scientists learn from this? We are not immune from the 'publish or perish' cultures that promote p-hacking, HARK-ing and other suspect practices. So, are we 'squeaky clean' in terms of research rigour? And if not, what does this mean for the validity of our own research?

Abnormal Animal Behaviour

Can tail lesion status of pigs at the end of the finishing period be predicted on arrival?

Friday, 4th August - 09:50: Abnormal Animal Behaviour (Bolero hall) - Oral

Prof. Anna Valros [1], ***Ms. Miina Tuominen-Brinkas*** [1], ***Ms. Hilkka Koskikallio*** [1], ***Prof. Mari Heinonen*** [1], ***Ms. Kristina Ahlqvist*** [1], ***Ms. Camilla Munsterhjelm*** [1]

1. *Research Centre for Animal Welfare, Department of Production Animal Medicine, Faculty of Veterinary Medicine, University of Helsinki*

Scoring of tail biting lesions at slaughter has been suggested as a promising measure of pig lifetime welfare. Studies have reported a high proportion of shortened but healed ('healed') tails at the slaughter stage, but there is no data on how many of these are the results of an injury occurring during the finishing stage, and how many from earlier rearing phases. The aim of this study was to investigate if tail status at arrival in the finishing unit predicted the type of tail lesions at the end of finishing, with a specific focus on healed tails.

The study was performed on five Finnish finisher farms. All pigs in one batch per farm were inspected on arrival (W0) and again 9 weeks later (W9). Tails were scored for shortening (not shortened vs shortened), tail score (TS0 = no lesion, TS1 = healed lesion; TS2 = fresh lesion ≤ 2 cm, TS3 = fresh lesion >2 cm), tail posture (clearly hanging or normal) and length. Sex of the pig was recorded.

The proportion of different TSs on W0 and W9 were: TS0: 48.0 vs 40.5%; TS1: 8.6 vs 28.4%; TS2: 38.4 vs 19.5% and TS3: 5.0 vs 11.7%. A multinomial mixed model predicting TS at W9 was built with pig (n=1492) as statistical unit and farm as random effect. The model classified 66.6 % of the observations correctly (TS0: 84.2%, TS1: 80.0%, TS2: 25.8%, TS3: 33.7%). For TSs that were predicted with high success (TS0 vs TS1), the odds of having a healed tail at W9 was decreased (OR: 0.51) if the tail had a normal posture on W0 ($p=0.005$) and if the tail was not shortened on W0 (0.19, $p<0.001$). The longer the tail was on W0, the lower the odds for having a healed tail on W9 (OR: 0.80 per 1 cm tail, $p<0.001$). W0 TS influenced the odds for having an intact tail at W9 (TS0 vs TS3, OR: 0.16, $p=0.001$, TS1 vs TS3, OR: 4.0, $p=0.03$, TS2 vs TS3, OR: 0.4, $p=0.03$). Sex was non-significant.

The results show that tail status at arrival in the finishing unit can predict the TS at the end of the finishing phase, especially when it comes to healed tail lesions. Predicting fresh tail lesions at the end of finishing by tail status on arrival was more difficult, probably as tail wounds heal within a few weeks.

Flow direction matters: hatchery-reared Coho Salmon develop less otolith deformities in tanks with alternating water flow direction

Friday, 4th August - 10:05: Abnormal Animal Behaviour (Bolero hall) - Oral

Ms. Leigh Gaffney [1], ***Mr. Micah Quindazzi*** [1], ***Ms. Emma Polard*** [1], ***Ms. Lydia Walton*** [1], ***Dr. Francis Juanes*** [1]

1. *University of Victoria, Department of Biology*

Sagittal otoliths are paired sensory structures that enable salmon to hear and maintain balance. Normal otolith composition involves aragonite, a polymorph of calcium carbonate, however otoliths with inclusions of vaterite, an abnormal polymorph, also occur. Vaterite formation is irreversible and results in deformed otoliths which are larger, lighter, and more brittle. These differences reduce otolith function and cause severe hearing impairment in salmon. While vaterite otoliths are rare in wild populations (< 10%), they are extremely common in hatchery-reared salmon (50-80% affected). Despite long-standing evidence of the occurrence of vaterite otoliths, the cause(s) of vaterite formation in hatchery-reared salmon are largely unknown. One factor that differs between hatchery and wild environments is water flow direction; a factor that influences salmon behaviour, growth, cognition, and survival. Hatchery salmon are most commonly reared in round tanks with constant, unchanging water flow directions but there is no scientific evidence to support this choice. The aim of this study was to assess whether changes in tank water flow direction influence vaterite otolith formation in hatchery-reared Coho Salmon (*Oncorhynchus kisutch*), one of the most reared salmon species. Coho fry (n= 48,000 fish; 0.5g ± 0.1g) were distributed into 6 circular tanks and reared for 52 weeks under standard hatchery conditions of constant water flow direction (2 tanks = clockwise only; 2 tanks = counter-clockwise only) or alternating water flow direction (2 tanks = alternated from clockwise to counter-clockwise every 7 days) until release to the wild as smolts (20g ± 4.5g). Coho (n=10 fish per tank) were euthanized (anaesthetic overdose of clove oil followed by gill clip) at weeks 1 and 52 for routine health inspections and otoliths were extracted and analyzed for vaterite. We found that the number of coho affected by vaterite increased over time (6% of fry vs 35-60% of smolts had at least one vaterite otolith). Results from a two-way ANOVA (life stage and water flow as fixed factors; tank as a random factor) and post hoc Tukey HSD tests revealed that vaterite prevalence was significantly higher ($F_{2,9}$=49.2, P<0.001) in smolts reared with constant water flow direction in comparison to smolts reared with alternating water flow direction. These results provide the first evidence that alternating water flow direction decreases vaterite otolith formation in hatchery-reared Coho Salmon and provide a scientific basis for their recommendation. This research has important implications for fish welfare and the efficacy of salmon restocking and conservation programs.

Light intensity during early life influences plumage condition of pullets

Friday, 4th August - 10:20: Abnormal Animal Behaviour (Bolero hall) - Oral

Dr. Kaitlin Wurtz [1], ***Dr. Joergen Kjaer*** [2], ***Dr. Anja Brinch Riber*** [1]

1. *Department of Animal and Veterinary Sciences, Aarhus University, Tjele, Denmark,* ***2.*** *Institut für Tierschutz und Tierhaltung, Friedrich-Loeffler-Institut, Celle, Germany; Department of Animal and Veterinary Sciences, Aarhus University, Tjele, Denmark*

The link between light intensity and feather pecking in laying hens has been addressed in multiple studies, but rarely with a focus on the rearing period. This study aimed to investigate the impact of light intensity during early life on plumage damage, used as an indicator of feather pecking behaviour. Data were collected on light intensity (age 1, 7, and 15 weeks) and plumage condition (age 7 and 15 weeks) from 18 commercial flocks of Dekalb White (n=7) or Lohmann LSL-Lite (n=11) pullets. Birds were kept at 19-20 birds/m2 in multitier housing systems with no natural light or outdoor access. Multiple recordings of light intensity were taken on the floor during each visit. Plumage condition was assessed on the wings and tail of 50 birds per flock using the scoring protocol MTool (Keppler and Knierim, mud-tierschutz@ble.de) which categorises feather damage into either being identifiably caused by feather pecking ('damaged feathers') or due to unidentifiable causes (e.g., abrasion, feather pecking; 'broken feathers') on a three-point scale (none, moderate, severe). Data (N=18) were analysed using a generalised estimating equations approach in the Genmod procedure of SAS Studio. Each classification variable (light intensity at 1, 7 or 15 weeks, producer, rearing system, genotype, feed manufacturer and heating system) was tested individually to reduce the number of variables for further testing. Variables reaching a *P*-value of 0.10 were included in the next model. Then a forward stepwise regression was made and variables not reaching significance at a *P*-value of 0.05 were dropped. Maximum light intensity recorded during the first week ranged between flocks from 6 to 120 lux. At 7 weeks of age, the proportion of moderately or severely damaged feathers ranged between flocks from 7% to 94% and broken feathers from 0% to 91%. At 15 weeks, the proportions ranged from 0% to 67% (damaged) and 0% to 64% (broken). The analysis showed that higher maximum light intensities during the first week were associated with a higher proportion of severely broken feathers at 7 weeks (P=0.035) and moderately broken feathers at 15 weeks (P=0.044). The proportion of moderately damaged feathers (P=0.080) and severely broken feathers at 15 weeks (P=0.067) increased with increasing maximum light intensities. These results show that there is a need for further investigation into the optimal light intensity for layer pullets during early life to both stimulate feed and water intake while minimising the risk of feather pecking and abrasion.

Does weaning age and litter sex-ratio affect the copulatory success of male European mink (Mustela lutreola)?

Friday, 4th August - 10:50: Abnormal Animal Behaviour (Bolero hall) - Oral

Dr. Kairi Kiik [1], Ms. Kristel Nemvalts [2], Mrs. Kadri Ashford [2], Ms. Andrea Marin [3], Ms. Carmen Aranda Vázquez [4], Dr. María Díez-León [5]

1. *University of Tartu,* ***2.*** *Conservation Research Centre, Tallinn Zoo, Estonia,* ***3.*** *University of Navarra,* ***4.*** *Fundación para la Investigación en Etología y Biodiversidad (FIEB),* ***5.*** *Royal Veterinary College*

Early life experiences influence normal behavioural development in a range of species. For example, early-weaned individuals are more likely to show abnormal repetitive behaviour, and play behaviour can be affected by litter sex ratio (SxR). This is particularly important in conservation breeding programmes, where males can sometimes show abnormal copulatory behaviour that jeopardises breeding success and might indicate underlying welfare issues. Captive-born males of the critically endangered European mink (Mustela lutreola; a different species than the farmed American mink, Neovison vison) in conservation breeding programmes aiming to reintroduce this species into the wild fail to successfully copulate compared to wild-caught males, and either behave passively or even aggressively toward receptive females. In this program, the litters are weaned at approximately 10 weeks old - earlier and in a more abrupt manner than in the wild. Here, we tested the hypotheses that litter sex-ratio and age at weaning from dam and litter will impact likelihood of successful copulation for these males. For this, we retrospectively obtained data on litter SxR (proportion of males over total number of kits in the litter), age of separation from the mother as well as littermates from 184 males, spanning 18 years of breeding this species in Tallinn Zoo. Weaning ages for these males ranged between 5 and 16 weeks. Preliminary results show that males from male-biased (i.e. SxR>0.5) litters are less likely to successfully copulate ($z=-2.6$; $p=0.01$). Additionally, we had behavioural data - courtship vocalizations (clucking), and whether they behaved aggressively or passively during courtship - for a subset of 128 males. Our preliminary results indicate that the longer the males stay with the littermates, they were less likely to cluck ($t=2.3$; $p=0.02$). These results already have implications for management and conservation by highlighting that how long litters are together and their composition, might have an effect to an animals future mating success. Future work will now account for other potential explanatory variables as well as assess welfare effects.

Do European mink show preference for conspecific scents during breeding season?

Friday, 4th August - 11:05: Abnormal Animal Behaviour (Bolero hall) - Oral

Ms. Andrea Marin [1], ***Dr. David Galicia*** [1], ***Ms. Carmen Aranda Vázquez*** [2], ***Mr. Ciprian Petrescu*** [2], ***Dr. Kairi Kiik*** [3], ***Ms. Kristel Nemvalts*** [3], ***Dr. María Díez-León*** [4]

1. *University of Navarra,* ***2.*** *Fundación para la Investigación en Etología y Biodiversidad (FIEB),* ***3.*** *Conservation Research Centre, Tallinn Zoo, Estonia,* ***4.*** *Royal Veterinary College*

Captive-born (CB) males of the critically endangered European mink show abnormal reproductive behaviour, which jeopardises programme outcomes and raises welfare concerns. Environmental enrichment increases male attractiveness in a related mustelid species by improving welfare-related traits, including normalising behaviour. Mink males might also show mate preference, as in other carnivore species; however, to our knowledge, how enrichment provision might impact female attractiveness to males has not been tested. We hypothesise that both animal origin (CB *vs* wild-born; WB) and enrichment provision may respectively influence female and male attractiveness in this species. These hypotheses predict that females will prefer scents from WB conspecifics and males will prefer those from more enriched females. To test this, we carried out preference tests with faeces (under the assumption that they convey relevant chemosensory information as in other species) in the European mink conservation breeding centre of the Foundation for Research in Ethology and Biodiversity (FIEB), Spain, during two consecutive breeding seasons (2021 and 2022). In their home enclosures, 13 females (1-16 independent dichotomous tests with unique combinations of male scents per female, n=64 different combinations) were presented with CB vs WB males' faeces, and 10 males (1-2 independent test per male, n=14) were presented with enriched (E) (riparian vegetation and pool) vs extra-enriched (EE) (a hammock, tunnels and tree stumps) females' faeces. Each mink was presented with faecal samples of opposite-sex mink (equidistant from their nest box) once a day. Tests were recorded via CCTV cameras and watched on VLC Player (observer was blind to sample treatment) between 17:00-01:00 recording each time the mink approached any sample in order to establish preference. A generalized linear mixed model with a negative binomial distribution was performed. Females do not show preference between scents from captive or wild born males, visiting the same number of times the faeces of CB and WB males ($z=0.46$, $p=0.64$), while males prefer EE females ($z=8.12$, $p=0.03$) with a greater number of visits to the EE females' faeces. These preliminary findings suggest level of enrichment provision affect female attractiveness, which might affect male courtship display and copulatory success of this critically endangered species. In contrast, male origin does not appear to influence female preference. Future work will now focus on increasing sample size to confirm these results, test if additional enrichment increases male attractiveness towards females, and assess whether mate preference affects reproductive behaviour display (e.g. vocalizations) and success.

Development of abnormal oral behaviors in dairy cattle in the first 6 months of life

Friday, 4th August - 11:20: Abnormal Animal Behaviour (Bolero hall) - Oral

Ms. Isabelle McDonald-Gilmartin [1], ***Dr. Blair Downey*** [2], ***Dr. Cassandra Tucker*** [1]

1. *Center for Animal Welfare, Department of Animal Science, University of California, Davis,* ***2.*** *Department of Animal Science, University of Tennessee, Knoxville*

Dairy cattle perform abnormal repetitive behaviors (ARBs) including tongue rolling (TR) and non-nutritive oral manipulation of non-feed items (NNOM). Research on oral ARBs in dairy cattle has often focused on either the milk-fed period or a single day during weaning through adulthood. Furthermore, there are perceptions that, of the 2 most common breeds of dairy cattle in the U.S., Jerseys perform ARBs more than Holsteins, but little data to evaluate this idea. We assessed breed differences and the ontogeny of ARBs in dairy cattle (n=24 Holsteins, n=6 Jerseys) in their first 24 wk of life in a longitudinal, repeated-measure study, with an open population. We expected that NNOM would be high during the milk-fed period and peak around weaning while expression of TR would become marked at weaning and persist into subsequent weeks. Calves were enrolled at birth, until n=30 was reached. Calves were limit-fed milk and individually housed from birth until the end of step-down weaning (6-7 wk); these are common practices on U.S. dairies. Weaned animals were housed in similarly-age groups. Each individual was observed once every 2 wk ("period") until 24 wk, resulting in 12 d of data/animal. We used behavioral sampling to record the performance of TR and NNOM for each individual in 5-min intervals, from 08:00-20:00 h. Fixed effects of breed and period were analyzed with linear mixed models; individual was a random effect. Patterns over time were identified based on visual assessment. TR occurred, on average across all 24 wk, for 5.2±0.6% intervals and NNOM for 28±2.6%. Jerseys performed significantly more NNOM (J:33.6±3% vs. H:26.7±2.6% intervals; p=0.024) and tended to perform more TR when compared to Holsteins (J:7.7±0.95% vs. H:4.6±0.5% intervals; p=0.054). Overall, NNOM was significantly higher in most of the milk-fed period, weaning and the 2 wk that followed (wk 4-9, 41.3±1.8%) compared to just after birth (wk 0-1, 21.2±1.4%) or 10-23 wk (22.3±1.4%; p<0.001)); this is a wider time range than we initially predicted. Cattle showed significantly more TR in wk 4-7 (8.6±1.3%), compared to all other weeks (0-3 and 8-23 wk; 4.5±0.8%; p<0.003), thus is exacerbated around weaning, but contrary to our prediction, dropped back to lower levels afterwards. Despite the limited sample size, we found initial evidence that Jerseys express more oral ARBs than Holsteins and that NNOM and TR are expressed at the highest levels in the weeks around weaning, within the first 6 mo of life.

Miscellaneous section

Feather fault bars and clinical welfare indicators for female broiler breeder pullets under qualitative feed restriction

Friday, 4th August - 09:50: Miscellaneous Section (Grande Hall) - Oral

Dr. Fernanda Tahamtani [1], ***Dr. Anja Brinch Riber*** [2], ***Dr. Hengameh Moradi*** [3]

1. *Animalia, Norwegian Meat and Poultry Research Centre, Oslo,* ***2.*** *Section of Behaviour, Stress and Welfare, Department of Animal and Veterinary Sciences, Aarhus University, Tjele,* ***3.*** *Department of Animal and Poultry Science, College of Aburaihan, University of Tehran, Pakdasht*

The quantitative feed restriction applied during rearing of broiler breeders inflicts chronic hunger and frustration due to unfulfilled behavioural needs for feeding. Qualitative feed restriction, which allows a larger amount of feed to be provided without increasing the energy intake, is considered an alternative used to alleviate the welfare problems associated with quantitative feed restriction. This study aimed at investigating the effect of qualitative feed restriction on a range of welfare indicators in broiler breeders at the end of the rearing period. In total, 1,200 female breeder chicks of the genotype Ross 308 were housed in 24 pens: six pens of 50 birds per dietary treatment. The treatments were: (1) standard feed (Control), (2) standard feed diluted with oat hulls (Insoluble), (3) standard feed diluted with oat hulls and sugar beet pulp (Mixed) and (4) standard feed plus maize silage (Roughage). The light schedule was 8h light/16h dark. The birds were weighed weekly 1-2 h after feeding. At 19 weeks of age, a clinical welfare assessment (plumage condition and dirtiness, footpad dermatitis, hyperkeratosis, hock burns and vent pasting) was performed on all birds before they were sacrificed. From each bird, three feathers (tail, primary, scapular) were plucked and macroscopically examined for the presence of fault bars of three different severities. Mortality was registered on occurrence throughout the rearing period. Treatment did not affect hock burns, hyperkeratosis or mortality ($P=0.17$). However, birds from the Mixed treatment had significantly worse plumage condition and footpad dermatitis compared to the Control and Roughage birds ($P<0.05$). Mixed birds were also dirtier and had more vent-pasting than Roughage birds but did not differ from Control birds. Control birds had more total fault bars in the tail feathers compared to birds from the Mixed treatment ($P<0.001$) but did not differ from the other two treatments. However, Control birds had more severe fault bars than Roughage birds ($P<0.05$) regardless of feather type. Body weight differed between the treatments, with Roughage birds having the steepest growth curve and Mixed birds having the least steep growth curve ($P<0.001$). Overall, the results showed improved welfare of Roughage birds and reduced welfare of Mixed birds, whereas the welfare of Insoluble birds did not seem to differ noticeably from that of Control birds. We recommend further developing a feeding strategy that includes daily allocation of roughage to broiler breeders during the rearing period.

Shining light on laying hen cognition: the effect of light during incubation depends on task and hybrid.

Friday, 4th August - 10:05: Miscellaneous Section (Grande Hall) - Oral

Ms. Maëva Manet [1], ***Ms. Saskia Kliphuis*** [1], ***Dr. Rebecca E. Nordquist*** [1], ***Dr. Vivian C. Goerlich*** [1], ***Prof. Frank Tuyttens*** [2], ***Prof. Bas Rodenburg*** [1]

1. *Animals in Science and Society, Faculty of Veterinary Medicine, Utrecht University,* ***2.*** *Animal Sciences Unit, Flanders Research Institute for Agriculture, Fisheries and Food (ILVO), Melle*

The influence of early life on animal welfare later in life is increasingly recognized as important. In chickens, a promising early-life intervention is the exposure to light during incubation. Due to the position of the embryo in the egg, the two brain hemispheres receive different amounts of light. This unequal exposure results in increased lateralization of the brain, which is the specialization of brain hemispheres on certain functions. In current practice, chickens are incubated in complete darkness. Broilers incubated in darkness have poorer cognitive abilities compared to light-incubated broilers. Information about the effect of light during incubation on laying hen cognition is scarce. In this experiment, we therefore incubated eggs of ISA Brown (brown) and Dekalb White (white) layer hybrids either in a green light-dark cycle (light), or in complete darkness (dark), resulting in a 2x2 design with four treatment groups: brown-light, brown-dark, white-light, white-dark. The individual birds underwent three cognition tests. At 4 weeks old, in a detour test, the chicks could access a mirror by passing a transparent barrier on either the left or right side. After six trials per chick, a lateralization index was calculated. Light chicks were 24% more lateralized than dark chicks (p<0.05), and there was no hybrid (p=0.96) or interaction effect (p=0.83) on chick lateralization. A 5-days holeboard test conducted when the hens were 21 weeks old revealed no treatment effects on hen working memory (p=0.09). Finally, at 24 weeks old, hens were given the choice between a familiar and an unfamiliar hen in a social recognition test. White-light hens approached the familiar hen faster than white-dark hens on days 1 and 2 (p<0.05), but slower on days 3 to 5 (p<0.05). There was no further effect of the incubation treatment and the hybrid on the latency to approach the familiar hen (p=0.17). Brown hens spent 14% more time close to the familiar hen than white hens did on day 2 (p<0.05). Dark hens tended to spend 23% more time close to the familiar hen than light hens did on day 5 (p=0.06), though the tendency was mainly seen in the brown hens. To conclude, light during incubation affected laying hen cognition at different life stages, though the effects were not consistent across tests or hybrids.

Play behaviour, fear responses and walking ability of conventional and organic broilers

Friday, 4th August - 10:20: Miscellaneous Section (Grande Hall) - Oral

Ms. Sigga Rasmussen [1], ***Dr. Kaitlin Wurtz*** [1], ***Dr. Anja Brinch Riber*** [1]

1. *Section of Behaviour, Stress and Welfare, Department of Animal and Veterinary Sciences, Aarhus University, Tjele*

Modern broiler production is under criticism due to welfare issues arising from rapid growth rates and high stocking densities. While organic production systems house broilers at lower stocking densities and use slower-growing hybrids compared to conventional systems, welfare concerns remain prevalent. The aim of this study was to measure play behaviour, fear response and walking ability in Danish conventional and organic broiler production systems. Our study included seven conventional fast-growing Ross 308 flocks and seven organic slower-growing Ranger Gold flocks. Welfare assessments were performed on-farm prior to slaughter at 31-33 days of age for conventional birds and at 49-55 days of age for organic birds. During each visit, play behaviour was measured through all-occurrence sampling using a transect method, where an observer created a temporarily open space by walking through the flock. A novel object test was performed to assess fear in 10 different locations of the house. Additionally, approximately 120 randomly chosen birds/flock were gait scored according to the Bristol scale in six different locations in the house. Statistical analyses were performed in R with the formulation of Generalized Additive Models. Our results demonstrated that organic broilers performed a lower frequency of play behaviour compared to conventional broilers (organic: 4.65±1.20, conventional: 14.84±3.51, P=0.0014). The walking ability of the organic broilers tended to be better than that of the conventional broilers (organic: 1.50±0.32, conventional: 2.27±0.27, P=0.0638). We found no difference in the fear levels of the birds in the different production systems. Our results suggest that walking ability cannot explain the organic birds' reduced engagement in play, as they tended to have better gait scores than conventional birds. As there was no difference in fear level, this also fails to explain the difference in expressed play behaviours. However, since we only tested for fear of novel objects, it might be possible that the organic birds were more fearful towards humans, which may have inhibited their play behaviour in a human-created open space. Alternatively, conventional broilers may express more play behaviours compared to organic broilers when measured through the transect method due to the greater contrast between the sudden availability of open space and their typical stocking density, resulting in increased compensatory play. Furthermore, age differences may also contribute to differences in expression of play. In future studies, we suggest investigating the occurrence of play behaviours in broiler flocks kept at different stocking densities under undisturbed circumstances using remote assessment strategies.

Whoa, No-Go: Evidence consistent with model-based strategy use in horses during an inhibitory control task.

Friday, 4th August - 10:35: Miscellaneous Section (Grande Hall) - Oral

Mx. Louise Evans [1], ***Mx. Heather Cameron-Whytock*** [1], ***Mx. Carrie Ijichi*** [1]

1. *School of Animal, Rural & Environmental Science, Nottingham Trent University, Southwell, Nottingham NG25 0QF, United Kingdom*

It is thought that horses lack the prospection, and brain architecture, required for model-based learning. In this opportunistic study, we investigate for the first time whether horses use model-based strategy in a Go/No-Go inhibitory control task. Twenty horses failed to reach learning criterion after 3 sessions of the Go/No-Go task, which used positive reinforcement for correct touches of a target. Horses responded indiscriminately to the target, accruing errors of emission (mean = 16.51 ± 3.75). This indicates horses either: are unable to understand the task; need further consolidation to reach learning criterion; or are utilising a model-based strategy of indiscriminate responding. Horses underwent a further 3 sessions of Go/No-Go, this time with the addition of negative punishment (a 10-second time-out period) as a cost for errors of emission. If horses are unable to complete Go/No-Go tasks, errors would remain high even when the cost was introduced. If horses found Go/No-Go difficult but the introduction of cost aided their learning, errors would gradually decrease throughout the 3 additional sessions. If horses built a cognitive model of the task but developed a strategy of indiscriminate responding, errors would suddenly decrease with the introduction of cost. A highly significant, immediate reduction in errors was observed when cost was introduced (mean = 8.02 ± 0.81, $p<0.0005$), and this remained stable throughout the 3 additional sessions. Following Lloyd Morgan's Canon, we argue that this provides evidence consistent with model-based strategy use in horses.

Pain state alters the response of lambs in an emotional reactivity test

Friday, 4th August - 10:50: Miscellaneous Section (Grande Hall) - Oral

Dr. Danila Marini [1], ***Dr. Jessica Monk*** [2], ***Dr. Dana Campbell*** [3], ***Dr. Caroline Lee*** [3], ***Mrs. Sue Belson*** [3], ***Dr. Alison Small*** [3]

1. *Davies Livestock Research Centre, The University of Adelaide, South Australia, Australia,* ***2.*** *University of New England, School of Environmental and Rural Science, Armidale NSW, 2351,* ***3.*** *CSIRO Agriculture and Food, FD McMaster Laboratory, Armidale, NSW, 2350*

Pain is an individual emotional experience. The use of emotional reactivity tests in lambs following a painful husbandry procedure may give some insight into that experience, resulting in improved assessment of pain. To examine the emotional response to pain caused by tail docking, 80 lambs were tested across 5 cohorts of 16. Male and female lambs were randomly allocated to one of two treatment groups; Ring - ring tail docked without analgesia and Sham – tail manipulated; no ring applied. After treatment application lambs were returned to their home pens with their mother and monitored for pain related behaviours for 45 mins. One hour after treatment, lambs were individually moved into a test arena (2.5 x 2.5 m, with opaque sides), in their treatment order for emotional reactivity testing. The test was divided into several consecutive phases: 'Isolation'- 90 s without any threat present, 'Novelty' – a brightly coloured umbrella was introduced into the arena and 'Startle' - once the lamb approached the closed umbrella, it was opened, and behaviours were recorded for a further 90 s. If the lamb did not approach the umbrella within 3 mins in the Novelty phase, the test was ceased. Statistical analyses were divided by test phase. Principal components analyses were used to condense correlated behavioural measures within each phase into their principal components. Across all phases, the first principal component explaining most of the variation in the data was labelled as 'Fearful', based on the items that clustered on each component. This included high factor loadings for increased vigilance in all phases, a longer latency to eat in the Novelty and Startle phases and increased vocalisations in the Isolation and Startle phases. Linear mixed effects models including treatment, sex, pen and cohort as fixed factors and lamb as a random effect were used for the analyses. There was no treatment effect seen during the isolation phase on any of the principal components. During the Novelty ($\chi^2(1) = 3.0$, $P = 0.084$) and Startle ($\chi^2(1) = 5.6$, $P = 0.018$) phases, Ring animals scored higher on the Fearful components than Sham animals. There was no effect of treatment on the other principal components. Tail-docking in this study led to greater fear-related behaviour within parts of the emotional reactivity tests. This study was therefore able to demonstrate that lambs in pain are likely experiencing a negative affective state.

A scenario study to understand the climatic cost of impaired welfare on dairy sheep using a deterministic modelling approach

Friday, 4th August - 11:05: Miscellaneous Section (Grande Hall) - Oral

Dr. Lydia Lanzoni [1], ***Ms. Kaia Waxenberg*** [2], ***Dr. Rachael Ramsey*** [2], ***Prof. Robert Martin Rees*** [2], ***Dr. Julian Bell*** [2], ***Dr. Emanuela Dalla Costa*** [3], ***Prof. Giorgio Vignola*** [1], ***Prof. Alberto Stanislao Atzori*** [4]

1. *Department of Veterinary Medicine, University of Teramo,* ***2.*** *Scotland's Rural College, Edinburgh,* ***3.*** *Department of Veterinary Medicine and Animal Sciences, University of Milan,* ***4.*** *Department of Agricultural Sciences, University of Sassari*

As countries move towards net zero to combat global climate change, the livestock industry must play a crucial role in implementing appropriate mitigation solutions. Small ruminant farming, which accounts for 6.5% of these livestock-derived emissions, has a high potential to reduce its impact through improved farming practices. Sustainable mitigation policies should achieve win-win mitigation strategies in line with the "One Welfare" approach, simultaneously improving animal, human and environmental welfare. Though animal welfare and farm carbon footprint are hypothetically linked by their relationships to farm productivity, few studies have actually quantified the effects of poor animal welfare on the environmental impact of farms. The present work aims to quantify the GHG abatement potential of various health and welfare improvements of dairy sheep farms in the Mediterranean basin. Data collected in a previous European project ("Life Forage4Climate") were used to characterize the dairy sheep baseline farm, representative of the Mediterranean semi-intensive system. A deterministic modelling approach was used to model six impaired welfare scenarios, covering the most common welfare challenges in this system. Literature data were used to evaluate the effect of each scenario condition on milk production, ewe and lamb mortality, and thus meat production and replacement rate. These scenarios were grouped into the physical welfare domains framework: health (mastitis, lameness, gastrointestinal nematodes – GIN), farm environment/behaviour (overstocking, heat stress), and nutrition (water deprivation). The data from the baseline and scenarios flocks were used as input data to perform a Life Cycle Assessment with the Agrecalc© tool, a carbon calculator developed by SRUC. The results, expressed as emission intensity (EI) in CO2eq to produce 1kg of fat-and-protein-corrected milk, were analysed with descriptive statistics to assess the changes between the baseline and each of the scenarios. An increase in EI was found in all impaired welfare scenarios when compared with the baseline. The "overstocking" scenario, with animals housed in <1.5 m2/head, was associated with the highest EI (+10.0% from the baseline). Mastitis, GIN, and lameness caused increases of +6.8%, +6.5% and +2.1%, respectively. Lower increases in EI were shown for water deprivation (+1.6%) and thermal discomfort (+1.0%). Animal welfare improvement practices on dairy sheep farms can therefore be associated with an improvement in the environmental efficiency of farms, reducing their carbon footprint. Enhancing welfare on farms, besides improving the mental state of the animals, is undoubtedly a prerequisite for resilient and sustainable animal food systems, even before considering other mitigation actions.

Individual differences in aggressive behaviours initiated by sheep in a competitive feeding environment

Friday, 4th August - 11:20: Miscellaneous Section (Grande Hall) - Oral

Ms. Bonnie Mayes [1], ***Dr. Peta Taylor*** [1], ***Dr. Frances Cowley*** [1], ***Dr. Amy Tait*** [1]

1. *University of New England*

Feeding sheep using troughs is widely practiced in intensive housing and transport scenarios, and a minimum trough space of 16cm per sheep has been recommended (Arnold & Maller, 1974). Limiting trough space can increase competition, leading to increased aggression and changes in the ability of animals to access feed. Aggression may reflect negative affective states, and may be a useful strategy for accessing feed, by displacing other animals. The aim of this experiment was to investigate the presence and consistency of individual differences in aggressive behaviours expressed by sheep in a competitive feeding environment, and investigate whether aggressive interactions are related to time spent at the feed trough.

The experiment was undertaken at The Commonwealth Scientific and Industrial Research Organisation (CSIRO) McMaster Laboratory, Armidale, NSW, Australia, and was approved by the CSIRO Animal Ethics Committee (ARA 20/05). Eighteen Merino wethers were housed in a group for 18 days, stocked at a density of 0.42m^2 per head, and provided with 6cm of feed trough per wether. Video footage was recorded for the entire duration. Three randomly selected focal wethers were observed continuously during the morning and afternoon feeding periods, on days 1-5 and 13-17. Statistical analyses were performed in Stata; negative binomial regression was used to estimate the effect of individual sheep, or day, on the counts of aggressive interactions initiated. A generalised linear model was used to assess the effect of the number of aggressive interactions initiated on time spent at the feed trough.

There was substantial between-wether variation in number of aggressive interactions initiated ($P \leq 0.004$). For one wether, there was an important effect of day; the count of aggressive initiations increased by a factor of 1.07 (95 % CI 1.03 to 1.11; $P < 0.001$) for each additional day. However, increased aggression did not have an effect on the time spent at the feed trough (95% CI 0.95 to 1.03; $P = 0.634$).

This suggests that there are individual differences in the use of aggression in competitive feeding situations, and that increased aggression may not be a useful strategy for increasing feed access. Furthermore, the frequency of initiating aggressive interactions may change over time for some individuals, but this relationship was only demonstrated by one sheep in one pen, and more individuals will be observed in future work.

Arnold, G., and Maller, R. (1974). Some aspects of competition between sheep for supplementary feed. *Animal Science, 19*(3), 309-319.

Poster presentations in oral format

Tactile stimulation influences the frequency of visits of crossbreed calves to an automatic milk feeder

No 1

Tuesday, 1st August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Dr. Karolini De-Sousa [1], ***Ms. Catiúcia Miranda*** [1], ***Dr. Maria Lucia Lima*** [1], ***Dr. Márcia Salles*** [1], ***Dr. Flavia Simili*** [1], ***Dr. Anibal Vercesi Filho*** [1], ***Dr. João Negrão*** [2], ***Dr. Lenira El Faro*** [1]

1. *Instituto de Zootecnia da Secretaria de Agricultura e Abastecimento do Estado de São Paulo (SAA), São Paulo,* ***2.*** *Faculdade de Zootecnia e Engenharia de Alimentos – Universidade de São Paulo, São Paulo*

We evaluate the effect of the end of tactile stimulation (TS) on the frequency of visits to an automatic milk feeder (AMF) by crossbreed (Gyr x Holstein) calves. This study was carried out at the Institute of Animal Science, São Paulo, Brazil. Eighteen female calves with an average (±SD) age of 31 ± 5.3 days and body weight 51 ± 5 kg were housed in a collective pen with a rest area, one water trough, one AMF, and one feeder. The treatments were calves that received (rTS, n=9) or not (nTS, n=9) tactile stimulation. The TS was performed by a handler for up to 4 minutes/calf/day for 30 days at the AMF. For the TS, a brush with medium hardness was used and the brushing movements were light from the neck to back. The calves received daily 6L of milk replacer supplied in an AMF (DeLaval CF1000S), which registered the number of visits with milk available and without milk available, and consumption. Two periods were analyzed, the last week with TS and the first week without TS, by paired Wilcoxon on R studio. There was no difference ($p>0.05$) in the consumption of milk in both treatments from the last week with TS (rTS: 5.5 ±0.9; nTS: 5.5 ±0.9) to the first week without TS (rTS: 5.6 ±0.8; nTS: 5.4 ±1.2). However, calves of both treatments increased ($p<0.01$) the number of visits with milk available (rTS ~60%, and nTS ~32%) in the first week without TS, which means that they drink less milk by visit at the first week without TS (rTS: 0.7L/visit; nTS: 0.8L/visit). The calves of rTS decreased ($p<0.01$) the number of visits without milk available from the last week with TS (rTS: 5.6 ±6.8) to the first week without TS (rTS: 4.5 ±3.6). While calves of nTS did not change ($p>0.05$) the number of visits (nTS: 5.9 ±4.7) without milk available. These results show that the tactile stimulation performed at the AMF affected the behavior of calves, including the calves that did not receive, probably because they were present when the other calves received TS. The increase in the number of visits with milk available after the end of the TS period may be related to waiting for this positive contact. We conclude that tactile stimulation is probably perceived as positive for the calves; however, the interruption of this practice can lead to behavioral changes.

Horses discriminate human body odors from joy and fear contexts

No 2

Tuesday, 1st August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Dr. Léa Lansade [1], ***Ms. Plotine Jardat*** [1], ***Dr. Alexandra Destrez*** [2], ***Dr. Fabrice Damon*** [3], ***Dr. Matthieu Keller*** [1], ***Dr. Ludovic Calandreau*** [1]

1. *CNRS, IFCE, INRAE, Université de Tours, PRC, F-37380, Nouzilly, France,* ***2.*** *Developmental Ethology & Cognitive Psychology Laboratory, Centre des Sciences du Goût et de l'Alimentation, Institut Agro Dijon, CNRUniversité de Bourgogne-Franche-Comté, Inrae, Dijon, France,* ***3.*** *3Development of Olfactory Communication & Cognition Laboratory, Centre des Sciences du Goût et de l'Alimentation, Institut Agro Dijon, CNUniversité de Bourgogne-Franche-Comté, Inrae, Dijon, France*

Animals are commonly believed to detect human emotions through smell, in link with the primitive and ubiquitous characteristics of chemoreception. Indeed, the brain areas dedicated to odor processing are among the oldest structures in mammalian evolution, and chemosignals may play a role in interspecific communication. However, few studies have conclusively demonstrated that animals can perceive human emotions through smell. To determine whether horses can discriminate between human odors of fear and joy, a habituation-discrimination protocol was used. Thirty horses were exposed to sweat odors from humans who declared they had experienced fear or joy while viewing a comedy or a horror film, respectively. A first odor was presented twice in subsequent trials (habituation, 2 min/trial), and after 1 minute the same odor and a novel odor were presented simultaneously (discrimination, 2 min). Both odors came from the same donor. Experimenters presenting the odors or coding the behavioral responses of horses to odors were blind to the condition. Horses sniffed the novel odor more than the repeated odor (novel: 6.55s +- 1.21 s; repeated: 4.6s +- 1.20 s; $Z = 3.388$, $p = 0.0007$), indicating that they discriminated between the human odors produced in fear and joy contexts. Moreover, horses showed a significant left-nostril bias when sniffing joy but not when sniffing fear (joy: 0.66+-0.30, comparison to chance level (0.50): $V = 52$, $p = 0.049$; fear: 0.59 +- 0.33, $V = 23.5$, $p = 0.80$). This asymmetric nostril use and differences in habituation speed further imply differences in the emotional processing of the two odours by horses.

Welfare challenges in marketing, transportation and slaughtering of ruminant animal in Bangladesh

No 3

Tuesday, 1st August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Dr. Professor Dr. Md. Jalal Uddin Sarder [1], Dr. Dr. Md. Hemayatul Islam [1], Dr. Rashida Khaton [1], Dr. Abdulla Al Mamun Bhuyan [1], Dr. Afia Khatun [1], Dr. Md. Reazul Islam [1], Dr. Ishrat Zerin Moni [1], Dr. Jashim Uddin [1]

1. *Department of Veterinary and Animal Sciences, Rajshahi University*

The aim of this study was to evaluate the welfare challenges during the marketing, transportation, and slaughtering of ruminant animals especially cattle in the Rajshahi district of Bangladesh. The data was collected through a survey questionnaire and visual observation of the animal's overall management during marketing, transportation, and slaughter. The survey period started from July to December 2021 and focused on a total of 504 cattle, mostly adults (Average body weight 200 kg), seven local markets, slaughtered in sixes slaughterhouses, transported by 20 local vehicles (Vutvuti), and 20 trucks. The survey focused on space allowances during the marketing and transportation of cattle. It was found that at the marketplace per adult, cattle had only 8.33±2.01 ft^2 space while the minimum requirement is 15 ft^2. During transportation per cattle had less than 6.0±1.92 ft^2 space. The humane handling practices were neglected during the loading, unloading, transporting, and slaughtering of cattle. The slaughtering places were not well designed even though some butchers slaughtered cattle in open spaces. There was also no special care for pregnant cattle and calves at the time of marketing and transportation. The loading and unloading of animals on the vehicles were also risky as there were no designated stairs or else. Structurally the local vehicle was not suitable for animal transport, e.g. with about 90˚slopes of the loading ramp. Therefore, accidents were observed especially involving pregnant animals. No feed or water was supplied during transportation despite travel times of 8 to 12 h. Slaughter sometimes involved the fixation of animals on hard floors, without proper restraining and or making animals senseless using blunt knives or directly entering the head of the knife into the trachea which is known to be painful for the animal. It is concluded that animal welfare is often poor during the marketing, transportation, and slaughtering of ruminants in Bangladesh. Possible reasons, e.g. ignorance and lack of training, economic interests, or weak animal welfare legislation should be further investigated.

Not just a matter of daily mood! Investigating the reliability of a separation and reunion test performed on pet dogs and their owners

No 4

Tuesday, 1st August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Ms. Sofie MacKenzie Cardy [1], ***Dr. Therese Rehn*** [1]

1. *Swedish University of Agricultural Sciences, Department of animal environment and health, POBox 234, S-53223 Skara*

Today, many owners refer to dogs (*Canis familiaris*) as family members and research has shown that a dog show similar attachment behaviour towards its owner, as would a child to its parent. The urge to express attachment behaviour is activated by stress, e.g. separation from the attachment figure. Therefore, observations of separation- and reunion behaviour is commonly used when evaluating the relationship quality. However, this method has not been evaluated for its reliability, which was the aim of the current study. Fifteen dog-human dyads were exposed to identical separation- and reunion tests (SRTs) at two different occasions (28 days in between), with the aim to see whether or not their behaviour changed according to daily conditions or mood. The SRT consisted of three main phases; the departure-, separation- (3 min) and reunion- (3 min) phase. In addition, the reunion phase was further divided into 1-min intervals to analyse potential differences during greeting in more detail. One observer registered the behaviour (instantaneous sampling and 1/0-sampling every 5 sec) of all dogs in a balanced design where half of the dogs were first observed during their first test occasion (SRT1) and the other half were first observed during their second test occasion (SRT2). As data did not follow a normal distribution, Wilcoxon's signed-rank tests were performed to investigate possible differences between the two occasions. As expected, no differences in the behaviour of the dog (nor owner) were observed between the two tests in any of the main phases. Results from the 1-min intervals during reunion showed that dogs were standing more during the last min of reunion at the second test occasion (SRT1: 0.51±0.04 (mean±SE); SRT2: 0.74±0.03; P=0.03, W=21), perhaps indicating some level of familiarity of the test procedure. Since no other differences were observed, it is difficult to further speculate about the possible reasons for this. Importantly, no differences were observed in behaviours related to proximity-seeking, separation distress nor secure base effects, which points toward a low within-individual variation related to time of testing. Hence, the SRT seems a reliable method to assess attachment qualities in dog-human dyads.

Human–Animal Interactions in Dairy Goats

No 5

Tuesday, 1st August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Dr. Francesca Carnovale [1], ***Mr. Giovanni Marcone*** [1], ***Dr. Francesco Serrapica*** [2], ***Prof. David Arney*** [1], ***Prof. Carmela Barone*** [2], ***Prof. Giuseppe De Rosa*** [2]

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It is widely assumed that the quality of human–animal interactions may have strong impacts on animals' living conditions and is fundamental to animal welfare. This work aims to evaluate the effectiveness of methods for assessing and monitoring the welfare of lactating goats. In particular, the methods regarding the assessment of the human-animal relationship. The experimental protocol included three tests and observations in the milking parlour, namely: avoidance distance in the pen, avoidance distance at the manger, approach test within 2 minutes and behavioural observations of stockmen and animals during milking. Fourteen dairy goat farms located in Potenza (Southern Italy) with lactating goats ranging from 67 to 450 were used. All farms raised the Rossa Mediterranean goat breed. The percentage of goats that permitted touching at the manger (mean ± SD: 12.36 ±9.50) was higher than found in the pen (9.67 ±11.86), and within 2 minutes inside the pen (8.19 ±13.78). The avoidance distance at the manger (0.63 ±0.28) was lower than that in the pen (1.19 ±0.58). Avoidance distance at the manger was positively correlated with that in the pen (Spearman correlation test (r_s) = 0.607; p<0.01), as was the percentage of goats touched at the manger and in the pen (r_s = 0.647; p<0.01). Approximately 60% of the stockmen interactions observed during milking were neutral (decisive tone, hand contact and light strokes with the stick, little use of force and short sounds), while the positive (speaking calmly and patting) and negative (screaming loudly, hitting animals and striking with a stick with force, kicking) interactions had similar values, approximately 20%. The number of neutral stockmen interactions was positively correlated with the percentage of goats moving away when approached at a distance >1 m (r_s = 0.799; p< 0.001) and negatively correlated with animals touched at the manger (r_s = -0.607; p< 0.05), in the pen (r_s = -0.613; p< 0.05) and within 2 minutes (rs = -0.669; p< 0.01). Regarding the degree of association between the behaviour of the milker and the animals during the milking routine, the percentage of neutral interactions tended to be positively correlated only with the number of kicks performed by the animals (rs = 0.476; p<0.10). It is concluded that avoidance distance at the manger and in the penanimals, are valid tests to evaluate the human-animal relationship in goats. In addition, avoidance distance at the manger may reliably replace the test performed in the pen.

Is milking reactivity of water buffalo cows influenced by the production system?

No 6

Tuesday, 1st August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Mrs. Madalina Mincu [1], ***Dr. Ioana Nicolae*** [1], ***Dr. Dinu Gavojdian*** [1]

1. *Research and Development Institute for Bovine*

Recent research outlined the significant impact that behavioural reactivity of water buffaloes has on milk yield and milkability traits, however, the impact of the production system on milking reactivity (MR) has not been investigated to date. We therefore performed a comparative study to investigate the effects of production system on MR in water buffalo reared under i) extensive, pasture-based (EXT) and ii) intensive, zero-grazing (INT) systems. The EXT farm practiced tied stanchion barn housing overnight, individual machine milking, had low levels of automation, with caretakers interacting frequently with the animals during feeding and milking. The INT farm practiced loose individual cubicles housing, feeding total mixed rations (TMR) and the milking was done in a parallel parlour (2 by 8, automatic units), with limited direct human-animal contact. The two farms were matched in size, with data being collected from sub-sets of 60 lactating multiparous cows/farm, randomly selected and matched for parity. MR was measured by two trained observers using a 5-point reactivity score (MRS), where 1-stands quietly and ruminates, 2-slight head and ears movements, 3-moderately hind leg movements, 4-vigorous hind leg movements, and 5-head butting and kicking. Chi-square test of independence was used to test whether the frequency of MRS distribution classes varied across the two production systems and Cramer's V was used as post-test to determine strengths of association between the variable. The percentage of animals classified as extremely calm (MRS1) in the EXT farm was of 50.0%, while in the INT farm 26.6% of buffalo cows were assigned to this group. There was a consistent distribution for MRS 2&3 in the INT production system, of 26.6% for both scores, and to a lesser extent for the EXT system, of 11.6% and 8.3%, respectively. A reduction in animals classified as extremely reactive (MRS 4&5) in the INT system was observed, with 10.0% of cows being assigned for each of temperament scores. By contrast, in the EXT system 6.6% of the buffalo cows received MRS4 and 23.3% were assigned MRS5. We found significant differences ($P \leq 0.01$) for MRS distribution between the two farms, and a moderate association strength ($V=0.377$). In the current study, intensively reared water buffalo cows expressed consistency and uniformity across MRS, when compared to extensively reared buffalo cows, which exhibited a more polarized MR clustering.

Oxytocin and IgA – do they respond to human tactile and vocal interactions?

No 7

Tuesday, 1st August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Dr. Stephanie Lürzel [1], ***Ms. Ruth Neubauer*** [1], ***Dr. Annika Lange*** [1], ***Prof. Susanne Waiblinger*** [2]

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Positive animal welfare includes opportunities for positive emotions, during which oxytocin and immunoglobulin A (IgA) have been suggested to increase, exerting beneficial physiological effects. We tested the hypotheses that salivary oxytocin and IgA increase during human-animal interactions that presumably elicit positive emotions. 12 Austrian Simmental heifers (6–24 months of age) that voluntarily accepted stroking by humans were tested individually in an outdoor run with visual contact to peers in three conditions (three times each, resulting in 36 trials per condition; at most one trial per day and animal): presence of a familiar person providing gentle tactile and vocal interactions (S); presence of the same person without interactions (N); no person (C). Each test comprised three 5-min phases: habituation; "active" interactions, where the person walked up to five times towards the animal to offer gentle interactions; "stationary" interactions, where the person stayed in the same spot, with tactile interactions only if the animal was close enough. Saliva was sampled before and after the test. We calculated linear mixed models with full-null model comparisons and controlled for pre-test oxytocin and IgA concentrations when testing for effects of behaviour. In condition S, all animals accepted stroking in the active phase most of the time (median 287, Q1–Q3 272–290 s) and in 32/36 trials also in the stationary phase (143, 73–187 s). Neck stretching, another indicator of enjoyment, occurred in 20/36 trials in the active phase and in 6/36 trials in the stationary phase. Oxytocin concentrations were 178 (141–193), 179 (139–201) and 151 (125–182) pg/ml in S, N and C before and 173 (113–221), 161 (136–204) and 160 (142–216) pg/ml after the test. IgA concentrations were 0.24 (0.18–0.41), 0.17 (0.06–0.25), and 0.21 (0.08–0.29) mg/ml in S, N and C before and 0.14 (0.11–0.18), 0.18 (0.12–0.42) and 0.24 (0.08–0.27) mg/ml after the test. Change of oxytocin and IgA concentration was not affected by condition ($p \geq 0.4$). Behaviour during the interaction phases was significantly associated with post-test oxytocin concentration ($p < 0.001$), the difference between models being caused by a significant negative association with rumination ($p < 0.001$). There was no significant association between post-test IgA and behaviour ($p = 0.69$). The data do not indicate an increase of oxytocin or IgA in reaction to stroking in cattle. Complex interactions between the current motivation for interactions, other motivations and the test situation might play a role.

Mouth movements during competition is a potential indicator of oral lesions in dressage horses

No 8

Tuesday, 1st August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

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2. *Vejle Hestepraksis*

The welfare of sports horses is debated both within and outside the horse community. One welfare concern is the frequent occurrence of oral lesions (ulceration) in riding horses. Lesions may be caused by inappropriate training methods with high levels of rein tension, tight nosebands, ill-fitted bits and poor dental care. Increased knowledge of behavioural signs of discomfort in horses can increase awareness by riders, trainers, officials, and competition judges, which is first step to reduce the occurrence.

This initial study included 11 warmblood dressage horses competing at upper national level (Intermediaire I; 5 mares, 2 stallions and 4 geldings; ridden by 8 female and 3 male riders). The horses were randomly selected for a routine inspection for oral lesions immediately after leaving the dressage arena at competition. Five of the 11 horses were found to have ulceration of the skin and/or mucosa at one or both commissures of the lips. The pathology of the lesions was equal to pressure wounds. Subsequently, an experienced observer who was blind regarding the outcome of the oral examination, scored mouth movements (opening of the mouth, i.e. with clear separation of the teeth) in the 11 horses from official video recordings available online from the event. The frequency of mouth movements ranged from 8 to 59 during the approx. 5.5 min dressage program. Due to the position of the official cameras, the mouth of the horses was only visible for approx. 2/3 of the program. Horses with oral lesions had a significantly higher frequency of mouth movements compared to horses without oral lesions (t-test, mean ± SE; lesions: 34.6 ± 6.7, no apparent lesions: 12.2 ± 2.4, $t = 3.4$, $P = 0.008$). Additional behavioural responses will be recorded and presented.

We conclude that mouth movements may be a useful indicator of oral lesions. Further studies are needed to investigate behavioural signs of discomfort in riding horses, as behaviour can be an early predictor of compromised welfare. Oral lesions in dressage and other horse sports disciplines are typically categorized as equal to pressure wound pathology, and are likely related to inappropriate training methods over time. Thus, behavioural indicators may help to address training methods that compromise horse welfare before a lesion develops.

A novel method for improving student veteran and shelter dog well-being: A brief canine socializing intervention.

No 9

Tuesday, 1st August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Ms. Emily Webberson [1], ***Dr. Katy Schroeder*** [2], ***Dr. John-Tyler Binfet*** [3], ***Dr. Anastasia Stellato*** [4]

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Veterans pursuing post-secondary education while reintegrating face heightened stress leading to compromised health. To support student well-being, post-secondary schools have begun to offer animal-assisted interventions (AAI); however, the influence of AAI on student veteran populations remains underexplored. As shelter dogs can benefit from human interaction, we aimed to assess whether participation in a brief socialization intervention influences veteran reported mood and dog behavior, and identify risk factors associated with a positive experience. Veterans (N = 27, Mage = 35, SD = 9.3; 85.2% male, 11.1% female) enrolled in a Southern U.S. mid-size public university participated with screened shelter dogs (N = 27, Mage = 2, SD = 0.9; 59.3% male, 40.7% female). Each veteran was paired with a dog and participated in activities of their choosing (e.g., playing, grooming, petting) for 30 minutes. Sessions were videorecorded in a quiet room near main campus. To assess changes in veteran mood, a pictorial self-report scale (assessing arousal (activated, deactivated), and valence (pleasant, unpleasant)) was completed pre- and post-interaction. Veterans self-reported how the activities influenced their interaction. Dog behavior was scored in-kennel pre-interaction and during the first and last two minutes of the interaction using Observer XT. Regression models were developed to assess whether veteran demographics and interaction components (e.g., activities, dog-specific traits) influenced their mood post-interaction. Paired t-tests were used to compare the rate of fear-related behaviors (e.g., reduced posture, avoidance) and general activity behaviors (e.g., jumping) observed in-kennel and during the interaction. Results reveal a non-significant trend of veterans' mood changing from unpleasant-activated (tense) and pleasant-activated (excited) to pleasant-deactivated (calm). Regression results revealed a negative association between veteran age and feeling pleasant deactivated (calm) post-interaction (OR: 0.89, p=0.039). Activities or dog-specific traits did not significantly influence post-interaction mood; however, 93% of veterans reported that the activities influenced their experience, and 96% reported enjoyment when petting. When comparing dog behavior from the first to the last two minutes of the interaction, there was a significant reduction in fear-related behaviors (p=0.0072). More fear-related behaviors were displayed during the beginning of the interaction than in-kennel (p=0.0013), though dogs displayed more general activity in-kennel compared to during the interaction (p=0.0004). Results suggest dogs were less active during the interaction compared to in-kennel and may enter the interaction at increased fear levels due to an unfamiliar human. Observed decreases in dog fear behavior and veteran-reported activity enjoyment suggest program benefits for shelter dogs and student veterans.

Using gene editing to “Improve” dogs – A reflection on limits of human interference in animals

No 10

Tuesday, 1st August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Mr. Zimbábwe Osório-Santos [1], Ms. Maria Cristina Yunes [1], Ms. Bianca Vandresen [1], Prof. Maria Jose Hotzel [1]

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Gene editing (GE) is a relatively precise gene manipulation tool, with various proposed animal applications to potentially improve animal health, welfare, and productivity. Public attitudes to GE in farm animals underpin a moral conflict between productivity and animal welfare. However, this may not apply to companion animals, who are often viewed as individuals rather than resources. To explore this issue, we recruited a convenience sample of Brazilian dog owners (n=808) via social media to participate in a survey with closed questions on sociodemographic characteristics, perceived dog-owner relationship, and the level of support (support, neutral, reject, or I do not know) for three different hypothetical applications of GE in dogs: 1) to make dogs resistant to zoonoses (rabies and leishmaniasis); 2) to prevent blindness and deafness in dogs; 3) to make dogs’ hair not allergenic to people. In an open-ended question, participants could justify their responses. Binomial mixed regression models were used to examine the impact of the different applications and demographic characteristics on support for GE. The open answers were subjected to thematic analysis. Significant differences in support levels were observed for the different applications ($P<0.0001$): blindness/deafness (43%), zoonoses (27%), and allergy (18%). Participants involved in animal agriculture, under 25, and males showed higher support for all applications ($P<0.05$); educational level and income had no impact. Most participants viewed their dog as a family member (80%), with fewer referring to them as a buddy/friend (17%) or animal (3%). The most discussed concern regarding the use of GE was the distribution of benefits between humans and dogs, with participants supporting GE only if it primarily or exclusively benefited animals. The view that humans could be the primary beneficiaries raised claims of anthropocentrism. Another concern was that GE could contribute to the objectification of dogs, with some participants arguing that people should love and accept dogs for who they are, instead of changing them. Others argued that GE could indirectly increase the commercialization of dogs, reducing adoptions. Potential, unknown negative impacts for humans and dogs, justified negative attitudes toward GE. Some participants stated that they lacked the knowledge to support or reject GE, others pointed to the lack of information about the technology and the need for further research. Participants’ attitudes to the use of GE to modify dogs raise a reflection on the limits of human interference in animals and challenge the notion of human superiority in the human-animal relationship.

Co-operative care does not scare – the impact of choice and control in dog's stress levels during nail clipping

No 11

Tuesday, 1st August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

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The relationship between a dog and its owner is based on their interactions. Nail clipping is a standard husbandry routine with pet dogs, and so is a common dog-owner interaction. If the dog feels stressed during this routine, it most likely decreases their welfare and poses a bite risk. Educating people in handling dogs in a low stress manner increases their safety, and the dog's welfare is likely to be enhanced.

This study investigated the impact of choice and control on the amount of stress signals displayed by dogs during routine nail clipping. The dogs were divided in two individual groups based on the owner's current husbandry routine – group 1, where the dogs usually had choice and control (CC) and group 2, where the dogs were usually restrained and could not "opt out" during nail clipping at home (no CC). The registration questionnaire revealed that 62% of the respondents (n=285) perceived that their dogs do not like nail clipping. 18 dogs from this sample were recruited to behavioural assessment based on their husbandry routine, availability and dog's health status. This study was conducted as part of BSc studies, and due to a lack of resources, the sample size was relatively small. These dogs were filmed while their owners clipped their nails as they normally do at home. The stress signals such as flat ears, lip licks, struggling, stiff body, panting and tucked tail were counted and analyzed from the videos, according to an ethogram of behavioural signs of distress.

Mann-Whitney U tests showed a significant difference in the amount of stress signals between the groups ($p=0.003$, $w=52$). The total count of stress signals were displayed for group 1 CC (n=9) was 61, the median was 7. For group 2 no CC (n=9) the total count of stress signals was 958, the median was 110. While duration of nail clipping was not officially noted, there did not appear to be a relevant difference between the two groups. These findings suggest that offering choice and control to a dog during husbandry procedures will most likely lower their stress levels, possibly having a positive impact on their own and their handler's welfare.

The reliability of a Human Approach Test in blue foxes

No 12

Tuesday, 1st August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Ms. Eeva Ojala [1], ***Dr. Tarja Koistinen*** [2], ***Ms. Maarit Iso-Oja*** [3], ***Prof. Jaakko Mononen*** [2]

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Behavioural measurements of the human-animal relationship (HAR) are valuable in the welfare assessment of farmed animals. In terms of scientific quality (reliability, validity and feasibility), HAR measurements of blue foxes (e.g. in the WelFur fox protocol) require revision. Reliability determines the degree of measurement error with repeated measurements under different conditions. This study tested, for the first time, consistency over time and inter-/intra-assessor repeatability of the newly developed Human Approach Test (AT) in blue foxes, hypothesising that AT has the potential as a reliable HAR measurement. In the AT, a novel assessor calmly approaches the fox cage, simultaneously assessing the behaviour of the fox. After coming in front of the cage, they move their hand close to the front wall, finally raising it on the top of the cage. The assessor scores temperament on a 7-point scale from very curious (=clear contact-seeking behaviour) to very fearful (=clear contact-avoiding behaviour with fear reactions). The 7-point scale has a better discriminative power than the binary HAR tests previously used in blue foxes.

Dataset A for studying consistency over time included 38 juvenile and 37 adult blue fox females. One person conducted six AT live assessments monthly from August 2019 to February 2020. The cage size (1.2 m2) and human interactions were standardised, but the furnishing and enrichments varied between the animals.

Three persons video-assessed an additional dataset to remove the confounding effects of a live situation using the same AT video recordings of 65 female blue foxes twice (35-day interval, adults and juveniles). These data were used to examine intra- and inter-assessor repeatability.

Consistency and repeatability values of AT were calculated with two-way mixed effects models by using Intraclass Correlation Coefficients (ICC). ICC (consistency) reflect the systematic differences of raters' scores to the same animals. ICC values range between 0 and 1, and the values closer to 1 support better reliability.

Fifteen ICC consistency values from the six assessments ranged from poor to moderate, averaging 0.351 for juveniles, and 0.565 for adults. Repeatability values from video recordings achieved excellent (three intra-assessor ICCs averaging 0.910) and good (12 inter-assessor ICCs averaging 0.797) levels.

With moderate robustness and good repeatability, AT showed its potential as a reliable HAR measurement. The reliability improves with more focused training and test descriptions. The premature traits of the juveniles may weaken the consistency over time, and the environmental factors influencing fox response need more investigation.

Cultural Discrimination Against Donkeys in Sudan

No 13

Tuesday, 1st August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Prof. Abdelkareem A. Ahmed [1], ***Mr. Saber Adam*** [2], ***Prof. Hassan Musa*** [3], ***Dr. Taha Musa*** [3], ***Dr. Jaafar Fedail*** [3], ***Prof. Demin Cai*** [4]

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Abstract: Scientific evidence for intelligence in donkeys could expose their historical unmerited cognitive derogatory status. Despite their enormous contribution to society, donkeys are discriminated against in popular culture in Sudan and often given little respect. The discrimination, therefore, could be reflected in their welfare by neglecting them and exposing them to stressful environments. The present study aims to assess the social bias of the donkey in Sudan. Eight hundred ninety-one respondents participated in this study. 59.3% (528) of respondents accepted having a donkey to provide them with happiness, while 66% (588) rejected having a donkey, 34% (303) did so because it provides them with an unfortunate in their life. 60.5% (539) of respondents reported that the donkey is an unwanted animal due to the noise caused by the donkey braking, whereas 39.5% (352) considered that the donkey is not a noisy animal. 79 % (704) of respondents agreed that the donkey is a stupid animal compared with other domestic animal species. On the other hand, 21 %(187) reported that the donkey is a smart animal. Surprisingly, 81.9% (730) of respondents acknowledged animal rights, while 18.1% (161) did not. Likewise, 30.9% (275) of respondents agreed to curse a stupid person with a donkey, but 69.1% (616) of respondents did not agree. In addition, 53.1% (473) of respondents indicated that the donkey is tolerated hard work in Sudan because it is easy to manage 92.6% (825), obedient animals 33.3% (297), and are unable to remember the events 13.6% (121). Moreover, 32.1% (286) of respondents agreed that the donkey is not an oppressed animal in Sudan compared with other domestic animals whereas, 67.9% (605) indicated that the donkey is an oppressed animal and is socially discriminated against. Furthermore, they indicated that 34.6% (308) of respondents agreed with the beating of donkeys considering that donkeys tolerate the pain 81.5% (726), whereas, 65.4% (583) did not agree with donkey beating and considered that donkeys do not tolerate pain. Finally, 72.4% of respondents agreed that the donkey deserves an apology and appreciation for what it offers to the Sudanese people, while 27.6% did not agree with that. We conclude that donkeys in Sudan are exposed to social discrimination that eventually will affect their welfare, and social awareness among Sudanese communities is required.

Keywords: Donkey; Social Discrimination; Sudan

Dog handlers' experiences of Dog-Assisted Education in Sweden

No 14

Tuesday, 1st August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

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The aim was to investigate experiences of dog handlers from working with Dog-Assisted Education in Swedish schools. A questionnaire created in Netigate was spread to handlers of educated social working dogs via an e-mail list and through Facebook and other social media. The questionnaire was open during 50 days in 2020, and the questions were multiple choice. Totally 69 dog handlers answered the questions. Results are presented descriptively with percentage of answers.

The dog-handler team work with pupils who have the following challenges; motivation (86%), problematic school absence (74%), difficulties to focus on tasks (74%), difficulties with all learning (69%), difficulties to read loud in the class room or to understand a text (63%), difficulties to sit still (60%), difficulties to count (51%), aggression against pupils/teachers (24%) and other challanges (46%). The tasks the dog-handler team carries out are; motivate the pupil to come to school (71%), work in separate room with pupils and special pedagogue (61%), visit the pupils at home (26%), social support outside the class room together with a pupil assistant (23%), social support in the class room (20%), talk with curator (10%) and other tasks (60%). When asked if the dog handlers experience that the intervention has reached expected result the answers were Yes (100%). Within which time frame the answers were; first session (30%), first week (29%), first month (55%), first 6 months (24%), first year (8%) and longer time (11%).

The length of each working session is; 15-30 min (48%), 30-45 min (39%), 45-60 min (23%), 0-15 min (10%), 60-120 min (4%) and more than 120 min (4%). Number of working session per pupil and week are; one (53%), two (38%), three (6%), four (12%), five (5%) and more (20%). Each intervention has a duration of; 0-4 weeks (12%), 4-12 weeks (47%), 3-6 months (38%), 6-12 months (42%), 1-2 years (23%), and more than 2 years (9%). Dog handlers have noted down the following risks to their dogs during sessions; pupils kicking, hitting and hugging hard, screaming, fighting with other pupils, other dogs contacting the dog when being outdoors, too long sessions and too many treats. Carrying out risk assessments before starting every intervention are recommended.

In conclusion, dog-assisted education can help pupils with the motivation to attend school and reach learning goals, but the length of sessions and the whole intervention may take time and the dogs' welfare always need to be considered.

Exogenous administration of corticosterone to hens influences their chicks' responses to feed and alarm playback calls

No 15

Tuesday, 1st August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

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This study investigated how different levels of exogenous corticosterone (eCORT) administered orally to hens can influence their chick's response to feed (FP) and alarm playback (AP) calls. Forty Nigerian indigenous chickens (32 hens and eight cocks) were subjected to one of four eCORT treatments (T_1 = 0mg (distilled water), T_2 = 2mg, T_3 = 4mg, and T_4 = 6 mg of eCORT daily for 14 days). The eggs laid by the hens from each treatment were hatched and brooded separately to prevent social facilitation. Chicks were subjected to FP and AP at 3 weeks of age. Playback was continuously for 1h and intermittently at10 mins interval for 1h. The level of fear (using tonic immobility test, TI) and stress-induced hyperthermia (temperatures of the eye (ET), wing (WT) and head (HT)) were measured at the end of 1h of audio stimuli. Data was analysed separately using Kruskal-Wallis test, significant means were separated using Mann-Whitney U test. After 1h of intermittent FP, HT was greater (χ^2 = 8.632, df = 3, P = 0.035) in T_1 and T_2 chicks than T_3 chicks and intermediate in T_4 chicks. After 1h of continuous FP, WT was greater (χ^2 = 10.505, df = 3, P = 0.015) in T_2 chicks, least in T_3 and T_4 chicks and intermediate in T_1 chicks. After 1h of intermittent AP, T_2 and T_3 chicks were more fearful (χ^2 = 15.537, df = 3, P = 0.001) than T_1 and T_4 chicks. The ET was greater (χ^2 = 10.589, df = 3, P = 0.014) in T_4 chicks and least T_1 and T_2 chicks. WT was greater (χ^2 = 12.399, df = 3, P = 0.006) in T_1 chicks than T_2, T_3 and T_4 chicks. After 1h of continuous AP, TI was greater (χ^2 = 13.199, df = 3, P = 0.004) in T_4 chicks, intermediate in T_3 chicks and least in T_1 and T_2 chicks. WT was greater (χ^2 = 17.401, df = 3, P = 0.001) in T_1 and T_3 chicks than T_2 and T_4 chicks. In conclusion, FP had no effect on level of fear but the effect of AP on fear was context dependent (intermittent vs continuous) and on the level of eCORT of the hens that produced the chicks. Continuous AP increased fear in T_4 chicks but reduced in T_2 chicks. Intermittent AP reduced fear in T_4 chicks but increased it in T_2 chicks.

How to set the stage to ‘’Tag ’n’ Track”?

No 16

Tuesday, 1st August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Mr. Serge ALINDEKON [1]***, Prof. Bas Rodenburg*** [2]***, Dr. Jan Langbein*** [3]***, Prof. Birger Puppe*** [3]***, Mr. Olaf Wilmsmeier*** [4]***, Prof. Helen Louton*** [1]

1. *Professorship of Animal Health and Welfare, University of Rostock,* ***2.*** *Animals in Science and Society, Faculty of Veterinary Medicine, Utrecht University,* ***3.*** *Research Institute for Farm Animal Biology (FBN),* ***4.*** *Wilmsmeier-solutions*

Passive RFID (Radio Frequency Identification) has the potential to advance research on poultry behaviour, as it allows automated, individualised, longitudinal and non-invasive monitoring. These features are only sometimes possible with traditional approaches to monitor animal behaviour. However, there are no guidelines for implementing and reporting on RFID in poultry research. Therefore, we set out to identify the insufficiencies and inconsistencies resulting from such a lack of guidelines that can be noted in reports on the validity and technical aspects of this technology deployed for tracking purposes, and to suggest a roadmap to address them. To this end, we systematically searched the relevant literature on 19.11.2022 in Scopus and Web-of-Science. The search query was built as follows: Topic = (RFID OR “radio frequency identification”) AND (poultry OR chick* OR bird OR hen OR broiler); “All Fields” was considered. After a screening process, 74 relevant papers were selected. They describe and/or report on the performance of 23 different RFID systems. The evaluation of this body of literature reveals three bottlenecks. Firstly, the main technical aspects, such as operating parameters, infrastructure, architecture and results of optimisation tests for 6 of these systems, were not provided. Secondly, the validation study, which should include measuring performance indicators such as reliability, accuracy, validity, precision, sensitivity, concordance and/or agreement, was not mentioned for 10 identified systems. Finally, some inconsistencies were found across the papers. For example, several authors used similar formulas to estimate the difference between the RFID system and the adopted gold standard; however, they referred to the results in diverse ways: “time discrepancies”, “time differences”, “average differences, ”identification speed“, ”delayed RFID detection time, or “accuracy”. These inconsistencies can be confusing. To overcome these bottlenecks, we propose a six-step roadmap that explains how to (1) define the tracking objectives and (2) analyse the tracking requirements and conditions, (3) conceptualise the RFID system, (4) deploy the system, (5) validate the system and (6) report on the validity and technical aspects of a deployed RFID system. The proposed roadmap and reporting standard are intended to serve as a reference for animal behaviour scientists, RFID system integrators and equipment manufacturers on selecting the right RFID equipment and installing and validating a system for poultry behaviour monitoring.

Accuracy of an ultra-wideband real-time location system for tracking growing-finishing pigs under practical conditions

No 17

Tuesday, 1st August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Mr. Maximilian Knoll [1], ***Dr. Lorenz Gygax*** [1], ***Prof. Edna Hillmann*** [1]

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Real-time location systems (RTLS) using ultra-wideband technology can be used to improve pig welfare by providing real-time data on the location and spatial movement of pigs, allowing early detection of potential welfare problems and prompt action to prevent or mitigate them. The aim of this study was to validate the accuracy of an RTLS for use in practical pig farms and involved static and dynamic measurements without animals. We carried out measurements in 12 pens of 10.7 m^2 each, located in the center of the tracking zone of the RTLS. We took measurements with one tag, recording x, y and z coordinates, at three different heights. The lower two mimicked standing and lying pigs. The third height was above the pen walls to check for any influences on the signal by the barn infrastructure and to allow an accuracy estimate under ideal conditions. We measured all three heights at four different locations in each pen (in the lying area, at the feeder, in the elimination area, and at the center of the pen). We repeated the same measurements using 6 tags aligned in a 2x3 grid with varying spacing to test if tags interfere with each other. We tested dynamic performance with the same 6 tags mounted on a tripod, at a height equivalent to a standing pig, which was rolled along the midline of the pen. The data collected were evaluated in R using linear mixed-effects models. E.g. for the single tag measurements, we used the distance between the location estimates of our RTLS and the location as measured with a laser distance meter in the barn as the outcome variable of a statistical model. We defined the locations (four-level factor) and heights (three-level factor) and their interaction as fixed effects. We included height nested in location nested in pen as the random effects to account for the experimental design and dependency of the single measurements. We expected that the deviations of the estimates from the true locations increased with lower heights and that this effect was stronger at the edges of the pens, which were closer to the barn structure as compared with the center of the pen. A high degree of accuracy allows for precise assignment of the functional areas in which individual animals are located, e.g. to analyze if a designated elimination area is also used for lying behavior by calculating the time spent at there.

Influence of social position on the feeding behavior of Nellore cattle

No 18

Tuesday, 1st August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Mrs. Julia Valente [1], Dr. Matheus Deniz [2], Dr. Karolini De-Sousa [3], Dr. Maria Eugênia Mercadante [3]

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This study aimed to evaluate the influence of social position on the feeding behavior of Nellore cattle. Weaned male calves with (mean ± SD) 276 ± 23.1 days old and an average weight of 269 ± 37.6 kg were evaluated separately in three feed efficiency tests with separate animals (2014, n = 58; 2016, n = 71, and 2017, n = 71). Animals were housed in two collective pens, each equipped with five electronic feeders (GrowSafe^{Ò}) and one water trough. The frequency of visits to the feeder, time spent in the feeder, and dry matter intake (DMI) were automatically obtained by the feeders. Furthermore, with the DMI data, we estimated the residual feed intake (RFI). The animals' social position was determined using replacements at the feeder; i.e., a replacement was considered when one bull pushed another bull and then occupied the same feeder in an interval of 1s - 10s. Based on replacement data, the animals were classified into three social categories (dominant, intermediate, and subordinate). A generalized linear model with Gamma distribution, logarithmic link function, and confidence interval of 95% was used. For interpretation purposes, the model estimative (ME) was used. The ME represents the odds of a given event occurring in relation to the reference category (dominant). The distribution of social hierarchy categories varied over the three years of the study. In 2014, 21% of the animals were classified as dominant, 61% as intermediate, and 18% as subordinate. In 2016, 15% were dominant, 48% intermediate, and 37% subordinate. In 2017, 18% were dominant, 54% intermediate, and 28% subordinate. Intermediate (ME: -0.082; $p<0.001$) and subordinate (ME: -0.127; $p<0.001$) animals were less likely to visit the feeder than dominant. In contrast, intermediate (ME: 0.164; $p<0.001$) and subordinate (ME: 0.265; $p<0.001$) animals were more likely to spent longer time at the feeder than dominant. Also, intermediate (ME: 0.03; $p<0.001$) and subordinate (ME: 0.09; $p<0.001$) animals were more likely to intake greater dry matter (I – ME: 0.22; and S – ME: 0.29) and were more likely ($p<0.001$) to show higher RFI than dominant animals. Our findings showed that social position influences the feeding behavior of Nellore cattle. Based on the RFI, we concluded that dominant animals were more efficient than intermediate and subordinate animals. So, dominant animals tend to consume less dry matter to gain the same weight as the average of the population in which they were evaluated.

Plasticity of Grazing Patterns on Rangeland in California Beef Cattle

No 19

Tuesday, 1st August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Ms. Maggie Creamer [1], ***Dr. Kristina Horback*** [1]

1. *Center for Animal Welfare, Department of Animal Science, University of California, Davis*

Grazing patterns of domestic beef cattle on expansive landscapes (i.e. rangelands) have been shown to be relatively stable over time, which can lead to under or overgrazing. Management tools (e.g., supplement blocks, water troughs) are implemented to optimize cattle grazing distribution to maintain vegetation quality, reduce pressure on sensitive riparian areas, and increase stocking density while accommodating the nutritional requirements of cattle. Unfortunately, these tools do not adjust the grazing patterns for all cattle. The objectives of this study were to examine individual consistency in grazing patterns among a herd of breeding cows (n=43) across two summer grazing seasons (June – September 2021 and 2022) on a 625-acre rangeland pasture in Northern California, and, to evaluate the effect of a new water trough at high elevation on individual grazing patterns. GPS collars collected location data approximately every 10 minutes and data were processed by GIS and R statistical software to remove outliers and obtain elevation, distance traveled, and distances to supplement sites and water. Between summer 2021 and summer 2022, average daily elevation use increased ($M = 17.13$(meters); paired $t(42) = 4.03$, $p<0.001$), and average daily distance traveled decreased ($M = 405.28$(meters); paired $t(42) = 8.07$, $p<0.001$). Cattle were evaluated for consistency across the two years based on Spearman's rank correlations and adjusted repeatabilities of rangeland use metrics. Cattle were consistent in 95% home ranges ($r = 0.41$, $p <0.01$; $R = 0.582$, $SE = 0.09$, $p < 0.001$), elevation use ($r = 0.45$, $p <0.01$; $R = 0.394$, $SE = 0.12$, $p < 0.05$) and distances to water ($r = 0.42$, $p <0.01$; $R = 0.452$, $SE = 0.12$, $p < 0.01$) and supplement ($r = 0.45$, $p <0.05$; $R = 0.359$, $SE = 0.13$, $p < 0.05$), however were not consistent in daily distance traveled across the two years ($r = 0.13$, $p = 0.41$; $R = 0.206$, $SE = 0.15$, $p = 0.18$). These results indicate that overall grazing patterns were influenced by the addition of a water trough, however some individual cattle were more rigid in rangeland use while others displayed plasticity in grazing patterns. This study is representative of the need to incorporate applied animal behavior techniques in rangeland management. Cattle ranchers should consider rigidity/plasticity of animal personality when evaluating the success of management tools to achieve optimal grazing distribution, and perhaps include personality assessments into breeding regimes to attain environmental sustainability of grazing lands.

Use of machine learning to distinguish between rigid versus flexible behavioural patterns in Asian elephants (Elephas maximus): a pilot study

No 20

Tuesday, 1st August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Ms. Yuting Lin [1], ***Prof. Tiago Branco*** [2], ***Prof. Troy Margrie*** [2], ***Prof. Christine Nicol*** [1], ***Mr. Lewis Rowden*** [3], ***Ms. Sanna Titus*** [3], ***Dr. Sofía Miñano*** [4], ***Dr. María Díez-León*** [1]

1. *Royal Veterinary College,* ***2.*** *UCL Sainsbury Wellcome Centre for Neural Circuits and Behaviour,* ***3.*** *UCL Sainsbury Wellcome Centre for Neural Circuits and Behaviour; Zoological Society of London,* ***4.*** *UCL Centre for Advanced Research Computing*

Abnormal repetitive behaviours (ARBs) are performed by millions of animals under human management, typified by their rigidity and association to poor welfare. However, whether they represent adaptive/ maladaptive behavioural responses or result from brain dysfunction has been understudied, partly because of the difficulty obtaining detailed, large-scale data on different forms of repetitive behavioural patterns while testing for cognitive and behavioural flexibility (e.g. in social contexts). New technologies, such as machine learning and computer vision, can help refine the classification and quantification of ARBs and enable more accurate and efficient analysis of large datasets, allowing for the discovery of new patterns and relationships that may be difficult for humans to discern. Here, we pilot the use of machine learning to differentiate rigid *versus* flexible behavioural patterns in elephants. Zoo elephants are ideal models as individuals of the species are known to perform ARBs, with global variation in social and environmental housing conditions impacting behaviour. We present an automated pipeline based on DeepLabCut (Mathis et al., Nat Neurosci. 21(9):1281–9, 2018) to estimate poses of six female Asian elephants (*Elephas maximus*) (five adults, one calf) at ZSL Whipsnade Zoo, using a dataset of 698 labelled frames consisting of 14 keypoints for each elephant. Based on pose estimation and tracking data, we constructed a supervised classifier using DLC2Action to predict rigid *versus* flexible behavioural patterns in one individual. The model achieved a normalised mean Average Precision of 0.812 and demonstrated good generalisation performance on unseen test videos, specifically for the same individual in the same enclosure across different time periods. Statistical results showed a strong, positive correlation between predicted mean probability of repetitive behaviours and actual proportion of time spent on those behaviours from human labelled data (r^2=0.973, P<.001) and a strong, negative relationship with the time spent on inactive behaviours (r^2=-0.952, P<.001). Our findings show the feasibility of using machine learning to identify ARBs (such as swaying and backward pacing). Further improvement is necessary for accuracy, and better algorithms and camera angles would be required to deal with severe occlusions often observed in naturalistic behaviours in elephants. The pilot study presents an innovative approach for investigating rigid *versus* flexible behavioural patterns in elephants and other animals, that can help automate ARB detection and investigate the relationship between behavioural and cognitive flexibility. We propose this method to complement current behavioural measures and help identify functional implications of a lack of behavioural flexibility.

Evaluation of infrared thermography as a non-invasive method for measuring stress in dairy cows during isolation

No 21

Tuesday, 1st August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Dr. Dinu Gavojdian [1], ***Mrs. Madalina Mincu*** [1], ***Dr. Ioana Nicolae*** [1]

1. *Research and Development Institute for Bovine*

Cattle are highly gregarious and form complex social relationships with their conspecifics, while social isolation was shown to induce strong negative behavioural and physiological responses, representing a welfare concern. However, during a typical production cycle, dairy cattle are frequently isolated e.g. in calving, AI or hospital pens, or regrouped based on their lactation status or productivity. The aim of the current pilot study was to evaluate if infrared thermography (IRT) could be used as a non-invasive tool for measuring stress in dairy cows under short isolation challenges. The study was carried out at the Experimental Farm of the Research and Development Institute for Bovine Romania, on 20 Holstein lactating multiparous dairy cows (2nd parity), during July 2022. Cows were housed in a tied stanchion barn, and were isolated individually from the herd for 4 hours post-milking. Eye and nasal IRT temperature were taken from a distance of 1.5 m each time, at pre-isolation (0 h), 2 h- and 4 h post-isolation, using FLIR ONE Pro LT mobile cameras and FLIR Systems INC© image processing software. Procedures were approved by RDIB Institutional Review Board (approval code PN-III-P1-1.1-TE-2021-0027), with gentle handling methods being always implemented during animals handling and isolation. Comparisons between the 3 time points were carried out using the nonparametric Mann-Whitney U test, all statistical inferences were carried out using Minitab17 software (Minitab LLC®) and decisions about the acceptance or rejection of the statistical hypothesis were made at the 0.05 level of significance. Eye IRT temperature increased significantly ($P \leq 0.05$) from 31.51±0.45°C pre-isolation, to 32.54±0.29°C at 2 h post-isolation and then decreased ($P > 0.05$) to 31.74±0.44°C at 4 h post-isolation. Nasal IRT temperature followed a similar pattern during the trial, increasing significantly ($P \leq 0.01$) from 27.86±0.54°C pre-isolation to 29.87±0.32°C at 2 h post-isolation and then decreased ($P > 0.05$) to 29.13±0.53°C at 4 h post isolation. In the present study, the nasal IRT temperature showed the highest sensitivity to the isolation challenge. Results are in accordance with previous studies which shown that cattle faced with negative stimuli can express learned helplessness, resulting in animals abandoning their attempts to avoid the negative context due to a perceived lack of control. The current pilot research showed that IRT could represent a feasible non-invasive method to assess transitory acute stress in dairy cattle, however, further studies are needed in order to validate the method.

Turkey on the track: Tracking turkey chicks automatically based on a deep learning algorithm.

No 22

Tuesday, 1st August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Prof. Jenny Stracke [1], ***Prof. Nicole Kemper*** [2], ***Mr. Rasho Ali*** [3], ***Ms. Mareike Dorozynski*** [3], ***Dr. Max Mehltretter*** [3]

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Speaking of animal welfare, one originally refers to the quality of an individual animal's life in relation to its environment. Most farm animals are kept in large groups. However, despite the relevance for farm animal welfare, there is only little information on the influence of individual personality on group performance. Furthermore, there is only sparse knowledge on what constitutes optimal behaviour in the group. This is basically due to technical gaps and limitations in resources, as such measures require a large data set over a long time period.

As a first step to approach this issue, the presented study aims to automatically track single animals in a group of turkeys to measure synchronous behaviour and the distribution of animals in space. The approach is based on image processing, as the usage of body-attached sensor technique is problematic in turkeys.

The study was performed on an organic farm housing turkeys (Cröllwitzer x Hockenhull) under German organic standards in single pens. Per pen, fifteen turkey chicks and an adult animal were housed. Pens were equipped with stationary cameras, recording animals over 24 hours. Videos were recorded with 30 frames per second and a resolution of 1280x720 pixels. Videos were annotated using axis-aligned bounding boxes to identify single turkey chicks. In total, the dataset consists of seven annotated video sequences of which five have a length between 1800 and 1850 frames, one video sequence with 2000 frames and one video sequence with 4000 frames. Data was split to create training, validation and test sets. We used a non-motion-model based tracking approach (Tracktor, Bergmann et al., IEEE/CV pp. 941-951, 2019). To improve the detection step we used more extensive data augmentation than the original approach. Additionally, we use a multi-scale re-identification model (MuDeep, Qian et al., ICCV pp. 5399-5408, 2017) to improve the re-identification of the detected chicks after the occlusion. For evaluating the detection model three metrics are used, namely Precision, Recall and Average Precision. For the quantitative evaluation of the results, we used the consistency of the trajectories (IDF1), the multiple object tracking precision (MOTP) and the multiple object tracking accuracy (MOTA).

Using our modified approach improves IDF1 (65.2%) and MOTA (62.7%) compared to the original approach (IDF1: 57.7%; MOTA: 60.8). This approach forms the base for further studies tracking single animals and in consequence will enable to measure synchronicity and inter-individual distances between single birds in a small group of animals.

Activity patterns of healthy calves housed in large groups

No 23

Tuesday, 1st August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Mr. Dengsheng SUN [1], ***Dr. Gwenaël Leday*** [2], ***Dr. Rik van der Tol*** [1], ***Dr. Laura Webb*** [3], ***Dr. Kees van Reenen*** [4]

1. *Agricultural Biosystems Engineering Group, Wageningen University & Research,* ***2.*** *Biometris Group, Wageningen University & Research,* ***3.*** *Animal Production Systems Group, Wageningen University & Research,* ***4.*** *Livestock Research, Wageningen University & Research*

Young calves are susceptible to disease. Studies indicate that calf activity often changes prior to a clinical diagnosis. Accelerometers can monitor activity continuously, offering an opportunity for early detection of disease in individual calves, based on deviation from 'normal' activity patterns. This requires the prior understanding of activity patterns in healthy calves. This study aimed at describing the normal activity patterns of group-housed healthy calves. Holstein-Friesian calves (n=231; 17 ± 4 d of age at arrival) were housed in six large pens. Milk replacer was available via automatic milk feeders twice daily (at around 4h30 and 15h30, each meal lasted about 6h). Calves had ad libitum access to starter. Accelerometers (SmartTag, Nedap N.V., the Netherlands) were fastened to one front ankle of each calf. High frequency (sum of every 15min) activity data for standing were continuously recorded from 6 to 28 weeks of age. Clinical examination was carried out twice per week by trained staff between 8 to 25 weeks of age, whereby any symptom of disease (e.g. nasal discharge) was scored a 1, 2 or 3 based on the severity, and subsequently summed to reach a 'health score'. A calf day was defined as a sick day when either: the total health score was ≥ 5, the temperature was ≥ 39.5, or diarrhea was detected. All calf days defined as sick, and between two healthy diagnoses, were removed from the dataset. Generalized additive mixed models with a Gaussian response were used to estimate daily group patterns of standing per week, corrected for trends over time/age. From these activity patterns, the following features (per week) were extracted from the model: number of peaks, time (of the day) of peaks, and the height (i.e. absolute value) of each peak. Preliminary results based on 40 calves showed that the mean number of peaks within a day for standing ranged from 2 to 4, with a decrease from 4 peaks between week 8 and 20 (at 4h54, 10h34, 16h29, and 19h50 in week 8), to 3 peaks between week 21 to 25 (at 5h35, 10h59, and 20h54 in week 21). The second peak tended to be the highest, while the third peak tended to be the lowest. We conclude that the standing pattern of healthy group-housed calves, corrected for trends over time, changes from week 8 to 25 of age, particularly from week 21 to 25, whereby calves drop the afternoon activity peak.

IoT for dogs: what types of technologies are commercially available , and do they work?

No 24

Tuesday, 1st August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Mr. Luis Fernando Costa Garrido [1], ***Prof. Leandro Batista Costa*** [1], ***Prof. Ruan Daros*** [1]

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Internet of Things (IoT) technologies that monitor dog behavior and activity are broadly available. However, to our knowledge, no study has assessed what types of technologies are commercially available, nevertheless if they are scientifically validated. The objective of this study is to assess if such technologies have been validated. Initially, a Google search was conducted to gather commercial products using the term “dog” plus “wearable sensor” and “internet of things”. The first five pages were screened, and companies’ names were retrieved from the companies’ websites, news, opinion articles, and market reports. After finding a company with a commercially available product, the product’s name, type (smart collar, automatic feeder, smart toy, or any other type) and main purpose (track location, activity monitor, nutrition monitoring, reducing stress, or any other purpose) were collected from companies’ official website. Subsequently, Google Scholar was used to search for validation studies using the company or product name. When no studies were found a second search was conducted adding the technology type. The first five pages were screened. Forty commercially available products were found, however, just seven products had studies validating their technology. The validated technologies were smart collars (5/25), environmental sensor (1/1), and camera with treat dispenser (1/3). Other types of technologies were found but not validated (automatic feeder, robot pet sitter, smart door, smart toy). Validated smart collars are used for monitoring location, activity levels, and specific behaviors (scratching, licking, resting, sleeping, walking, running, and eating). The environmental sensor monitors sound, and environment’s temperature and humidity. This technology warns if the dog is barking or facing heat stress when left in closed spaces. Cameras with treat dispensers are used by pet parents to interact with their dogs. One study shows that the use of this product can reduce behaviors associated with stress. Besides validating the technology, this was the only study to address the positive effects of its use (“treat dispenser can reduce stress”). Furthermore, no studies addressed the impacts of the everyday use of these technologies on pet parents. Overall, only few technologies are validated, and even fewer studies assess technology’s potential to enhance dogs’ health and welfare. We suggest that applied ethologists are needed to bridge this knowledge gap and urge our scientific community to engage in discussions with animal technology companies.

Reliability of the observation time for recording agonistic behaviours for welfare assessment of dairy cows

No 25

Tuesday, 1st August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Mx. Miroslav Kjosevski [1], ***Mx. Ena Dobirkj*** [1]

1. *Animal Welfare Center, Department for Animal Hygiene and Environmental Protection, Faculty of Veterinary Medicine – Skopje, Macedonia*

The widely used Welfare Quality® protocol for welfare assessment of dairy cows includes the agonistic behaviour as a single measure for the criterion 'expression of social behaviours' in dairy cows. The measure consists of recording the number of Head butts, Displacements, Chasings, Fights and Chase-ups in total net time of 2 hours, with minimum duration/segment of 10 minutes. The objective of this study was to identify the reliability of the set observation times in the protocol and the optimal sampling time and period of the day for a representative measurement of the agonistic behaviours. In an enclosed area of a free-range farm a herd of 91 dairy cows was continually observed for a total period of 14 hours, from 07:00 (after milking) to 21:00h (night). Besides the main matrix with all agonistic interactions, other multiple matrices with different duration of observation were created, from 10 minutes matrices (agonistic interactions in each 10 min. intervals from 07:00 – 21:00h, 84 different 10 min. samplings) until 120 min. matrices (seven different time samplings). This setup allows comparing the multiple samples, from 7 to 84, of different durations of observation with the standard (14 hours of observation). For reliability testing of the records from different observation periods, the Pearson correlation (r) was made between each period and the overall continuous records. The highest reliability with 10min. interval observations' for all interactions were found at 10:00h, 09:30h and 19:40h ($r=0.67$, $r=0.58$ and $r=0.57$, $p<0.001$) and lowest at 14:40h ($r=-0.09$, $p>0.05$). The reliability of one hour observations was highest at 09:00h and 19:00h ($r=0.73$ and $r=0.72$, $p<0.001$) and lowest at 11:00h ($r=-0.12$, $p>0.05$). While, in two hours observations the most reliable timings were 09:00-11:00h and 17:00-19:00h ($r=0.80$ and $r=0.69$, $p<0.001$) and the least reliable timing was from 11:00-12:00h ($r=0.25$, $p<0.05$). The findings for displacements with highest reliability in 10 and 60 min. observations were starting at 10:00h and 18:00h ($r=0.75$ and $r=0.78$, $p<0.001$), respectively, and the number of fights was higher in the 10-min interval at 13:10h and 09:50h where 13% of all fights were recorded. This study indicates that the most reliable duration for observing the agonistic behaviours in dairy cows are two hours with possible optimization of one hour. The most reliable period for observation was after milking. It is necessary to obtain more data for optimizing the duration and period of observation of the agonistic behaviors in assessing welfare of dairy cows.

Social housing improves dairy calves' performance in a competition test

No 26

Tuesday, 1st August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Ms. Malina Suchon [1], ***Dr. Thomas Ede*** [2], ***Ms. Bianca Vandresen*** [1], ***Prof. Marina A.G. von Keyserlingk*** [1]

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On many dairy farms, preweaned calves are housed individually. However, social isolation is known to impair behavioral development. We investigated the impact of early-life social housing on calves' competitive skills. All procedures used were approved by the UBC Animal Ethics Committee and are in line with ISAE Ethical Guidelines. Holstein heifers (n=18, i.e., focal calves) were assigned to either individual housing (n = 9) or pair housing (n = 9) at the age of 11 d. Each focal calf was match paired based on age (age difference: 1.833 ± 1.384 d) and birthweight[ET1] (BW difference: 4.694 ± 2.804 kg) with an unfamiliar competitor calf reared in a group (range: 7 – 10 calves). Prior to testing, all calves were individually habituated to a test arena that contained a single bottle filled with 0.5L of milk. At 25 d of age, focal calves were subjected to a competition test against their assigned competitor for 5 consecutive days. The test began when both calves entered the test arena and ended when the milk bottle was empty "(test session duration: 74.425 ± 2.296 s, range: 36.4 – 257.7 s). We recorded calves' latency to approach the bottle and time spent drinking. Data were analyzed using Linear mixed-effects models in R 4.0.3. and *P*-values were calculated by Monte Carlo sampling with 1000 permutations. We noted an interaction between competition day and housing treatment on calves' latency to approach the reward (*P* = 0.011) and time drinking from the bottle (*P* = 0.002). Pair-housed calves showed consistently low latencies to approach (slope over days = -0.471 $s.d^{-1}$, *P* = 0.665,), and increased their time spent drinking over competition days (slope = 6.587 $s.d^{-1}$, *P* = 0.023), while individually housed calves' latency increased (slope = 5.518 $s.d^{-1}$, *P* = 0.007) and their time spent drinking decreased over competition days (slope = -2.878 $s.d^{-1}$, *P* = 0.021). To control for the influence of personality on their competitive abilities, calves were subjected to personality tests assessing boldness (i.e., Open Field, Novel Object, and Novel Human) before the housing treatment period and after the competition tests. Boldness tended to affect the latency to approach the bottle (*P* = 0.065) but had no effect on the time drinking to the milk bottle (*P* = 0.844). These results suggest that pair-housed calves outperformed single-housed calves in a competition setting, supporting social housing as beneficial for the behavioral development of dairy calves.

Changes in play behaviour of dairy calves in reaction to weaning and separation from their dam - Do slight age differences impact the responses?

No 28

Tuesday, 1st August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Ms. Anina Vogt [1], ***Dr. Kerstin Barth*** [2], ***Prof. Uta König von Borstel*** [1], ***Prof. Susanne Waiblinger*** [3]

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There is evidence from the literature that increasing age of calves at weaning and separation from the dam is beneficial to the calves' welfare during the weaning process. However, studies so far have examined beef cattle with rather profound age differences of 2-6 months between treatments. We therefore investigated, if small age differences in dairy calves may already affect their reaction to weaning and separation from the dam. For the study, 24 dam-reared dairy calves (age at weaning start: 83–102 days) were weaned and separated over three weeks either with the two-step method using a nose flap or by gradual reduction of contact time to the dam. Calves were fitted with an accelerometer on days -4, +3, +10, +17 relative to weaning start on the medial side of the right hind leg for 9 hours from 08:00 a.m. till 05:00 p.m. for automatic assessment of locomotor play. G-force readings from the accelerometer were analysed using the peak acceleration method, i.e. counts of peak acceleration (CPA) measurements from the accelerometer determine counts of play events of the calf. For validation, a correlation between counts of observed play events from video and CPA measurements was calculated. Differences to baseline (day -4) were calculated for analysis of the treatment weeks by subtracting the baseline value from the value of the treatment week. Baseline values ranged from 6 to 114 CPA (median: 24) and were not associated with age of the calves (r_s= - 0.16, p=0.43), however the six highest baseline values (42–114 CPA) were all seen in younger calves (83–87 days). Results of a GLMM with repeated measures (fixed effects: weaning method, week, sex, interaction of weaning method with week, interaction of weaning method with age at start of weaning; covariate: age at start of weaning) showed that the difference in CPA was 1.46 ± 0.85 measurements more positive for each additional day the calves were older at the start of weaning (p=0.058). That is, the older the calves were when the weaning process started, the lower tended to be their decrease in play behaviour in response to the stressor. Thus, even small increases in weaning age seem to affect responses to weaning and separation. This result is, however, presumably strongly influenced by individual younger calves with very high baseline levels of play behaviour and thus still needs to be confirmed in a study with a larger sample size.

The effectiveness of different pharmacological approaches to mitigate pain following caustic disbudding on calves – A systematic review

No 29

Tuesday, 1st August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Mr. Zimbábwe Osório-Santos [1], ***Prof. Maria Jose Hotzel*** [1]

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Caustic disbudding pain may be underestimated because animals tend to struggle less during its application than during cautery disbudding. Additionally, the literature regarding the need for anesthetics is contradictory. This systematic review aimed to explore the effectiveness of analgesics, anesthetic block, and their combination to mitigate pain following caustic disbudding in calves. Articles were identified via searches in the Google Scholar, Scopus, and Web of Science databases (n=911). Only peer-reviewed, original studies examining the use of analgesics and/or anesthetic block following caustic disbudding were included. Our final sample consisted of 12 studies from 9 articles. Studies' general information and results from the comparison of the group that received a pharmacological intervention with the one that received no pain control (NPC) were extracted. Lidocaine was tested alone or with analgesics on 8/12, and it was the only anesthetic tested. The analgesics tested were flunixin-meglumine (5/10), meloxicam (4/10), and tramadol (1/10). The primary outcomes were cortisol (9/12) and pain behavior (9/12): head shakes/scratches (9/9), transitions between lying and standing (6/9), and ear flicks (5/9). Cortisol and pain behaviors were used to compare the effectiveness of pharmacological interventions across studies. Since studies' observational periods varied from 40min until 24h following disbudding, and time points were not standardized, we clustered findings in three moments following disbudding: within the first hour; 2h-3h; and findings reported after 4h. Within the first hour, calves treated only with analgesics had similar levels of cortisol and pain behavior to the NPC calves, in 2/3 studies. At the same time, lidocaine prevented cortisol rises in 4/5 studies, and lidocaine+analgesic in all 4 studies reported it. Accordingly, lidocaine alone (4 studies) or with analgesics (3 studies) reduced pain behavior expression. Between 2-3 hours, lidocaine alone resulted in higher cortisol levels than the NPC group in 2/3 studies, although pain behavior did not differ in any study (4). Analgesics alone or with lidocaine prevented this cortisol raise in 3 studies and reduced pain behaviors in 2/3. From 4 hours, the use of lidocaine and analgesics alone or combined did not result in cortisol differences from the NPC group. However, analgesics alone or combined reduced pain behaviors in 2/3 studies, while Lidocaine alone increased it in 2/3. Our results show that caustic disbudding pain is better mitigated when the anesthetic block is combined with analgesics, reducing the acute pain immediately following the procedure and preventing later pain response when the anesthetic effect wanes.

Expert elicitation to design a risk-based framework for monitoring welfare on EU dairy farms

No 31

Tuesday, 1st August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Dr. Eliana Lima [1], ***Prof. Christoph Winckler*** [2], ***Dr. Hans-Hermann Thulke*** [3], ***Dr. Denise Candiani*** [1], ***Ms. Mariana Aires*** [1], ***Dr. Yves Van der Stede*** [1], ***Prof. Martin Green*** [4]

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The European Food Safety Authority (EFSA) provides scientific advice to legislators on food safety and animal welfare. EFSA was requested by the European Commission to identify characteristics of dairy farms that could be used as risk-indicators of poor welfare, including characteristics that impact cow behaviour. A literature review revealed insufficient evidence to complete the request, therefore an expert elicitation was undertaken. The aim was i) to define key characteristics of farms at high risk of poor welfare and ii) to devise a practical method of welfare assessment, using animal-based measures (ABM) on high-risk farms, to allow targeting of farms that require corrective action.

Method: Eight EU dairy cow specialists were requested to participate in the elicitation. The elicitation comprised three phases, based on a Nominal Group Technique, an approach that facilitates idea generation and leads to group consensus. In Phase 1, farm characteristics (FC) associated with poor welfare were identified and ranked. FC were required to be measurable without a farm visit; either by annual self-reporting by farmers or from national databases. The five highest ranked FCs were carried forward to Phase 2. Phase 2 comprised identification of welfare consequences, including behavioural impacts, judged to originate from the presence of each FC, followed by selection of ABM to be used to assess each welfare consequence at a farm visit. In Phase 3, a threshold value for each ABM was elicited (the point at which the farm would be required to take corrective action).

Results: The 5 highest ranked farm characteristics were: 1) Farms with more cows than available cubicles, 2) Farms with <7m^2/cow total space for housed cows, 3) Farms on which cubicle dimensions are inappropriate, 4) Farms with a high mortality rate (rate of on-farm mortality /emergency slaughter over a 1-year period), and 5) Farms that do not provide access to pasture for at least 60 days of the year. Behavioural and health-related ABMs to evaluate cow welfare on farms with these characteristics were: FC1 - hygiene score, occurrence of agonistic interactions, gait score; FC2 - occurrence of agonistic interactions, gait score; FC3 – deviations from normal rising behaviour, integument lesion score, gait score; FC4 - mortality rate, FC5 - gait score, integument lesion score. In conclusion, a risk-based scheme to evaluate dairy cow welfare across EU dairy farms was developed. It is recommended that this scheme is piloted to validate its practicality and effectiveness, prior to widespread implementation.

Goats that stare at video screens –behavioural responses of goats towards images of familiar and unfamiliar con- and heterospecifics

No 32

Tuesday, 1st August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Ms. Jana Deutsch [1]***, Mr. Steve Lebing*** [1]***, Dr. Anja Eggert*** [2]***, Dr. Christian Nawroth*** [2]

1. *University of Rostock,* ***2.*** *Research Institute for Farm Animal Biology (FBN)*

Many cognitive paradigms rely on active decision-making, creating participation biases (i.e., the lack of learning how to indicate a choice) while once-learned contingencies might bias the outcomes of subsequent similar tests. Additionally, many domestic farm animal species are descendants of prey animals, equipped with a heightened vigilance towards novel (and thus potentially threatening) stimuli. However, this might also impede our ability to correctly assess their cognitive capacities as this vigilance might also hamper their active decision-making in choice tasks. We here present a promising approach to study goat perception and cognition without the need to extensively train animals, allowing less-bias prone repeated testing of subjects and therefore adhering stronger to the 3Rs principle. In our looking time paradigm, we assessed the attention of 10 dwarf goats (*Capra hircus*) towards images of familiar and unfamiliar con- and heterospecifics using an experimental apparatus containing two video screens. Subjects were confronted with images on either the left or the right screen of the apparatus while the other screen remained white. The presented images were single faces of either familiar or unfamiliar goats or humans, presented for 10 seconds each. Each subject received 8 trials for each stimulus type, resulting in a total of 32 trials. Subjects' behavioural responses (direction of first look, looking duration) were assessed and analysed using a linear mixed-effects model. Goats paid more attention towards images depicting other goats compared to humans (1.89 s ± 0.38 s and 1.27 s ± 0.25 s respectively). But they did not significantly differ in their looking behaviour when confronted with familiar vs. unfamiliar individuals (1.59 s ± 0.30 s and 1.51 s ± 0.29 s, respectively). This indicates that goats can discriminate between two-dimensional con- and heterospecific faces, but also that they either lack the ability to categorise other individuals regarding their familiarity using 2D face images alone or might be unable to recognise these images as representations of real-life subjects. The looking time paradigm developed in this study is a promising approach to investigate a variety of other research questions linked to how domestic ungulate species perceive their physical and social environment. Future steps will encompass the automation of the stimulus presentation and video coding, which will enable future home-pen implementation of the apparatus and multi-site testing.

The use and effect of a hiding space on the lying and sleep-like behaviour of newborn dairy calves during temporary separation from their dams

No 33

Wednesday, 2nd August - 15:45: Poster presentations in oral format (Grande Hall) - Poster

Ms. Hannah Spitzer [1], Dr. Rebecca Meagher [2], Dr. William Montelpare [3], Dr. Shawn McKenna [1], Dr. Miriam Gordon [2], Dr. Kathryn Proudfoot [1]

1. *Atlantic Veterinary College, University of Prince Edward Island,* ***2.*** *Department of Animal Science and Aquaculture, Dalhousie University,* ***3.*** *Department of Applied Human Sciences, University of Prince Edward Island*

In feral herds of cattle, newborn calves hide for several days before joining the herd. It is unclear whether indoor housed dairy calves show similar hiding behaviour when temporarily separated from the dam. The objectives were to describe the hiding behaviour of dairy calves during temporary separation from the dam during the first week of life and assess the effect of a hide on lying and sleep-like behaviour (resting with head still and neck raised or relaxed) of calves. Twenty-eight cow-calf pairs were randomly assigned to 1 of 2 treatments: a hide (n=14), or no hide (n=14). The hide was constructed using 3 solid panels (each 107h x 76w cm) to create a "U" shape to fit the calf but not the dam. Between treatments, calves were match-paired considering sex and breed (Holstein and Holstein-Angus cross). The cow was moved into 1 of 3 experimental pens before or within 2 h of calving. Beginning 3 d after calving, the cow was temporarily removed from the pen twice daily (am and pm) for milking. On d 7, the pair were separated and removed from the experimental pen. Hide use (n=14; duration of time spent in the hide and near the hide), as well as lying and sleep-like behaviour (n=28; duration, bouts, and bout duration) were recorded continuously using video cameras during the first 1 h after the dam was removed for am milking on d 3-6. Descriptive statistics were calculated for hide use across days. For lying and sleep-like behaviours, an area under the curve (AUC) was calculated for each calf; Wilcoxon Signed Rank tests were used to evaluate the hypothesis that the provision of a hide will increase behaviours of interest. Hide use decreased over days (in hide slope=-2.91; near hide slope=-4.14) and was variable between calves. Lying duration (P=0.21), bouts (P=0.32), and bout duration (P=0.30) were not different between treatments. Duration of sleep-like behaviour was higher (Z=-1.91; P=0.03) for calves without a hide (median=15.12 min/d) compared to those with a hide (median=12.75 min/d). The number of sleep-like bouts were not different between treatments (P=0.38), but the duration of sleep-like bouts tended to be higher (Z=-1.68; P=0.05) for calves without a hide (median=3.36 min/d) compared with those with a hide (median=2.48 min/d). Results suggest that providing calves with a space to hide during temporary separation from the dam can affect their sleep-like behaviour.

Piglexity – A simulation to understand behavioural complexity as a basis for its use as an integrative welfare indicator

No 34

Wednesday, 2nd August - 15:45: Poster presentations in oral format (Grande Hall) - Poster

Ms. Christina Raudies [1], ***Dr. Lorenz Gygax*** [1]

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Behavioural complexity is thought to reflect the ability of an animal to adapt to its environment. If it can do so flexibly, an animal follows its wants and reaches its goals, both of which are likely to be associated with positive emotional states. Accordingly, it is expected that higher levels of behavioural complexity are related to better animal welfare. Complexity could therefore serve as an integral indicator of welfare. Here, we simulate behavioural sequences varying different aspects of complexity and can learn accordingly which and how these aspects influence the level of complexity. We further test how these changes in the simulation are reflected in the measure of behavioural complexity that we propose.

For the simulation, we use the R package MicSim (Zinn 2022 originally designed for continuous time microsimulation for social studies). We vary the number of potential behavioural states continuously between 5 and 20. We simulate also behavioural transitions with lower transition probabilities, meaning an animal spends a longer duration in the state before the transition (in nature, e.g., resting or exploration) and with higher transition probabilities (shorter duration in the state; in nature, e.g., agonistic or play behaviour). This is integrated into our simulation by varying the proportion of transitions with low and high probabilities continuously between 0 and 1. Moreover, the difference between low and high transition probabilities is also varied. Finally, the variation within transitions with low or high probability is further varied. We run 500 simulations that vary the different aspects based on a four-dimensional Halton sequence (aspects independently varied).

The simulation runs will then be evaluated using a measure of behavioural complexity. This measure will include the proportion of potential behaviours observed, the number of potential transitions observed and the variability in transition probabilities within and between the potential transitions. The latter will be based on multi-state parametric survival analysis reflecting the fact that a basic definition of behavioural complexity is based on the extent to which subsequent behaviours depend on the preceding behaviours. These aspects of complexity will be integrated based on a principal component analysis.

In our overall project, a follow-up step will be to validate this measure of behavioural complexity in practice for fattening pigs on farms with different husbandry systems. We expect a higher level of behavioural complexity on farms where the animals' environment is closer to natural conditions compared to more intensive and artificial environments.

Comparison of conventional-indoor, deep-straw, and organic systems on pig welfare evaluated at fattening phase and slaughterhouse.

No 35

Wednesday, 2nd August - 15:45: Poster presentations in oral format (Grande Hall) - Poster

Mr. Marc Bagaria [1], Mr. Pau Aymerich [2], Ms. Carme Soldevila [2], Mr. Giovanni Marcone [3], Ms. Maria Francisca Ferreira [4], Dr. Emma Fabrega [5]

1. *Institute of Agrifood Research and Technology (IRTA),* ***2.*** *Vall Companys Group, Lleida,* ***3.*** *Institute of Veterinary Medicine and Animal Sciences, Estonian University of Life Sciences, Tartu, Estonia,* ***4.*** *School of Agrarian and Veterinary Sciences (ECAV), University of Trás-os-Montes and Alto Douro, Vila Real, Portugal,* ***5.*** *Institute of Agrifood Research and Technology (IRTA), Monells*

Pigs are produced in a variety of systems, from conventional-intensive to organic farming, which are expected to present a different impact on pig behaviour, welfare, and productivity. The objective of this study was to investigate the effect of the productive system on pigs' welfare. Three fattening systems were compared: conventional-indoor(C), deep-straw(S), and organic(O). In the C system 13 docked pigs were housed in partially slatted floor pens at 0.69 m²/pig, whereas S and O were housed in pens with 54 (1.36 m²/pig) and 65 (1.4 m²/pig) undocked animals, respectively, in deep-straw concrete floor and an outdoor run. The following parameters were assessed weekly for 10 weeks in 80 fattening pigs per system: behaviour using instantaneous scan and continuous sampling (positive and negative social encounters, enrichment and pen exploration, tail and ear biting, resting), health (respiratory, thermal comfort, scouring, body manure, skin, ear, and tail lesions), and environment (temperature, relative humidity, ammonia, and CO□). Hair samples for cortisol analysis were taken at the end of the fattening phase. At the slaughterhouse, ear, tail, and carcass lesions were evaluated, and blood was collected to analyse lactate and neutrophil-to-lymphocyte ratio. Data analysis was performed using different GENMOD, GLIMMIX, and GLM with SAS 9.4 software. C pigs showed less pen (3.8%(C), 6.9%(S), 4.3%(O), p<0.05) and enrichment exploration (6.3%(C), 7.5%(S), 8.2%(O), p<0.05) and rested more (72%(C), 57%(S), 68%(O), p<0.05), whereas S pigs showed less social negative interactions (3.4%(C), 2.1%(S), 3.2%(O), p<0.05). Scouring (0%(C), 100%(S), 100%(O), p<0.001) and body manure were lower in C systems (23%(C), 47%(S), 74%(O), p<0.05). O pigs presented less skin lesions (24%(C), 14%(S), 0%(O), p<0.001). C system presented higher temperature (20ºC(C), 16 ºC(S), 17.5ºC (O), p<0.05), ammonia (9ppm(C), 5ppm(S), 0ppm(O), p<0.001), and CO□ concentrations (0.18%Vol(C), 0.13%Vol(S), 0.05%Vol(O), p<0.001). O pigs presented lower hair cortisol (16.1pg/mg(C), 25.5pg/mg(S), 9.6pg/mg(O), p<0.001) and neutrophil-to-lymphocyte ratio (1.1(C), 1.1(S), 0.6(O), p<0.001). At the slaughterhouse, carcass lesions were lower in C pigs (31%(C), 48%(S), 61%(O), p<0.001), and tail lesions were higher in S compared to O (26%(S), 11%(O), p<0.001). In this study, pigs kept following EU organic production legislation presented lower levels of chronic stress according to cortisol in hair and neutrophil-to-lymphocyte ratio compared to the other systems. The deep-straw system prevented tail lesions to the same extent as the organic, although levels of chronic stress were found to be higher. Conventional-indoor pigs were cleaner and presented less carcass lesions but were less active and environmental quality was lower.

Stress-induced hyperthermia and the fear response of chicks to intermittent noise depend on the stress level of their mothers

No 36

Wednesday, 2nd August - 15:45: Poster presentations in oral format (Grande Hall) - Poster

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Maternal stress has an impact on the welfare of chicks. However, little is known about the responses of chicks to intermittent noise (IN), whose mothers were subjected to different levels of physiological stress (using exogenous corticosterone), administered for 14 days via oral delivery. This study involved the use of 3-week-old Yoruba ecotype chicks hatched from hens offered 0 (15 chicks), 2 (10 chicks), 4 (10 chicks), and 6 (9 chicks) mg of exogenous corticosterone (eCORT). All the chicks were subjected to a one-time exposure to intermittent noise for one hour (9–10 a.m.). The playback noise (65 dB), which was a combination of sounds from the generator, truck, and marketplace, was played intermittently at regular intervals of 10 minutes over an hour (the chicks were exposed to the noise three times). Before and after the one-hour playback of intermittent noise, the level of fear (number of attempts to induce tonic immobility (NOA) and duration of tonic immobility (DTI)) was measured using a tonic immobility test (TI). Also, the surface body temperatures from the eyes (ET) and under the wings (WT) were measured using a HTi thermal image camera. The data on NOA and DTI were analyzed using a two-related sample t-test, while ET and WT were analyzed using a paired sample t-test. Analysis was done separately for chicks with different levels of maternal stress. ET and WT of chicks from control mother hens were similar before and after the IN, but the NOA was lower ($Z = -2.326$, $P = 0.020$) after the IN. Chicks from hens treated with 2 and 4 mg eCORT had higher ($t(9) = -4.275$, $P = 0.002$, and $t(9) = -4.561$, $P = 0.001$) WT after IN, but ET, NOA, and DTI were not affected. Finally, chicks from hens treated with 6 mg eCORT had a lower ($t(8) = 4.369$, $P = 0.002$) ET after IN, but there was no effect on WT, NOA, or DTI. In conclusion, intermittent noise increased the level of fear in chicks from control hens. Chicks from mothers subjected to 2 mg and 4 mg eCORT showed an increase in WT, while those from mothers subjected to 6 mg eCORT had a reduced ET after exposure to intermittent noise.

A preliminary study of behaviour and emotions of therapy horses during training

No 37

Wednesday, 2nd August - 15:45: Poster presentations in oral format (Grande Hall) - Poster

Dr. Anna Lundberg [1], ***Ms. Johanna Johansson*** [1], ***Ms. Petra Boelhouwers*** [1], ***Dr. Hanna Sassner*** [2], ***Dr. Jenny Yngvesson*** [1]

1. *Section of Anthrozoology and Applied Ethology, Dep. of Animal Environment and Health, Swedish University of Agricultural Sciences,* ***2.*** *Section of Animal Environment and Building Function, Dep. of Biosystems and Technology, Swedish University of Agricultural Sciences*

Our aim was to investigate the emotional reactions of therapy horses when trained in a standard procedure, relevant to their use as therapy horses. There is growing evidence of the efficacy of horse-assisted interventions on human wellbeing; however, studies on horse welfare in these situations are not consistent.

We contacted around 16 therapy stables in a region of Uppsala, Sweden and were welcomed to eight of those, specialised in human care and therapy. In total nine horses were exposed to five different semi-new tasks. The horses were trained in a known environment by their regular trainer, wearing their regular tack. Five different exercises were reviewed; to stand with both front feet on a pad, to cross a line of 5 m kitchen paper, to walk sideways over a pole with the front hoofs on one side and rear hoofs on the other, to back up where length and direction was decided by each trainer, and to be desensitized to an umbrella. Behaviour (mainly aversive), heart rate (polar), and heart rate variability was registered. All values are given as medians.

All horses performed the tasks, however HR-data is missing for the hoof pad task for one horse. Of all exercises, the trainer spent longest time with the umbrella task (194.7 sec, Q1-Q3 153.6-291.5), the highest heart rate was registered during the kitchen paper task (39 bpm, Q1-Q3 36-44), the lowest was found during the umbrella task (35 bpm, Q1-Q3 32-42), $p<0.001$, $Z=-8$, $H=64.7$). The lowest HRV occurred during the kitchen paper task (1467 RR interval, Q1-Q3 1273-1640), whereas the highest HRV was found during the umbrella task (1716 RR interval, Q1-Q3 1363-1933, $p<0.001$, $Z=9.5$, $H=89.3$). When comparing the umbrella and the kitchen paper tasks the number of behaviours showed by the horse was highest for the umbrella task (4.5 vs 1 behaviour) but the frequency was lower (0.99 behaviours/min vs. 2.4 behaviours/min). The most common behaviours were “ears directed backwards”, “tongue outside mouth” and “chewing”.

These results are preliminary and should be interpreted carefully. However, they point at the importance of combining both behaviour and physiology to fully understand how horses perceive training. In this case horses may, somewhat surprising, find kitchen paper more frightening than an umbrella. “Chasing” an umbrella, as some trainers let the horses do, may potentially be connected with feelings of curiosity and control while crossing a novel stimuli on the ground may be intimidating.

Social structure and network position of group-housed dairy calves

No 38

Wednesday, 2nd August - 15:45: Poster presentations in oral format (Grande Hall) - Poster

Dr. Katharine Burke [1], ***Ms. Katie Gingerich*** [1], ***Dr. Emily Miller-Cushon*** [1]

1. *University of Florida*

Gregarious animals often choose to interact with other individuals based on characteristics such as sex, age, and body size. However, we know little about the social structure and development of group-housed calves. The aim of this study was to determine factors influencing a calves' social network position and assess individual consistency. Holstein calves were group-housed (9 groups; 10 calves/group) at approximately 2 weeks of age (M = 15 d, SD = 2.9). Calves (heifer: n = 55, bull: n = 32) were weaned over 10 d beginning at 40 d of age (M = 47 d, SD = 2.5) and remained on treatment until 9 weeks of age. Continuous positional data were recorded within the pen using an ultra-wideband positioning system (TrackLab by Noldus). Non-directed weighted association matrices based on the frequency that calves spent in close proximity (1 meter) were constructed for each group consisting of consecutive 4-day periods per week over 6 weeks. Social network position was measured using two centrality measures: strength and eigenvector. To determine factors that influence social structure, mixed models were used to test fixed effects of sex, weight, age at grouping, season (warm or cool), and time period (pre-weaning, weaning and post-weaning), with group and calf ID as nested random factors. Sex [t=-0.19, p=0.84], weight [t=-1.06, p=0.28], age at grouping [t=0.48, p=0.63], and season [t=0.37, p=0.70] weren't significant predictors of strength. However, time period was a significant predictor for strength [beta = -0.10, 95% CI [-0.16, -0.04], t = -3.95, p < .001], with the highest scores found during pre-weaning and lowest during post-weaning. This suggests that calves were associating with more individuals in the early weeks of group formation and were more discerning with social interactions as time went on. The only predictor for eigenvector was for season [beta = -0.02, 95% CI [-0.04, 0.00], t = -2.00, p =.04], with calves exhibiting higher eigenvector during the cooler months. To test whether eigenvector was consistent over treatment, we used within subjects ANOVA and post-hoc analyses with a Bonferroni adjustment. While strength changed over time, individual eigenvector scores were consistent and did not differ significantly across weeks for all groups (p > min 0.14). Our study suggests that the amount of time spent within a group may play a role in shaping associations in dairy calves, but that dynamics of sociality and network structure may also be driven by individual and life-history traits.

Awareness of smallholder dairy farmers in South West Nigeria on behaviors as positive welfare indicators in dairy cattle

No 39

Wednesday, 2nd August - 15:45: Poster presentations in oral format (Grande Hall) - Poster

Dr. Bukola Oyebanji [1]

1. *Obafemi Awolowo University, Ile-Ife*

Traditionally in Nigeria, dairy production had been limited to Fulani pastoralists who rear local breed of cattle that are not specialized for milk production. The increase in the demand of milk by the growing population of Nigeria which could not be met by local production, and government policy banning importation of milk has made it imperative to develop the dairy sector. In addition, the changing social, economic, political and environmental conditions have brought pastoralism under pressure. This has led to the backward integration by some major dairy companies in Nigeria, which not only involves the pastoralists but other sedentary dairy farmers in the South West of Nigeria.

The study was carried out as a case study of smallholder dairy farmers (<500liters of milk per day per farm and not local pastoralists) in Osun and Oyo states of Nigeria to investigate their knowledge of positive welfare indicators of dairy animals. Questionnaires with open-ended questions on farmers' knowledge of Feeding, access to pasture and rumination, Exploration, Comfort, lying, and resting behaviors, Social affiliative behaviors and brushes, play, maternal and mating behaviors as welfare indicators.

Twenty-one dairy farmers were interviewed. Data was analyzed using MEANS and FREQ procedures of SAS to generate descriptive statistics. The most popular local breed kept by farmers was the white Fulani (Bunaji) cattle while Sokoto Gudali was kept by only two farmers (9.5%). All the farmers were involved in breed improvement through cross-breeding, two of the farmers had exotic bulls for mating, while the rest of the farmers depended on artificial insemination. The average number of animals per farm was 41.4 and average farm size was 43 acres.

Positive welfare in dairy was a new concept to the farmers, although all the farmers were aware about feeding behavior as a health indicator. All (100%) the farmers allowed their animals grazing period between the hours of 10am and 4 pm. Farmers claimed it was more expensive for them to do cut and carry feeding, so grazing was not about welfare but economical issue. Mating behavior was difficult to assess due to the use of artificial insemination by most of the farmers

In conclusion, the dairy sector in Nigeria is still nascent, there is presently no on-farm welfare assessment system. There is need to create awareness among dairy farmers by animal welfare researchers so as to incorporate welfare standards into the culture of the developing dairy industry in Nigeria.

Meeting farm animal behavioural needs to ensure good animal welfare

No 40

Wednesday, 2nd August - 15:45: Poster presentations in oral format (Grande Hall) - Poster

Prof. Bas Rodenburg [1], ***Dr. Mona Giersberg*** [1], ***Dr. Vivian C. Goerlich*** [1], ***Prof. Saskia Arndt*** [1]

1. *Animals in Science and Society, Faculty of Veterinary Medicine, Utrecht University*

In animal welfare approaches, the focus is shifting from preventing welfare problems, towards ensuring positive animal welfare. To reach positive animal welfare states, animals have to be able to adapt to the circumstances in their environment. For this purpose, the environment needs to offer variation and needs to support the animals' behavioural needs. In The Netherlands, the Council for Animal Affairs (RDA), proposed six principles that should be met to provide opportunities for positive welfare in farm animals (modelled after the five domains): 1) the intrinsic value is respected, and animals have 2) good feeding, 3) good housing, 4) good health and 5) opportunities for natural behaviour. They use this behaviour to adapt to their environment to 6) reach a state the animals themselves perceive as positive. Dutch government adopted the report of the Council and proposed that a covenant should be reached between the livestock industry, NGO's and government to make significant progress towards livestock farming with a focus on positive animal welfare. We propose to start this redesigning process from the point of view of the animals: what are the animal's behavioural needs? What should the environment look like to meet those needs? Animal-based design is needed to translate the needs of the animals into a housing system. In this approach, also other sustainability aspects can be integrated, so that the new housing design is also environmentally sustainable and economically feasible. A truly animal-based design should also take away the need for physical mutilations, such as beak trimming in hens, tail docking in pigs and dehorning in cattle and goats. One major question that remains is what the best route is for a transition towards farm animal production with opportunities for positive welfare: is this an evolution of small but significant steps, or is it a revolution where new farms have to be constructed from scratch? Perhaps the most likely outcome is that it will be a mixture of both approaches, reflecting the diversity already present in the farming landscape. For a successful transition, it is also important that the developments in the Netherlands align with European initiatives to improve farm animal welfare, under the Farm to Fork strategy. Perhaps the process in the Netherlands to reach a covenant on positive farm animal welfare can inspire other EU member states to initiate a similar debate, leading to improved farm animal welfare in the European Union.

The effects of unpredictable chronic mild stress on decision-making under ambiguity in laying hens

No 41

Wednesday, 2nd August - 15:45: Poster presentations in oral format (Grande Hall) - Poster

Dr. Lubor Kostal [1], ***Dr. Monika Okuliarova*** [2], ***Prof. Michal Zeman*** [2], ***Dr. Katarina Pichova*** [1]

1. *Centre of Biosciences, Slovak Academy of Sciences, Bratislava,* ***2.*** *Faculty of Natural Sciences, Comenius University, Bratislava*

The phenomenon of affect-induced cognitive bias has been proposed as a proxy measure of the valence (positive/negative) of emotions in animals. In our previous studies (Pichová et al., this volume), we did not prove any or at least consistent judgment bias in laying hens housed under different housing conditions (enriched cages vs. deep litter pens). A possible explanation of these results is that this procedure did not induce a large enough contrast in affective states between the treatment groups. Since in the seminal study of Harding et al. (2004) the negative judgement bias was induced in rats by unpredictable chronic mild stress, we tested the hypothesis whether the unpredictable chronic mild stress will induce negative ('pessimistic') judgment bias also in laying hens. Dominant Leghorn hens (n=22) housed in deep litter pens were trained in a touchscreen operant chamber to discriminate between positive (white circle; rewarded with mealworm) and negative (80% grey circle; punished with white noise) stimuli. For half of the hens, the colours of stimuli were reversed. Fourteen laying hens that mastered the discrimination training were divided into two groups. Eight of them were exposed to unpredictable chronic mild stress, i.e. to one stressor (mixing social groups for 2h, placing groups into a crate for 2h, thwarting access to water for 4h, thwarting access to food for 4h, removing perches and nestboxes for 4h) per day 5 days a week in a randomised sequence for four weeks, and the remaining six served as control. Then the hens were tested in judgment bias tests in which, in addition to the positive and negative stimuli, 3 ambiguous stimuli (20, 40 and 60% grey) were presented. At the end of the experiment, the blood samples for the plasma corticosterone assay were collected from the wing vein. The results of the behavioural tests were analysed using the GLIMMIX procedure in SAS (individual animals served as replicates in statistical tests) and plasma corticosterone data using a t-test. The treatment did not affect visual discrimination ($F_{1, 252}$=1.43; p=0.234), nor the proportion of responses to ambiguous cues in the judgment bias test ($F_{1, 153}$=0.08; p=0.773). Plasma corticosterone levels did not differ between the treatment groups. Unpredictable chronic mild stress, or more specifically the combination of stressors as used in the protocol described here, did not induce the pessimistic judgment bias in laying hens.

Can there be compensation between positive and negative welfare and can net effect be assessed?

No 42

Wednesday, 2nd August - 15:45: Poster presentations in oral format (Grande Hall) - Poster

Prof. Don Broom [1]

1. *University of Cambridge*

The absence of poor welfare and measures of positive welfare are important in evaluating good welfare. In considering any system or practice involving non-human animals there is a need to evaluate the overall balance on the range between good and poor, i.e. net welfare. Direct behavioural measures, such as eyelid angle in horses, MRI measures in certain brain areas and measures of physiology such as oxytocin concentration, together with experimental studies of motivation, help in evaluating whether positive or negative components of welfare are prevailing. Measuring the strength of approach and strength of avoidance in a particular situation indicates the net response and the net welfare caused by that situation. Judgement bias studies can also indicate this balance between positive and negative. There are some detailed comprehensive studies measuring a range of aspects of positive and negative welfare in the same individuals. Humans and other sentient animals, with examples from mammals, birds and fish, may tolerate a negative experience in order to increase the chances of having a positive experience and a positive experience may be sufficient to overcome an existing negative experience resulting in net good welfare. It is concluded that good welfare can often compensate for poor welfare but does not do so in all circumstances.

Integrating welfare assessment into animal behaviour studies

No 43

Wednesday, 2nd August - 15:45: Poster presentations in oral format (Grande Hall) - Poster

Dr. Janire Castellano Bueno [1], ***Dr. Anne Clay*** [1], ***Dr. Vittoria Elliot*** [2], ***Mx. Grey Fernandez*** [1]

1. *Wild Animal Initiative,* ***2.*** *NMNH - Smithsonian Institution*

The animal sciences literature agrees that integrating welfare considerations into animal behaviour studies is crucial for understanding the underlying mechanisms of behaviour and to avoid biased interpretation of the results. Its importance is highlighted by its emphasis in various regulations and frameworks (i.e., STRANGE). Inclusion of welfare may also be essential to overcome the replication crisis in the field by shedding light on individual differences and reducing unreliable interpretation of results. Yet, welfare assessments are not a routine part of animal behaviour experimental designs.

We created a survey for behavioural ecologists aimed at identifying the current challenges or obstacles and general opinions about integrating welfare assessments into animal behaviour studies. Some of the main potential obstacles considered in the survey were the lack of standard methods for assessing welfare, limited funding, and a need for interdisciplinary collaboration. The survey was anonymized and was shared with international behavioural scientists (inclusive of multiple career stages), species of study focus, previous experience, and personal opinion about welfare research. In this talk we will present the results of the survey and discuss differing perspectives and future opportunities. We will highlight the importance of addressing the challenges whilst emphasizing the need and the benefits of integrating welfare considerations into animal behaviour studies.

Impacts of environmental enrichment provision during yard weaning for beef calves

No 44

Wednesday, 2nd August - 15:45: Poster presentations in oral format (Grande Hall) - Poster

Ms. Emily Dickson [1], ***Dr. Jessica Monk*** [2], ***Dr. Caroline Lee*** [2], ***Mr. Jim Lea*** [2], ***Dr. Dana Campbell*** [2]

1. *University of New England,* ***2.*** *CSIRO Agriculture and Food, FD McMaster Laboratory, Armidale, NSW, 2350*

Yard-weaning of beef calves can improve calf familiarity with management procedures but the maternal separation and unfamiliar environment can be highly stressful. Environmental enrichment may reduce this stress, by increasing the range of normal behavioural expression and positive social interactions. In the current study, 48 mixed-sex Angus calves were yard weaned over 16 days, with half receiving multiple enrichments (cattle brush, manila rope, and a 'horse ball'). Calves were initially housed in eight groups of six, balanced for sex, sire, weight, agitation in crush score (CS), and flight speed exiting crush (FS), however on day 10 were regrouped into two groups (enriched and control) due to mud posing a welfare risk. The weight, FS and CS of calves were measured on day 1 and 16, with FS and CS also taken on day 7. Faecal cortisol sampling occurred on days 2, 7, and 10, and an attention bias test (ABT) conducted on day 12, measuring isolated individual's responses to the perceived threat of a dog as an indicator of affective state. GLMMs were fit for physiological and temperament measures, with fixed effects as treatment, day, and sex, and random effect as individual. For the ABT, Kaplan-Meier curves were used to analyse behavioural latencies (first step, eating hay, non-vigilance), GLMs fit for duration data (stepping, wall exploration, eating hay, vigilance), and GLMs with a Poisson distribution for count data (tail swishes, head shakes, vocalisations). There were no significant differences in weight, cortisol, CS and FS between treatments ($p > 0.05$). During the ABT control calves ate sooner ($p = 0.037$) and spent longer eating ($p < 0.001$), suggesting a more positive affective state, however they also displayed more tail swishing ($p = 0.003$), indicating a more negative affect. Enriched calves walked sooner ($p = 0.048$), spent longer walking ($p < 0.001$) and explored the arena walls more ($p = 0.004$), which may be due to increased curiosity, anxiety, or motivation to return to their pen mates. Enriched calves also spent longer being vigilant ($p < 0.001$), suggesting a negative affective state. Finally, there was no difference in number of vocalisations, head shakes, or latency to non-vigilance ($p > 0.05$). Although enrichment did not affect physiological or temperament traits, the ABT suggests impacts on affective state, with additional measures currently being analysed to aid in this interpretation. However, as calves had to be regrouped, caution should be taken interpreting results.

Use of space and resources by laboratory mice housed in pet cages or laboratory cages.

No 45

Wednesday, 2nd August - 15:45: Poster presentations in oral format - Poster

Ms. Michelle Gygax [1], ***Dr. Janja Novak*** [1], ***Ms. Milena Sanches Fortes*** [2], ***Dr. Bernhard Voelkl*** [1], ***Prof. Hanno Würbel*** [1]

1. *Animal Welfare Department, Veterinary Public Health Institute, University of Bern.,* ***2.*** *Animal Welfare Department, Veterinary Public Health Institute, University of Bern*

The mouse is the most commonly used laboratory animal, yet little is known about the species-typical behavioural and physiological needs of mice in captivity. Laboratory mice are mostly housed in small and barren cages with little opportunity to express a diverse behavioural repertoire. In Switzerland, housing conditions for mice are defined by an arbitrary quantity of space, which differs greatly between laboratory mice and pet mice. This raises the question whether the set minimum space allowance is sufficient for mice.

As a first step to determine minimum housing requirements for mice, we conducted a purely exploratory study and observed behaviour and enrichment use of mice in both large extensively enriched pet cages and standard laboratory cages with minimal enrichment, to establish exhaustive ethograms for mice under these two conditions. We used 64 mice of both sexes and two strains (SWISS and C57BL/6; n=16 per sex and strain) housed in groups of 3 and 5 (1 cage per group size, sex, strain and housing condition) to enhance external validity of results. We used generalized linear mixed effect models (GLMMs) with a binomial distribution to model the data.

We found that mice in pet cages showed more digging (CI=1.61-28.40, OR 0.11), gnawing (CI=2.47-22.76, OR 7.5), and locomotion (CI=1.57-2.65, OR 2.04), but spent more time under the bedding material (CI=35.43-2149, OR 275.9). However, Mice in pet cages showed less rearing (CI=0.12-0.25, OR 0.18) and stereotypic behavior (CI=0.0-0.01, OR 0) and spent less time on the bedding material (CI=0.07-0.17, OR 11) or climbing on the cage lid (CI=0.06-0.21, OR 0.11) than mice in lab cages.

Our results indicate that mice actively engage with enrichments during the dark phase, when given the opportunity, while spending most of the light phase underground. In lab cages, activity is mostly limited to climbing, locomotion and stereotypic behaviour and most of the light phase is spent inactive on the bedding. These findings will inform future studies assessing preferences of mice for specific enrichments.

Nausea-induced pica in laboratory rats with kaolin, zeolite, bentonite, and gypsum as test substances

No 46

Wednesday, 2nd August - 15:45: Poster presentations in oral format - Poster

Prof. Sadahiko Nakajima [1]

1. *Kwansei Gakuin University*

Pica is compulsive eating of nonfood substances. Biobehavioral studies with laboratory animals are helpful in understanding pica etiology. An animal model of pica is rats' kaolin clay ingestion caused by nausea-inducing treatments such as emetic drugs (e.g., lithium chloride, LiCl). Recently, Nakajima (2023, Physiology & Behavior, https://doi.org/10.1016/j.physbeh.2023.114076) reported that nauseated rats ingested not only kaolin but also gypsum and lime, suggesting that these minerals have some commonality in the etiology of pica behavior. However, the levels of gypsum and lime consumption were no greater than that of kaolin consumption. In other words, the superiority of kaolin as a test substance could not be overturned.

The present study aimed to find aimed to find a mineral more suitable than kaolin for detecting nausea in rats. In two experiments, a single dose of 127 mg of LiCl per kg body weight was used to induce nausea, and the mineral intake was measured over a 23-hour period. Experiment 1 compared three types of minerals in a between-group design (8 animals per group as in Nakajima, 2023): conventional kaolin for ceramics (kaolin A), special kaolin sold for nausea detection (kaolin B), and bentonite. A three-way ANOVA with group (3 minerals), drug (LiCl; saline),and day (baseline 1; test; baseline 2) as factors showed that the nauseated rats ingested all minerals ($ps < .006$). Furthermore, multiple comparisons revealed that the pica due to LiCl injection was greatest in kaolin A and similarly low in kaolin B and zeolite. Experiment 2 compared three types of commercial health soils in a similar design: edible kaolin, edible bentonite, and edible chalk. A three-way ANOVA and subsequent analyses of the mineral consumptions revealed that the pica was highest in the kaolin group, followed by the bentonite group. Unexpectedly, the nauseated rats did not consume edible chalk. From the results of the two experiments, we can say the following. (1) Kaolin as well as zeolite and bentonite can be used to detect nausea, but kaolin is the best choice. (2) Even kaolin varies in the magnitude of pica caused by nausea, depending on the product. (3) Like kaolin, both zeolite and bentonite are composed primarily of aluminosilicate, suggesting that this component is important for pica generation.

This study was supported by the JSPS Grants (18K03192 and 22K03204) and approved by the Kwansei Gakuin University Committee for Animal Experimentation. There are no conflicts of interest to report for this study.

Visual discrimination between groups of balls by domestic dogs (Canis familiaris)

No 47

Wednesday, 2nd August - 15:45: Poster presentations in oral format - Poster

Dr. Megumi Fukuzawa [1], ***Mrs. Chisato Asao*** [1], ***Mrs. Akari Matsuhashi*** [1]

1. *Nihon University, College of Bioresource Sciences*

Although food rewards are offered in dog training, it is reported that the dogs will often choose a larger, rather than a smaller, quantity (McGuire et al., 2018). In this study, we used balls, which are also frequently used as rewards, to evaluate dogs' responses to groups of balls in different configurations. After conditioning the dogs by showing them 'four' balls which pasted on a white panel (45 x 45 cm) at regular intervals, a two-way alternative test was conducted using additional ball combinations. Configurations of 1+4, 2+4, and 3+4 balls (17 participants; females 9, males 8; 15~131 months), and 5+4, 6+4, and 7+4 balls (16 participants; females 9, males 7; 15~176 months) were randomly presented in six ways. Each dog's posture (4 categories) and behaviour (7 categories) for 1 minute in response to each configuration of balls were continuously video recorded, and the time the dog spent each category was determined. These times were measured to 1/100th of a second. These studies were observer-blind, i.e. the evaluation observer was blinded to the configurations of balls.

Mirrored arrangements of identical-number combination of balls (to identify deviation to the left-right) did not affect the dog's response in many observation categories; and for all combinations, the time spent in a standing posture was significantly longer than for other postures (Tukey, $P < 0.05$).

For 1+4, 2+4, and 3+4 configurations, the time spent "exploration the balls" and "gazing at the ball" when configured as 1 or 3 tended to be longer than for 4 balls. A negative correlation with age was also observed for both behaviours. In 4+5, 4+6, and 4+7 configurations, gazing at the ball(s) from close position was observed longer than from a far position for configuration 5 (t-test, $P < 0.05$). In the 6+4 configuration, there was a difference in the time ($P = 0.059$) and the number of times ($P < 0.05$) that the dog glanced at the group of 6 from both near and far positions, but no correlation with age was observed.

These findings suggest that dogs are able to recognize the difference in the numbers of balls, when placed in groups, but that it takes time for them to generalize a configuration that differs from when they are conditioned to expect multiple balls presented simultaneously in a single group.

Towards standardization of fear test battery for horses

No 48

Wednesday, 2nd August - 15:45: Poster presentations in oral format - Poster

Dr. Elena Gobbo [1], ***Dr. Manja Zupan Šemrov*** [1]

1. *University of Ljubljana, Biotechnical Faculty, Department of Animal Science*

From the perspective of human-horse interaction, fearfulness is one of the most important personality traits. Horses are fearful of objects, sounds, movements, and even more so when these triggers are combined. Therefore, evaluating their responsiveness is critical to safety and welfare. Despite that, there is currently no standardized method for measuring fearfulness in horses. Our goal was to develop and standardize a behavioral fear test battery. Prior to testing on a larger scale, a pilot study was conducted with 24 adult Lippizan horses. By targeting different senses, we predicted each subsequent test will present a greater challenge for the horse. The first was the passive human test, in which a passive stranger held the horse on a relaxed leash. The second was the umbrella test, in which the horse was led through a passage formed by two umbrellas. The third was the rolling ball test, in which a large ball was released from the ramp and rolled down by the horse. The fourth was the bag test, in which a noisy plastic bag attached to a whip, was swung in front of the horse. The test battery was performed twice on two different days. Each test was videotaped and the horse received a fear score on a modified 5-point scale, by a blind observer. Higher score presented a higher fear level. If a horse showed severe fear reactions, the test was terminated. For validation purposes, maximum heart rate (HR) was measured during the behavioral tests using the Polar V800 monitor and for HR stabilization, the horse rested for 15 minutes before each test. Exploratory non-parametric ANOVA on ranks and correlations were performed. Analysis showed that in first (χ^2=50,5; p<0,001) and second (χ^2=58,1; p<0,001) repetitions, each subsequent test presented a more fear inducing stimulus, which was reflected in an increased fear score. Increased HR was associated with higher fear scores on all tests in the first repetition (all; p<0,01), but only on the third test in the second repetition (p<0,001). Comparing the first and second battery, we found that fear scores were higher in first repetition on the second (H=-3,0; p=0,003) and third (H=-3,1; p=0,002) test. HR was higher in first repetition only on the fourth test (p=0,003). Current evidence suggests that each subsequent test represents a more fearful experience, evident in behavioral and physiological reactivity. It's planned to test a larger number of horses to investigate validity, reliability, and repeatability.

Impact of environmental enrichment sessions on cat stress scores of cats hospitalized for sporotrichosis treatment

No 49

Wednesday, 2nd August - 15:45: Poster presentations in oral format - Poster

Ms. Sabrina Sato [1], ***Prof. Ruan Daros*** [1]

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Feline sporotrichosis treatment requires long-term isolation of infected animals and the hospital environment imposes several stressors. This study aimed to evaluate the effect of environmental enrichment sessions (EES) on the stress levels of cats hospitalized for sporotrichosis treatment. Twelve cats were observed during eight weeks of treatment at the university veterinary clinic's infectious diseases isolation ward. The cats were divided into two groups: experimental (n = 8) and control (n = 4), final sample size difference between groups is due to eventual deaths and life stage of the subjects. Both groups were housed in individual cages under the same environmental conditions and medical treatment routine, except that the experimental group subjects participated in a total of 18 individual EES of 15 to 20 minutes from weeks 2 to 7. The sessions occurred 3 times per week out of the cat's home cage in an arena of 3 m^2 inside the isolation ward. During the EES, the subjects could choose between different types of environmental enrichment: physical, cognitive, sensorial and social (cat-human interaction). The assessment of cat's stress levels was made 3 times per week while they were in their cages and approximately 2 hours before EES, through direct behavioral observation using an adapted Cat Stress Score (CSS) that ranges from 1 (relaxed) to 5 (terrified) and considered body language, facial expression, vocalizations, activity and cage position. Due to the habituation process of cats, the CSS was summarized per week and divided into four phases: 1: adaptation (wk 1), 2: baseline (2-4), 3: enriched (wk 5-7) and 4: post-EES (wk 8). Statistical analyses were performed in R using mixed linear regression. The study was not powered for including interactions thus only the main effects were assessed. The results show that CSS reduced through the experimental period in both groups ($p < 0.01$). Although, the statistical analysis of all phases did not indicate a statistically significant difference between treatments($p > 0.05$), a subset analysis using only phase 3 showed differences in CSS between groups (Control: 1.78±0.10 vs Experimental: 1.35±0.08; $p < 0.01$). Overall, cats reduced their CSS through the weeks under veterinary care and an adaptation period to the environment and the EES treatment had some impact in reducing CSS. The low number of cats may have resulted in type II errors not allowing us to detect the effect of treatments across all weeks of the study.

German Shepherds or Belgian Shepherd Malinois: comparision of the performance in scent detection tests

No 50

Wednesday, 2nd August - 15:45: Poster presentations in oral format - Poster

Dr. Helena Chaloupková [1], ***Dr. Milena Santariová*** [1], ***Ms. Adéla Polónyiová*** [1]

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Detection dogs trained to search for various odorous substances are an effective tool in the fight against crime. Due to the high costs of training and maintaining these dogs, it is necessary to preselect suitable individuals for this purpose. One of the selection criteria is the dog breed. Unfortunately, there is a lack of studies that compare dog breeds for their suitability as detection dogs. Until the recent past, German Shepherds were widely used by police, army and customs services around the world. However, over the last few decades, Belgian Shepherd Malinois have become more popular in terms of service cynology. The aim of our study was to compare the two most common working dog breeds, namely the German Shepherd and Belgian Shepherd Malinois (Malinois). The prediction was made that Malinois would not outperform German Shepherds. For this purpose, we evaluated the results of customs dogs (539 German Shepherds and 177 Malinois) currently undergoing their certification process against data from a 10-year database. The certification process consists of two sets of tests: scent detection and obedience. Every scent detection dog was required to search for specific target scents (drugs, banknotes and tobacco) in six training areas that imitated real workplaces. The obedience test consisted of ten tasks, which the dog had to perform (e.g. recall, heelwork, changes of position at the handler's leg). The evaluation of the scent detection and obedience tests was done by certified judges. The data were analysed using PROC GLIMMIX in SAS software (version 9.4). The results of the scent tests did not reveal a significant difference between the breeds ($P = 0.31$). For the obedience test, the scores were higher in Malinois (84%) compared to German Shepherds (80%), with $P < 0.01$. The age and sex of the dogs did not significantly affect their evaluation in both tests. Our results showed that although Malinois do not outperform German Shepherds in the special discipline - the detection of specific target scents - both breeds are suitable for this purpose.

Is castration the new sexy? Sexual behaviour directed towards castrated male dogs

No 51

Wednesday, 2nd August - 15:45: Poster presentations in oral format - Poster

Prof. Björn Forkman [1]

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It is well known that castration may result in behavioural changes of the dog that is castrated and in many cases, this is indeed the reason for the castration. The aim of the current study is however on the behaviour of the dogs meeting the castrated dog. The respondents were a convenience sample of dog owners recruited from Facebook groups (n=1483). There were 845 male dogs, 452 were intact males and 393 castrated males. The median age at castration was 16 months. There were 384 intact and 245 neutered female dogs. The respondents were asked to assess the behaviour of their dog on a 5-step Likert scale.

Intact males were equally likely to sniff the bottom of castrated and intact male dogs (p=0.18 Wilcoxon Matched Pairs). They were however more likely to show dominance behaviour (putting their head on the shoulder of the other dog) when meeting a castrated than an intact male (p=0.004, Wilcoxon Matched-pairs), there was also a tendency for intact males to be more likely to mount castrated males than other intact males (p=0.07). Finally, intact males showed less aggression towards castrated than intact males (p<0.001). Very similar results were obtained independently of whether the other male dog was known or not.

Although at a low level, there was a tendency for castrated males showed more presentation of their bottom towards an intact unknown male than towards a castrated unknown male (p=0.065), no such tendency was found for known males (p=0.64).

Female dogs showed both more sniffing at the castrated dogs' bottoms than intact dogs' bottoms (p<0.001, Wilcoxon Matched-pairs), more putting their head on the shoulder of the castrated dog than the intact dog (p<0.001, Wilcoxon Matched-pairs) and finally more mounting behaviour towards castrated dogs than intact dogs, although at very low levels (p<0.001, Wilcoxon Matched-pairs).

The results indicate that not only may castration affect the behaviour of the castrated individual but also of the dogs meeting the castrated individual. Some of the behaviour changes may be interpreted as castration resulting in an increased sexual attraction.

Place conditioning as evaluation of affective valence in neonatal piglets

No 52

Wednesday, 2nd August - 15:45: Poster presentations in oral format - Poster

Dr. Thomas Ede [1], ***Ms. Sarah Ibach*** [1], ***Dr. Thomas Parsons*** [1]

1. *University of Pennsylvania*

Surgical castration of neonatal piglets is commonly performed on swine farms to decrease aggression and eliminate 'boar taint,' a foul smell/taste found in meat from intact males. This procedure is done routinely without anesthesia or analgesia. While acutely painful, little is known about the impact of castration in the hours following the procedure on the animal's affective state or possible pharmacological interventions to improve it. A conditioned place aversion paradigm was implemented to test a piglet's memory of the procedure. A testing apparatus was created with 3 equally sized arenas. The two outer 'treatment' pens each contained unique visual and tactile cues while the center pen remained neutral. Piglets (n=22) were subjected to surgical castration following topical local anesthesia in one outer pen or a sham procedure in the other followed by a 2 h recovery period. Treatments were randomized, balanced for order, and given 48 h apart. Twenty-four hours after the last treatment, piglets were returned to the center chamber of the apparatus with free access to all pens, to investigate how they divide their time between the castration and sham pens. Piglets displayed no aversion to the castration pen during this place conditioning test (-48 s, 95CI = [-156, 60]). A second trial was conducted with 22 additional piglets where a presumed positive experience was evaluated following the same paradigm. In this trial, the two conditioning treatments were a sham procedure identical to the first trial vs. an enriched arena including straw, toys and sucrose solution (which were removed during tests). We expected piglets to develop a preference for the arena associated with the enrichments, but piglets did not show a difference in time spent during tests (128 s, 95CI = [-12, 268]). We hypothesize the lack of place aversion or preference can be explained by an apparent indifference of piglets between treatments (either sham vs. castration or sham vs. enrichment). Alternatively, the place conditioning paradigm simply might not be sensitive enough to detect any differences experienced by the animals and linked to multiple methodological factors such as relevancy of cues provided, orientation of pens, isolation from their dam, and length or number of conditioning sessions. These findings also could result from the inability of neonatal piglets to learn the differences between treatments or their inability to focus on the environment rather than their current affective state. Further studies are ongoing to differentiate these possible interpretations.

Social sham chewing in sows

No 53

Wednesday, 2nd August - 15:45: Poster presentations in oral format - Poster

Dr. Claes Anderson [1], ***Mrs. Linda Marie Backeman Hannius*** [1], ***Dr. Anna Wallenbeck*** [1]

1. *Department of Animal Environment and Health, Swedish University of Agricultural Sciences*

In a larger research project studying sows' social abilities, first parity sows (FPS) (mean age: 409.2 days) were placed in a novel area with an unfamiliar multiparous sow (MS) in a 60 minutes paired interaction test. For this test, sows were filmed and behaviours were recorded using continuous sampling. We observed a non-expected behaviour in the pilot observations and due to its relative recurring frequency, it was added to the ethogram as *Sham chewing* defined as: *Chewing, with no apparent substrate in its mouth, often resulting in froth on the sides of the lips of the pig*. On several occasions this behaviour was accompanied by, or resulted in, froth on the sides of the lips of the pig. To our knowledge, sham chewing in sows has not previously been described in a social context, which we aim to do with this paper as FPS and MS regularly sham chewed in connection to social interactions. From 27 hours of video material from this test (the initial 20 min from each 60 min test were analysed, when most interactions were observed, based on the pilot study), we observed 659 and 915 occasions of chewing performed by FPS and MS, respectively. Of the FPS and MS, 72 of 73 showed and 79 of 82 showed the behaviour, respectively. FPS performed chewing on average 0.4±0.36 times per minute (Mean±Std) while MS performed chewing 0.6±0.40 times per minute. The timing of chewing and performance of social interactions was correlated ($r=0.94$ for FPS and $r=0.90$ for FPS and MS respectively, Pearson correlations, $p<0.001$ for both), meaning that over time (minutes) in the test, the frequencies of chewing and social interactions followed each other. Chewing behaviour has previously been descried as an oral stereotypic behaviour in sows, suggested to stem from e.g. foraging and hunger frustration. However, in this study, the sows were fed before the test and had ample bedding material for rooting and foraging, which sows regularly were observed chewing on. The sham chewing was clearly expressed when the sows encountered the other sow in the test. Our suggestion is therefore that this chewing should be considered as part of the social behaviour of the sows and we speculate that this behaviour is associated with communication between the sows. We encourage researchers studying social mixing of pigs in the future to be attentive to such chewing and welcome further investigation concerning its potential welfare implications.

Defining and validating descriptors used in the Qualitative Behavioral Assessment of post-wean sows

No 54

Wednesday, 2nd August - 15:45: Poster presentations in oral format - Poster

Ms. Sarah Ibach [1], ***Dr. Jen-Yun Chou*** [2], ***Dr. Monica Battini*** [3], ***Dr. Thomas Parsons*** [1]

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Qualitative Behavior Assessment (QBA) can be a valuable approach in understanding farm animal welfare. It uses a holistic approach to capture an animal's emotional state and promises improved detection of positive emotions, which sometimes can be difficult to identify using ethological-based methods. Lists of QBA descriptors validated to assess pig welfare exist, but definitions for descriptors of individual sows are not published. The objective of this study was to create and validate clear and specific definitions for a pre-existing fixed list of descriptors. A fixed list of 20 descriptors was partly modified from the EU Welfare Quality® assessment protocol for pigs to fit the context of post-weaned sows. Ten pig experts (i.e. researchers, veterinarians, technicians, farmers) were recruited to assist with defining these descriptors in a focus group-style discussion. Descriptor definitions were discussed and voted upon, with revising and re-voting as needed until an 80% agreement was reached. Half of these experts participated in a validation study. The newly developed definitions were tested by implementing QBA on a video library of post-weaned sows selected to capture a wide range of sow behavior. Principal component analysis identified two main components interpreted to represent the valence (positive or negative) and arousal (high or low) of each descriptor. Experts displayed almost perfect agreement in identifying the valence of descriptors (Kendall's W = 0.91) and substantial agreement in the arousal (Kendall's W = 0.66). Inter-observer reliability was also measured for each descriptor. Half of the descriptors evoked substantial agreement or better (Kendall's W > 0.6) between the experts and only two descriptors exhibited less than moderate agreement (Kendall's W < 0.4). These findings validate our process to delineate clear definitions for a fixed list of QBA descriptors in individual sows. This study is the first of its kind to detail the creation and validation of QBA descriptor definitions and paves the way for a more reliable use of fixed-list QBA to assess sow welfare and positive emotional states.

Fight outcome and weight gain as a function of basic social network parameters in the group of weaned piglets

No 55

Wednesday, 2nd August - 15:45: Poster presentations in oral format - Poster

Ms. Nikolina Mesarec [1], Prof. Maja Prevolnik Povše [1], Prof. Dejan Škorjanc [1], Dr. Janko Skok [1]

1. *University of Maribor, Faculty of Agriculture and Life Sciences, Department of Animal Science*

After weaning, piglets establish social order by using fighting as a means of positioning themselves in the dominant hierarchy. Although considered the most effective means of establishing social order, excessive fighting also puts a burden on piglets, especially under farming conditions where groups suddenly mix. There is a fine line between the effectiveness and harmfulness of fighting, which depends on the dynamics in the social group. In the present study, we therefore investigated fighting among piglets after weaning and weight gain using social network analysis (SNA). We implemented an experimental design that allowed for spontaneous mixing of piglets after weaning and was conducted in six replicates with two litters each (117 piglets in total). The fights were monitored 8 days after weaning using video analysis and included the following data: Identification and characteristics of piglets (sex, body weight), and fight characteristics in terms of initiation (initiator/attacker) and outcome (winner/loser/draw). Using cluster analysis, piglets were divided into three groups with high, medium, and low success in winning fights (67, 36, 13%, respectively). In the SNA, various parameters were calculated: *total*, *in-* and *out-degree centrality* (total number of fights and the number of received and initiated fights each piglet had with others), *betweenness* (number of times a piglet acts as a 'bridge' between other piglets), *closeness* (distance to all piglets in the network) and *eigen-vector centrality* (a measure of piglet's influence on the network based on its interactions with other piglets in the network, also taking into account the interactions of other piglets in the network). Compared to piglets with low and medium winning index, piglets with high winning index had significantly higher *total degree* (17.1, 19.6, 20.5, respectively), higher *out- degree centrality* (6.5, 10.0, 13.0, respectively), had more connections with most piglets in the group (*closeness* of 0.034, 0.038, 0.043, respectively) and to a greater extent influence the dynamics of the network (*eigen-vector* of 0.52, 0.58, 0.67, respectively). The results indirectly showed also positive correlations of SNA parameters with basic piglet traits, as the winners were also heavier and had greater weight gains (r~0.30). The results implicitly point to the importance of active positioning of piglets in the group fighting network. Further analyses of individual-level SNA parameters with group-level SNA parameters (e.g., number and size of cliques) are needed to determine the boundary between the effectiveness and harmfulness of fighting, as well as the optimal social conditions (mixing strategies) after weaning.

Understanding the current practice of piglet teeth resection and the risk factors for piglet facial and sow teat lesions using a global online survey

No 56

Wednesday, 2nd August - 15:45: Poster presentations in oral format - Poster

Dr. Jen-Yun Chou [1], ***Dr. Jeremy Marchant*** [2], ***Dr. Elena Nalon*** [3], ***Dr. Huỳnh Thủy*** [4], ***Dr. Heleen van de Weerd*** [5], ***Dr. Laura Boyle*** [1], ***Dr. Sarah Ison*** [6]

1. *Pig Development Department, Animal and Grassland Research and Innovation Centre, Teagasc,* ***2.*** *United States Department of Agriculture, ARS, LBRU,* ***3.*** *Eurogroup for Animals,* ***4.*** *Farm Technology, Department of Biosystems Engineering, Wageningen University and Research,* ***5.*** *Cerebrus Associates,* ***6.*** *Compassion in World Farming*

In commercial pig production, teeth resection is used to prevent piglet facial (PF) and sow teat (ST) lesions. This procedure, carried out by resecting or grinding the piglets' canine (needle) teeth, is painful and stressful for the animals, and therefore it is an animal welfare concern. Besides the presence or absence of needle teeth, there is a clear knowledge gap on the other risk factors that play a role in the occurrence of PF and ST lesions. To determine the prevalence of PF and ST lesions and understand the preventative measures used on farms that help pig producers manage them, we circulated an online survey to stakeholders in the global pig industry. The survey was anonymous and available in English, Dutch, French, German, Italian, Portuguese, Spanish and Chinese. It was distributed by convenience sampling, through the co-authors' professional and social networks. Responses were collected on the method, frequency, and reason for resecting piglets' teeth, the presence/incidence of PF and ST lesions, and preventative measures used to control them. The survey was open for five months and 75 responses were collected from 17 countries, with the majority based in Europe (66.7%). Most respondents (90.7%) were directly involved in farm operations. Many reported the lesions as manageable or not a problem (PF: 76.0%; ST: 73.4%). PF and ST lesions were the main reported reasons for conducting teeth resection, but 50.7% of the respondents reported the procedure was not carried out on their farms. Intact teeth, poor milk production and large litter size were considered similarly as the top risk factors for both types of lesions. Respondents using alternative farrowing systems (i.e. not using farrowing crates) more frequently reported these lesions as being manageable ($P < 0.05$). Many other successful prevention strategies were reported including selecting mothering traits (66.0%), improving sow nutrition (63.5%), increasing water intake (61.0%), conducting frequent checks in the farrowing house (57.9%), improving early piglet nutrition (57.9%) and using nurse sows (54.5%). This survey showed that there are interventions other than teeth resection to prevent PF and ST lesions. More science-based evidence is needed to understand the risk factors behind PF and ST lesions beyond teeth resection to phase out this painful procedure.

Conservation Education: the signage used in Swedish Zoos

No 57

Wednesday, 2nd August - 15:45: Poster presentations in oral format - Poster

Dr. Maria Andersson [1]***, Ms. Elin Torgersson*** [2]***, Ms. Lisa Lundin*** [3]***, Dr. Lina Roth*** [4]

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Education is one of the main roles of modern zoos together with research and conservation. In recent years, emphasis on the importance of conservation in zoo education has increased and the term 'conservation education' is more and more used when discussing zoos' education work. Zoos in Sweden use a variety of education activities for example signage, guided tours, zoo lectures, feeding sessions and others, but evaluation of the effect of these have been scarce. The aim of the present study was to analyse the information on species signs (N=404) at 11 zoos in Sweden. A predetermined protocol was used in the evaluation, included items regarding conservation, animal biology, behaviour, ecology and animal welfare, and for every detailed criteria, the assessment was "yes or no". The signage analysis showed that zoos were good at providing basic species facts for example size (88 % of signs), geographical distribution (86 %), diet (84 %), and number of offspring (75 %). However, less information was found on conservation information, where 68 % of signs included threat status, 44 % of signs included information about the specific threats and only 17 % of signs included information about what action visitors could take in relation to conservation. There was a large variation between zoos. Very few signs included information about animal welfare and animal care of the species at the zoo, for example 4 % of signs included information concerning the design of the enclosure, 2 % included information about environmental enrichment and 1 % of signs included information about the training of animals. Though Swedish zoos generally provided information about the animals' ecology and to some extent about threat status and conservation efforts, information about animal welfare and how zoo visitors could contribute to conservation was inadequate.

Broiler behavior is affected by genetic strain and stocking density

No 58

Thursday, 3rd August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Dr. Shawna Weimer [1], ***Mr. Kevin Thompson*** [1], ***Dr. Darrin Karcher*** [2], ***Dr. Marisa Erasmus*** [2]

1. *University of Arkansas,* ***2.*** *Purdue University*

Fast growth rate and stocking density are global animal welfare concerns for broiler chickens, which has led to increased consumer interest in chicken from slower-growing broilers raised at lower stocking densities. The objective of this study was to evaluate the effect of genetic strain and stocking density on the behavior of broilers. The study was a 2x2 complete randomized block design. Broiler chicks from either a fast-growing strain (FG, n=284 birds) or slow-growing strain (SG, n=284 birds) were placed at either 29 kg/m^2 (n=31 birds/pen) or 37 kg/m^2 (n=40 birds/pen) into 16 pens (n=4 pens/treatment). On day 25, 39, and 60 (SG only) of age, behavioral observations were conducted via instantaneous scan sampling at 30-s intervals over two, 30-minute videos recorded in the morning and afternoon of each day (124 scans/pen/age). The behavior of all birds in each pen were categorized as either: mobile, standing, sitting, lateral sitting, eating, drinking, preening, foraging, dustbathing, aggression, or not visible. Scan count data were used to calculate the mean proportion of birds engaged in each behavior. The number of scans for each behavior were analyzed as a binomial distribution for the effect of genetic strain (FG, SG), stocking density (29 kg/m^2, 37 kg/m^2), age (day 25, 39, 60), time of day (AM, PM), block (1-4), scan time (each 30-s interval) with the Glimmix procedure in SAS. Results are reported as the proportion of birds within each behavior category. There was a stronger effect of genetic strain than stocking density on behavior across ages. Surprisingly, there was no difference in eating at both ages. Compared with SG, FG broilers engaged in more drinking ($P<0.01$) on days 25 and 39 (0.03 vs. 0.02 at both ages, respectively), while SG broilers exhibited more standing ($P<0.01$) than FG on days 25 (0.12 vs. 0.08, respectively) and 39 (0.12 vs. 0.08, respectively). Interestingly, there were no differences in the proportion of birds sitting, but FG broilers exhibited more lateral sitting ($P<0.0001$) than SG on day 25 (0.04 vs. 0.01, respectively) and 39 (0.08 vs. 0.02, respectively). On day 39, but not 25, more SG broilers engaged in preening than FG ($P<0.01$; 0.06 vs. 0.04, respectively). The results suggest that fast-growing broilers exhibit more drinking and lateral sitting, while slow-growing broilers exhibit more preening at older, but not younger, ages and that studies comparing different genetic strains of broilers should assess behavior at multiple ages.

Effect of light sources on behaviour and health in broiler breeders

No 59

Thursday, 3rd August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Dr. Guro Vasdal [1], ***Dr. Kathe Kittelsen*** [1], ***Dr. Fernanda Tahamtani*** [2]

1. *Animalia, Norwegian Meat and Poultry Research Centre, Oslo,* ***2.*** *Animalia*

Common light sources in broiler breeder houses includes compact fluorescent lights (CFL) and light-emitting diodes (LED). Investigations on how these influence behaviour and welfare are needed. The aim of this study was to investigate the effects of two light sources for broiler breeders (Evolys with UVA (LED) and Biolux 965 (CFL)) on behaviour and health of two hybrids during the production period. We predicted fewer aggressive interactions with UVA present and more activity in Hubbard compared to Ross flocks.

Eight commercial breeder flocks (Ross 308 n=4) (Hubbard JA757 n=4) with Evolys (Ross n=2, Hubbard n=2) or Biolux (Ross n=2, Hubbard n=2) were visited twice during the production period (25 and 50 weeks) to record behaviour and health. Behaviours included resting, locomotion, exploration, comfort, feather pecking, aggression, and mating, and was scored using direct observations. In four areas/flock, the number of birds performing each behaviour was scored every two minutes for 20 min. Health was scored using a transect walk, where number of birds observed with one or more of the following welfare indicators was noted: feather loss (FL) on head, back/wings, breast, and tail, wounds on head, back/wings, tail, and feet, dirty plumage, lameness, sickness and dead birds.

The most common behaviours were resting, locomotion, comfort and exploration, and these were influenced by a three-way interaction between light source, hybrid and age. Light source did not affect resting, locomotion, exploratory or comfort behaviour in Hubbard birds at any age. In contrast, Ross housed in Evolys tended to rest more at 25 weeks (P=0.091), and less at 50 weeks compared to Biolux (P=0.04), and Ross in Biolux showed more locomotion at 25 weeks compared to Evolys (P<0.0001). Ross at 25 weeks explored more in Biolux compared to Evolys (P=0.0007). More comfort behaviour was performed in Evolys in 25 week old Ross (P=0.002), but not at 50 weeks. These inconsistencies might be due to low sample size, which is a limitation in the study.

The most common welfare indicators were FL back/wings (mean 3.9%), wounds on back/wings (mean 0.22%), and FLhead (mean 0.18%). There was no effect of light source, hybrid or age on FL back/wings, breast or tail. There was no effect of hybrid or light source on FLhead but there was increased FLhead with increased age (P=0.0008).

Light source appears to have minor effects on selected health indicators, but does influence behaviour, hovewer with different effects between hybrids and age.

COMPARATIVE EFFETS OF COCONÇUT WATER AS ANTI-STRESS FOR BOILER CHICKENS UNDER HEAT STRESS CONDITIONS

No 60

Thursday, 3rd August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Mr. Akosile Oluwaseun [1]

1. FEDERAL UNIVERSITY OFAGRICULTURE ABEOKUTA

Heat stress causes a drastic reduction in broiler productivity. Some studies have shown that honey and coconut water showed some level of effectiveness as anti-stress in experimentally heat-stressed broiler chickens. This study compared the effects of coconut water and honey as anti-stress on welfare, immunity, gastro-intestinal tract development and growth performance in broiler chickens under heat stress conditions. One thousand unsexed broiler chickens were used for this experiment. In the first experiment, six hundred chicks were used for the coconut water experiment. The birds were allotted to five treatments of ordinary water, 0.5g/L of water, 0.5%, 1% and 1.5% coconut water under 3 housing temperatures of ambient temperature (ambient), 22-24°C (cold), and 34-36°C (hot) having four replicates of ten birds each. Generally, results showed that the use of coconut water at different levels under different temperatures did not have effect on the performance of the birds. In experiment I, at week 5 and 6, water consumption of the birds reared under Hot and Ambient temperature was higher than those in cold environment. The feed intake of the birds offered vitamin C and 0.5% coconut water under cold condition was higher than those offered ordinary water and vitamin C under hot condition but comparable to the feed intake of the birds in the other treatment groups under different temperature regimes at week 5. Birds administered 1.5%CW (under ambient condition), 0, 0.5, 1.0, 1.5%CW and Vitamin C (in hot environment) were similar but higher significantly respiratory rate than in birds administered 0, 0.5, 1.0, 1.5%CW and Vitamin C (in cold), 0, 0.5, 1.0%CW and Vitamin C (in natural environment). Broiler chickens offered 0, 1.0%CW and Vitamin C (in cold) 0 and 0.5%CW (in ambient environment), 0, 0.5and 1.5%CW (hot) were similar and significantly higher than in birds offered 0.5 and 1.5CW (in cold), Vitamin C, 1.0and 1.5%CW (in ambient), 1.0% and Vitamin C (in hot environments) respectively. A higher percentage of broilers in the hot housing temperature displayed thermoregulatory behaviour than those under ambient conditions and the lowest in the cold housing temperature. A higher percentage of broilers performed ingestive behaviour in the Cold and ambient than in the hot temperature housing. A higher percentage of the birds were sitting in the ambient than hot and cold housing temperatures. It was concluded that different levels of coconut water had no consistent effect on the performance of broiler chickens.

Alterations in cerebellum induced by selection for tameness in Red Junglefowl

No 61

Thursday, 3rd August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Mrs. Johanna Gjøen [1], ***Dr. Felipe Cunha*** [2], ***Prof. Per Jensen*** [3]

1. *Linköping University, 58183 Linköping,* ***2.*** *IFM Biology, AVIAN Behavioural Physiology and Genomics Group, Linköping University, 581 83 Linköping,* ***3.*** *Linköping University, IFM, S-58183 Linköping*

Wild species can be adapted to human society through the process of domestication. The domestication syndrome is typically typified by numerous phenotypic alterations, including shrinkage of the brain and its size in several brain regions. Moreover, the domesticated chicken's cerebellum (Ga*llus gallus domesticus*) is typically larger than that of the ancestor Red jungle fowl (*Gallus gallus*). It is unknown what cause this difference, but we do know that one of the crucial elements of successful selection processes leading to domestication, is to reduce the inherited fear of humans. We here study two selection lines of Red junglefowl, produced over the course of ten generations, where one simulates early domestication (Low-fear), whereas the other function as a control group (High-fear). The standardized fear-of-human-test was used as the tameness indicator. Previous studies using these selection lines have shown that low-fear birds have a larger absolute size of cerebellum and correlates with significantly reduced reactions to a fearful stimulus. In the last two decades, researchers concur that the cerebellum is essential for social cognition. Larger cerebellum may be a product of the selection pressure caused by human interaction and adaptation. To investigate this allometric relationship further, we extracted brains from randomly selected birds from both the High-fear (N = 16) and Low-fear (N = 15) line, dissecting the different regions of the brain and weighed them as well as counting cells, using isotropic fractionator technique to estimate the proportion of neurons in in the Cerebellum. These birds had been kept and cared for at the research facility belonging to Linköping University, in enclosures consisting of both an outdoor and indoor area. The birds were culled with rapid decapitation and the experiment were carried out under the ethical licence from Linköping Animal Ethics Committee. A T-test and correlation was used to analyse the cerebellar difference between the two lines as well as Generalized linear model. Unlike the previous study, we found no significant difference in cerebellum weight t = -1.13, with df = 28 (p= .27). However, a significant difference in the neuron density was evident between the two lines, being lowest in the low fear birds t = 2.40, with df = 28 (p<.05). The GLMz showed that Line had a significant effect on *Body weight, Cerebellum, Neuron density* and *Relative Brain size*. We thus conclude that selection for tameness does affect neuron density in the chicken cerebellum

Welfare of spent hens in Flemish slaughterhouses: current situation

No 62

Thursday, 3rd August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Dr. Noémie Van Noten [1], ***Dr. Anneleen Watteyn*** [1], ***Dr. Nathalie Sleeckx*** [2], ***Dr. Ine Kempen*** [2], ***Dr. Niels Demaître*** [2], ***Dr. Bart Ampe*** [1], ***Prof. Frank Tuyttens*** [1]

1. *Animal Sciences Unit, Flanders Research Institute for Agriculture, Fisheries and Food (ILVO), Melle,* ***2.*** *Experimental Poultry Center, Geel*

Despite the rising concern about welfare of laying hens, objective monitoring systems to properly evaluate their welfare are currently still lacking. In this context, a pilot version of a ready-to-use welfare monitoring protocol for spent hens at the level of the slaughterhouse was developed. Data was gathered by means of questionnaires in a custom made mobile application according to the following protocol. First, the flock behavior and climate were inspected during lairage. Next, a range of animal-based indicators were scored on a random subset of 100 animals per flock after stunning. Scoring of plumage on 6 body parts, skin injuries in 3 zones and dermatitis was done on a 1 (severe damage) -4 (perfect condition) point scale according to Tauson *et al.* (2005; Anim. Sci. Pap. Rep, 23(Suppl 1), 153-159). Comb injuries were scored on a 0 (no injuries)-2 point scare. Keel bone fractures and deviations were detected by palpation. Subsequently, after defeathering, counts of fresh fractures and bruises on wings, legs and breast were registered during a 2 times 5 min inspection at the slaughter line. Lastly, death on arrivals, rejects and information on rearing conditions (e.g. housing system, egg color, flock age…) were copied from the slaughterhouse documents. Between November 2021 and February 2023, 49 Flemish flocks were monitored with this pilot protocol. For each indicator the mean score or the prevalence per flock (experimental unit) was calculated. Statistical analysis was performed using the GLM procedure in RStudio (version 2022.07.2). Values are displayed as means ± standard error. Mean plumage scores were 2.2±0.05, 1.9±0.08, 2.0±0.07, 2.4±0.06, 1.4±0.05 and 1.6±0.08 for the neck, back, tail, wings, breast and cloaca zone, respectively. Injuries were rather rare, with mean scores ranging from 3.8±0.02 for the breast region to 4.0±0.01 for the backside. The mean prevalence of keel bone fractures (53.5±2.84%) and deviations (54.5±2.92%) was high, with a significantly lower prevalence of keel bone fractures in hens housed in enriched cages (36.7±4.45%) as compared to floor-management (54.5±3.74%) and aviaries (65.4±3.98%). Remarkable was the high prevalence of bruises at the wing tips (11.9±1.94%) as compared to other body parts (<3%). Based on these data, the final set of indicators which will be assessed at the slaughter line, will be chosen. In the future, thresholds for each welfare indicator can be set by the animal welfare authorities. In this way, a stepwise improvement of the welfare of the Flemish laying hens is pursued.

LEGMONI, a ready-to-use tool for evaluating laying hen welfare at the slaughterhouse

No 63

Thursday, 3rd August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Dr. Anneleen Watteyn [1], ***Dr. Noémie Van Noten*** [2], ***Dr. Nathalie Sleeckx*** [3], ***Dr. Ine Kempen*** [3], ***Dr. Niels Demaître*** [3], ***Dr. Bart Ampe*** [1], ***Prof. Frank Tuyttens*** [1]

1. *Animal Sciences Unit, Flanders Research Institute for Agriculture, Fisheries and Food (ILVO), Melle,* ***2.*** *Flanders Research Institute for Agriculture, Fisheries and Food (ILVO), Animal Sciences Unit, Melle,* ***3.*** *Experimental Poultry Center, Geel*

Laying hens have a relatively long lifespan which is influenced by various factors (hatchery, rearing, egg production, transport and slaughterhouse). The welfare of hens can therefore be affected in many ways. In Flanders, all spent laying hens are slaughtered. Hence, the slaughterhouse seems to be a good location for welfare monitoring, both in terms of biosecurity and feasibility.

The aim of this project was to develop a tool to evaluate laying hen welfare at the slaughterhouse. Therefore, a mobile application (LEGMONI) has been developed to assess the welfare of each flock with instant access to the results. The main animal welfare indicators (AWI) and the stage of production to which they can be associated, were determined through an experimental phase where assessments on 20 flocks were done during several stages (at the start and end of production, during catching and in the slaughterhouse). After statistical analyses (Pearson correlation) and consultations with the expert panel, a list of final AWI was compiled, taking into account assessment time and the most appropriate location in the slaughterhouse to measure.

The final assessment is conducted in four questionnaires according to slaughterhouse location. The first questionnaire is taken in the lairage, focusing on climate and behavior (panting or huddling) in the crates. Those indicators mainly relate to the slaughterhouse, but the catching team can also have an impact. The next step is the assessment of 100 individual stunned hens for different AWI (feather score, injuries, footpad dermatitis, keel bone damage) which provide information on the production period. Afterwards, the defeathered hens are evaluated at the evisceration line during 2x5 minutes for bruises and fractures on breast, wings and legs. This mainly provides information on the catching process, but influences from farm management and the slaughterhouse can also be involved. Finally, the number of rejected hens, deaths on arrival and general information (farm management, transport time, contact information) is collected. The completed questionnaires can be uploaded and a report is immediately generated with calculated scores for the AWI and also benchmarking (as percentile) is displayed. A report is shared with all actors for a specific flock, and can also be consulted on the website by the involved parties.

The generated results could lead to public statistics and the setting of thresholds for minimum scores. Assessing and benchmarking hen welfare encourages the whole chain to address points of attention, and attempts to increase chicken welfare over time.

Does smelling the mothers' wool during social isolation affects the lambs' behavioural response?

No 64

Thursday, 3rd August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Dr. Aline Freitas de Melo [1], Ms. Sofía Ackerman [1], Mr. Sebastián Rodríguez-Möller [1], Ms. Paula Janavel [1], Ms. Ana María García [1], Dr. Ophélie Ménant [1], Dr. Fréderic Lévy [2], Dr. Rodolfo Ungerfeld [1]

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In situations of fear and stress, lambs seek protection from their mother and recognize maternal odours over odours from other lactating ewes. The aim of this study was to determine whether volatile chemicals from the mother's wool affect the lamb's behavioural response during social isolation. The study was approved by the Ethical Committee of Universidad de la República. Twenty-nine Merilín singleton lambs (3 months old) were separated from their mother for 3-4 h before undergoing a social isolation test for 10 min. Ten min before the test, lambs got wearing a mask that they had been accustomed to over the past week, with different stimuli: the wool of their mothers (MW group; n=10), the wool of other lactating-ewes (LW group; n=9), or an empty mask (NoW; n=10). The day before the isolation test, the wool was collected from both flanks and the udder zone, and mixed with the inguinal wax, remaining frozen until the test. The 4 m x 4 m pen test, to which lambs had previously been accustomed to, had 2 m white walls and 16 squares (1 m x 1 m) drawn on the floor. The time each lamb spent in the periphery of the test pen, the number of lines crossed, vocalizations, eliminations (urination and defecation) and sniffing were recorded. The number of vocalizations tended to differ among groups (MW group: 118.2 ± 23.1, LW group: 103.7 ± 23.4, NoW: 83.6 ± 23.1; P=0.097). The other variables did not differ among groups. In conclusion, the lambs who smelled the wool of their mother slightly emitted more vocalizations in a stressful situation, possibly seeking protection.

Exposure to the mother activates the main olfactory bulb of lambs

No 65

Thursday, 3rd August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Dr. Aline Freitas de Melo [1], ***Dr. Fréderic Lévy*** [2], ***Dr. Maryse Meurisse*** [3], ***Ms. Daniela Casuriaga*** [4], ***Dr. Raquel Pérez-Clariget*** [5], ***Dr. Rodolfo Ungerfeld*** [1]

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The brain structures by which the lamb recognizes and bonds to its' mother are unknown. The aim of this study was to compare the neuronal activation of the main olfactory bulb (MOB) of lambs exposed to their mothers, lactating ewes or no social stimuli. The testing pen consisted of two similar pens (3mx2m) separated by a metallic fence. At separation, suckling lambs of one month of age were isolated for 90 min in one area of the testing pen. Thereafter, either the mother (n=10; group MOT) or a lactating-ewe (n=9; group LE) were introduced to an adjacent pen for another 90 min. In the third group, lambs remained isolated (n=9, group ISO). Neuronal activation was investigated 90 min later according to the time required for maximum c-Fos expression in sheep. A lamb was considered to be in the contact zone of a ewe when it was less than 80 cm from it. The time spent by the lamb walking in the contact zone, the time sniffing the ewe, the number of vocalizations and contact attempts with the ewe were recorded during the first 20 min. Thereafter, the lambs were anaesthetized with sodium thiopental (12.5 mg/kg, I.V.) followed by bleeding. The MOBs were dissected and fixed in paraformaldehyde and stored in a sucrose solution. The MOBs were sectioned using a cryostat, and sections were used for c-Fos immunohistochemistry. The number of c-Fos-positive cells in the granular layer of the MOB (12 sections/animal) was measured using a light microscope, and the density of labelled cells was determined using the Mercator software. The lambs of the three groups differed in the time walking (3.1±17 s, 29.4±10.0s and 210.5±37.6s; for ISO, LE and MOT lambs, respectively, P<0.0001). MOT and LE lambs vocalized more than ISO lambs (17.3±4.7 and 7.4±4.5 vs 0.1±0.1;P=0.01 and P=0.02, respectively). MOT lambs attempted to reunite with their mother more than LE lambs did with the lactating ewe (21.7±5.8 vs 2.6±1.0;P=0.04), sniffed more often the mother (13.3±3.3 vs 4.0±1.1;P=0.01), and tended to do so during more time (27.1±11.1s vs 4.9±1.4s;P=0.059). C-Fos immunoreactivity differed according to the treatment (P=0.049): it was greater in MOT than ISO lambs ($1.59\pm0.27_X10^{-3}mm^3$ vs $1.17\pm0.26_X10^{-3}mm^3$; P=0.014), while LE lambs had intermediate values that did not differ from any ($1.38\pm0.28_X10^{-3}mm^3$). Recognition of the mother is accompanied by increased activation of the MOB of lambs, suggesting that olfactory cues from the mother are important for the recognition process.

Validation of an associative learning test to evaluate the cognitive ability of yearling sheep born to sheared or non-sheared mothers

No 66

Thursday, 3rd August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Dr. Lorena Lacuesta [1], ***Ms. Carolina Carrasco*** [2], ***Mr. Álvaro Aquino*** [1], ***Dr. Aline Freitas de Melo*** [1], ***Dr. Karina Neimaur*** [2], ***Dr. Luis Cal*** [2], ***Dr. Rodolfo Ungerfeld*** [2]

1. *Facultad de Veterinaria Universidad de la República,* ***2.*** *Facultad de Veterinaria, Unversidad de la República*

Shearing pregnant ewes increase their food consumption, placental development, nutrient transference to the foetus, lambs' birth weight, and survival rate. Therefore, shearing pregnant ewes might affect their offspring's brain development and later cognitive abilities. The aims were to validate an associative learning test to evaluate the cognitive ability of lambs, and to compare the result between lambs born to sheared or non-sheared mothers during gestation. Nineteen singleton Merino 11-mo-old sheep born to ewes that were sheared at day 80 of gestation (5 females/14 castrated males, group SHE, 27.6 ± 0.5 kg) and 18 born to non-sheared ewes (5 females/13 castrated males, group CON, 27.4 ± 0.9 kg) were subjected to an associative learning test. The animals were fasted overnight before each test, and were trained to relate symbols with the access to pellet ration on a bucket during 9 consecutive days. The animals entered a triangular enclosure (6 m x side) with two buckets filled with ration placed on the opposite corners, exchanging the side in every test to avoid laterality. At the top of the bucket with free access to the ration was placed a picture of a black triangle (30 cm x side), and at the top of the bucket without access to the ration (a wire mesh metal fence was placed over) was a picture of a similar size black cross. A rectangular area (1 m × 2 m) was delimited on the floor around each bucket. On the tenth day, the tests included the symbols without buckets. Each test lasted 3 min. On each day, the first area at which each animal entered was registered, and the number of animals that entered each area was compared with the Fisher's exact probability test. There was no effect of treatments on the number of animals that entered first into each area in any test. On the last test without food, 9/18 CON and 9/19 SHE animals entered first to the zone of the triangle. Although it has been reported that sheep recognize pictures of symbols, at least in these conditions, there was no associative learning. Sheep likely require more tests, time, or being older to associate a symbol with a feeding stimulus. Lambs born to ewes sheared or not during gestation behave similarly in these tests, so more research is needed to demonstrate the effects of shearing pregnant ewes on the learning abilities of their offspring.

Improving sheep welfare at slaughter: feasibility of animal-based indicators to assess electrical stunning

No 67

Thursday, 3rd August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Ms. Marta Comin [1], ***Prof. Sara Barbieri*** [1], ***Prof. Michela Minero*** [1], ***Dr. Emanuela Dalla Costa*** [1]

1. *Department of Veterinary Medicine and Animal Sciences, University of Milan*

According to EU legislation on the killing of animals (EC n. 1099/2009), to ensure that animals do not regain consciousness before slaughter, operators are required to evaluate the efficiency of stunning method through animal-based indicators (ABMs). To assess the efficiency of stunning in sheep, EFSA (2021) has indicated a list of ABMs. However, information on their feasibility under different conditions (i.e., type of restrain and the distance between the animal and the assessor) is still lacking. The aim of this study was to evaluate the feasibility of 6 ABMs commonly applied in the slaughterhouses to assess proper stunning in sheep.

The ABMs feasibility was assessed during the normal slaughter routine, on 50 lambs (25-40 kg) between the end of stunning and shackling in one Italian slaughterhouse, in one-day data collection in December 2022. Lambs were manually restrained and stunned with head-only electrical method. One trained assessor, positioned between 1.5–3.0 meters from the stunning area, evaluated the possibility to observe of each ABM. Different feasibility aspects were considered: position and distance from the animal, access to the animal, time needed for the evaluation of ABM, environmental noises, and blind spots due to the presence of operators and movements during the shackling and hoisting.

The preliminary results showed that it was always possible to assess the tonic-clonic seizures and the vocalisations, whereas it was not possible to assess the corneal reflex due to the impossibility to directly access nor clearly see the eye of the lambs, and the breathing due to the presence of moving operators in the visual field. These constraints also influenced the assessment of spontaneous blinking in 94% of animals. The collapse was difficult to assess in 52% due to the restraining of the lambs, which were kept raised above the floor by one operator. No ABMs were affected by the time needed for the evaluation and the environmental noises.

In the considered abattoir, our preliminary results highlighted that feasibility constraints influenced the possibility to directly observe ABMs between the end of stunning and shackling. Breathing, posture and spontaneous blinking presented some observational limitations; further research including different slaughter contexts is suggested to improve the representativeness of the sample.

Social transmission in sheep training on virtual fence

No 68

Thursday, 3rd August - 15:30: Poster presentations in oral format (Grande Hall) - Poster

Dr. Per Nielsen [1], ***Mrs. Lotten Wahlund*** [1]

1. *RISE Research Institute of Sweden*

Virtual fences have been developed over the last 20 years with focusing enabling an easy and flexible pasture management for goats, sheep, and cattle. The focus on research have been on the animal's ability to learn to associate an audio cue with a future electrical stimulus and their ability to learn a correct avoiding behaviour in response to the audio cue. No research has focused on what the presence of already trained sheep have on the learning curve of naïve sheep. Thus, the aim of this study was to examine if sheep have a faster learning curve when trained together with sheep that already know how to react to the sound cues in comparison to a group of naïve sheep.

Fifteen, one year old sheep, where divided into two groups of five (group 1) and ten (group 2). Additional five sheep of the same age, that had been trained on virtual fence two months before, was included in group 1. One day 1 the sheep was moved to two rectangular pastures with 40 meters from the back of the fence line to the virtual fence line. On day 3 the virtual fence line was move additional 30 meter to simulate strip pasture. Number of audio and electrical stimuli was collected by the system.

A success rate was calculated as ((#audio cues – #electrical stimuli)/ #audio cues) as a measure of how well the animal have learnt to react correctly to the system. Data was analyses using a mixed model in SAS, with #audio cues, #electrical stimuli and success rate as dependent variables and group, day, and their interaction as fixed effects. Animal was defined as repeated measure.

Day affected average number of sound cues, with an increasing number of sound cues from day 1 to day 5 (2.95 vs 8.25 ± 1.2, $P<0.05$). Furthermore, Group 1 had a higher success rate than Group 2 (0.94 ± 0.05 vs 0.75 ± 0.04, $P<0.05$). No other significant effects were found.

The results conclude that sheep learn to use a virtual fence and they get better over time. Additionally, it can be concluded that social transmission occur when sheep are being trained to use a virtual fence together with already trained sheep

Studying environmental enrichment and enclosure change to gather insights into the minds of sharks.

No 69

Thursday, 3rd August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Ms. Kristie Lawrence [1]***, Ms. Sally Sherwen*** [2]***, Ms. Hannah Larson*** [2]

1. *Animal Welfare Science Centre, University of Melbourne,* ***2.*** *Zoos Victoria*

Although progress has been made in the development of tools for measuring animal welfare in zoos, there remains no scientifically validated welfare assessment tool for use in captive elasmobranch (shark and ray) species. Welfare indicators for elasmobranchs are poorly understood, however, behaviour can be used to understand how an animal is coping with the captive environment and is a key indicator in animal welfare assessment. In order to develop these behavioural indicators and sampling methodology it is important to first understand time budgets of behaviour. This study examined the behaviour of Port Jackson sharks (*Heterodontus portusjacksoni*, n=4*)* housed in an enclosure at a zoo in Victoria, Australia. Behaviour was considered under two treatments: original enclosure design, and enriched enclosure, renovated to represent species natural habitats. The behaviour and location of each individual was recorded using instantaneous scan sampling for six 45-minute blocks, roughly every two hours between 0700h and 1730h. The location and average proportion of time spent engaged in each behaviour, including resting, swimming, and abnormal behaviours, termed surface and perimeter swimming, was calculated across 10 days for each treatment. During each observation block, all-occurrence sampling was used to record the performance of the stereotypic behaviour spy-hopping, defined as vigorous vertical propulsion breaching the water's surface. In the original enclosure, sharks spent 26% of their time active, 10% perimeter swimming and 6% surface swimming. In the enriched enclosure, sharks spent 32% of their time active, 7% perimeter swimming and 4% surface swimming. Resting behaviour remained high, near 60% for both treatments. A Wilcoxon Signed Rank Test was used to compare behaviour between the treatments. Our analysis found a statistically significant reduction in the proportion of time spent engaged in perimeter swimming (T1 mean = .099, T2 mean = .066, z = -2.43, p =.015) and surface swimming (T1 mean = .057, T2 mean = .038, z = -2.28, p =.025) following enclosure renovations. Similarly, the average number of spy-hopping per observation block significantly decreased (T1 mean = 1.50, T2 mean = 1.29, z = -2.05, p = .04) after renovations. Although a small sample size was used, this study provides a good understanding of time budgets of behaviours in sharks which will inform the development of behaviour sampling methodology. Furthermore, the results indicate that enclosures with multiple micro-habitats allow for a greater proportion of the day spent exhibiting natural behaviours and reduced stereotypies, leading to overall better welfare states.

Impact of individual pens removal on veal calves' behaviour

No 70

Thursday, 3rd August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Mr. Didier BASTIEN [1], ***Mrs. Virginie LEFOUL*** [1]

1. *The French Livestock Institute, Meat Quality Department, Veal calves experimental farm, Le Rheu 35 650*

The European Commission plans to phase out the use of cages for farm animals from 2025. A trial was conducted to study the impact of individual pen removal in veal calf production the first 28 days. 60 male Holstein calves aged 20 days and weighing 49.0 kg were divided into 3 batches and housed for the first 28 days in individual pens (**IP28**), by pair (**PH28**) or in groups of 5 calves (**GROUP**). The calves were then fattened in collective pen of 5 calves for a total period of 24 weeks. Drinking from buckets in collective pens requires the presence of headlocks that allow individual monitoring of milk consumption. Continuous sampling observations were carried out from 6 am to 8 pm on 4 days (D13, D27, D112 and D156). The use of headlocks for **PH28** and **GROUP** the first days resulted in more retreat movement of the calves (35.0% of calves in the first two days and 20.7% at 2 weeks). At D13, prepuce-sucking was more frequent in **PH28** and **GROUP** (8.2% and 11.1% of their daytime *vs* 0.4% for **IP28, p<0.01**) and still very present at D27 for **PH28** (65% calves affected *vs* 0% for **IP28**, **p<0.01**, and 56% for **GROUP** being intermediate, **NS**). 65% of this activity occurred 3 hours around milk drinking. 2 calves from **GROUP** developed a strong prepuce-sucking behaviour and had to be isolated because they shunned their milk and were losing weight. Positive interactions such as grooming were equivalent between the 3 batches. Nevertheless, **IP28** spent more time expressing pica behaviour on D13 (7.8% *vs* 1.5% for **PH28** and **GROUP**, **p<0.01**). These differences are balanced out during the rest of the fattening period. Furthermore, no significant differences were observed on the number of health treatments per batch (1.7 treatment/calf, **NS**) or on live weight at slaughter, despite 10 kg difference between **IP28** *vs* **PH28** and **GROUP** (**IP28:** 262.7 kg, **PH28:** 252.5 kg, **GROUP:** 251.9 kg, **NS**).

These results show that fattening calves in individual pens leads to the development of pica behaviour but does not alter their growth. Fattening male calves in pairs or in groups from the first 28 days of fattening results in an increase in prepuce-sucking which leads to a loss of appetite and weight, confirming the only other study on the same production where 8% of the calves had to be removed of the study (Abdelfattah et al., 2013).

Cognitive and stereotypies behavioural aspects in the horse.

No 71

Thursday, 3rd August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Mr. Damiano Altieri [1], Ms. Stefania Maisto [1], Prof. David Arney [2], Prof. Rossella Di Palo [1], Dr. Francesca Carnovale [2]

1. *Department of Veterinary Medicine and Animal Production, Federico II , Naples Italy,* ***2.*** *Institute of Veterinary Medicine and Animal Sciences, Estonian University of Life Sciences, Tartu, Estonia*

The history of the human-horse relationship (Equus caballus) is based on man's needs to take advantage of the many resources and skills of this animal that support human needs for work and for sport. To facilitate this interspecific relationship, studies have examined the cognitive and behavioural aspects of the horse to improve current training methods and have produced a better understanding of the actual and potential learning skills of the horse, leading to considerable improvement in herd management. The aim of this study was to simplify protocols to assess the behaviour of horses and assess the impacts on their welfare, giving particular attention to abnormal behaviour and stereotypies. During the evaluation, the main behavioural aspects were analysed in order to verify the incidence of stereotypies and any differences between subjects in the same housing conditions. Feedback was collected from the farm manager regarding the suitability of the protocol used and the results presented. The farm used was anonymous but was situated in the region of Campania in Italy. In the period between September 9 and September 16, 2021, 23 stallions were monitored, and a behavioural assessment form was filled. The horses were observed every day for 10 minutes after the distribution of the feed. Furthermore, the avoidance distance test (AD) and voluntary animal approach test (VAA) were used, as described by Dalla Costa et al. (2014). The ISAE guidelines for Ethical Treatment of Animals in Applied Animal Behaviour Research were followed. Evaluation of the incidences of the different behaviours showed that the most frequent stereotypies were tongue movement and lip movement, both with an average prevalence of about 40%, followed by movement in a circle, observed in 36% of the individuals, and biting, with an average prevalence of 20%. The presence of biting behaviour was recorded in 9 stallions, 6 of which showed a biting frequency greater than or equal to 50%. During the avoidance distance test, horses that allowed their muzzles to be touched by the human assessor were found to be in 55% of cases. The results obtained from the surveys and tests using this method received positive feedback from the manager and allowed the stable staff to make evidence-based individual and group changes to improve the horses' welfare.

Using group scan sampling to try to understand how a citrus-extract product has an effect on tail biting in pigs

No 72

Thursday, 3rd August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Dr. Alexis Nalovic [1]***, Ms. Aurélie Auvray*** [2]***, Mr. Jean Francois Gabarrou*** [2]

1. *EPIDALIS,* ***2.*** *Phode*

This trial is the second part of a preliminary study which goal is to investigate the effect of an antistress sensory feed additive, mainly based on essential oil of orange (VeO, Phodé), on tail biting.
The first part was focused on the number and severity of tail lesions between control and treatment group while the second part investigated the behavioural differences *via* a time budget analysis, the hypothesis being that there was less tail manipulation in the treatment group.
A total of six successive batches between 130 and 160 gilts each were monitored following the farmer's routine, from 7 weeks of age until the end of the fattening period. All gilts were dry fed following the farm's usual rationing. Batches were successive and were alternately treatment or control batches, beginning with a treatment batch (randomly determined). Treatment batches received VeO solution in the water (100 ml/1000l of drunk water) for the whole duration of the trial. Two pens per treatment and per batches were filmed since 8 weeks of age. The camera used were FarmCam® and the videos were analyzed using BORIS free software with a blind observer. Behaviour was analyzed from 8 am to 8 pm every 30 minutes *via* a group scan sampling using a previously established ethogram. Data were analyzed using a Chi-square test in R free software. Time budgets were made on pigs activity period only.

A total of 11524 behaviours were scored, 7115 in treatment groups and 4409 for control groups. Time budgets are significantly different between the two groups (p-value<0,01) and the differences are as followed: more manipulations (of pigs and object) for control (12,5% vs 9,3%, p-value<0,01), more head in trough/drinkers for treatment groups (14,3% vs 11,5%, p-value<0,01) and more digging (snout on ground) for treatment groups (6% vs 4,6%, p-value<0,01). No other significant differences were found.
In the first part of the study, we found significantly less severe tail lesions in treatment groups (Nalovic *et al.*, ISAE 2022). Time budget analysis confirms that treated pigs showed less manipulation (of pigs or objects) but also spend more time foraging and actually eating or drinking. This behavioural change could explain why we found less lesions, as there could be less pigs starting a tail-biting outbreak. The potential mechanism involves an action on serotonin's activity in the brain (Coutens *et al.*, 2020). Those preliminary results need to be confirmed by analysing behaviour of more batches.

Characterization of Clinical Signs in Newly Arrived Calves with Bovine Respiratory Disease (BRD) Based on Different Case Definitions

No 73

Thursday, 3rd August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Ms. Katrina Garneau [1], ***Dr. Diego Moya*** [1], ***Dr. John Campbell*** [1], ***Dr. Emily Snyder*** [1], ***Dr. Karen Schwartzkopf-Genswein*** [2], ***Dr. Michael Jelinski*** [3]

1. *Department of Large Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, Saskatchewan, Canada,* ***2.*** *Lethbridge Research and Development Centre, Agriculture and Agri-Food Canada, Lethbridge, Alberta, Canada,* ***3.*** *Veterinary Agri-Health Services Ltd., Rocky View County, Alberta, Canada*

An observational study was conducted at 5 commercial feedlots in Alberta and Saskatchewan during the fall and winter of 2021 and 2022 to characterize the clinical signs associated with different case definitions of BRD in newly arrived calves, and to standardize on-farm BRD diagnosis based on visual diagnosis. The decision-making process of 12 pen riders used to identify calves with BRD were documented. Clinical signs observed included mouth secretions, nose secretions, eye expression, abnormal ear position, lack of stretching, coughing, flat-tail, altered respiration, rumen fill, abnormal movement, pen isolation, hiding behaviour, lethargy, and head carriage. All calves identified for BRD treatment (n=163) had rectal temperature (RT), blood lactate (BL; Arkray Factory Inc., Shiga, Japan), and lung auscultation (LA) score (Whisper, Merck Animal Health, Kirkland, Quebec) measured at chute-side. The thresholds for case definitions were: RT ≥ 40°C, BL concentration ≥4 mmol/L and LA score ≥ 2. Nose secretions (Odds Ratio (OR) = 2.43, *P* = 0.02) and abnormal ear position (OR = 2.11, P = 0.22) were positively associated when the BRD case definition was based on RT. A BRD case definition that combined RT and BL was positively associated with ear position (OR = 5.65, *P* = 0.11), nose secretions (OR = 3.02, *P* = 0.04), and lack of stretching (OR = 2.53, *P* = 0.68). A case definition based on RT, BL and LA scores was positively associated with nose secretions (OR = 7.70, *P* = 0.01). When only RT was used in the case definition (industry standard), nose secretions had a sensitivity (Se) of 58.4%, specificity (Sp) of 69.4%, positive predictive value (PPV) of 79.7%, and negative predictive value (NPV) of 44.7%; while ear position had a Se = 15.8%, Sp = 91.8%, PPV = 81.8% and NPV = 31.9%. The agreement between RT and either BL or LA was 62.6% (Cohen's K (CK) = 0.18) and 55.2% (CK = 0.09), respectively, and it was lower than between BL and LA (66.9%, CK = 0.33). Results indicate a limited number of clinical signs (nose secretions and ear position) consistently associated with a diagnosis of BRD based on different case definitions, although with moderate Se or Sp. The use of RT, BL, and LA as chute-side tests to diagnose BRD only showed a slight agreement. Further analyses are required to optimize BRD detection based on the diagnostic tools available, and the accuracy of the clinical signs assessed.

Direct observations of tail posture as a proxy for tail damage in pigs

No 74

Thursday, 3rd August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Dr. Megan Lucas [1], ***Mrs. Rutu Galea*** [1], ***Prof. Mark Stevenson*** [2], ***Prof. Paul Hemsworth*** [1], ***Dr. Rebecca Morrison*** [3], ***Dr. Maria Jorquera-Chavez*** [3], ***Dr. Lauren Hemsworth*** [1]

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Early detection of tail damage is important in managing tail biting in pigs. However, tail damage can be challenging to identify during routine health and welfare inspections conducted outside the pen, and detailed visual inspections of individual animals is not practical on farm. Limited evidence suggests a relationship between tail posture and tail biting. We hypothesised that direct observations of tail posture at a pen level could be used as a proxy measurement for tail biting, whereby the proportion of pigs with low tail postures in the pen would be a predictor of tail damage period prevalence.

Non-docked pigs were housed in ¾ slatted-floored pens groups of 14 same-sex pigs at the start of the experiment. No enrichment was provided unless there was a fresh tail injury in the pen, after which different enrichments were rotated every 2-3 days until fresh damage had subsided. Tail posture and tail damage were assessed by a trained observer 3 times/week after weaning. To assess tail posture, the observer gently encouraged pigs to stand and gave them 20 s to settle, before using scan sampling from outside the pen to record the number of tails hanging (vertical) and tucked (pressed tight against the body) for all standing pigs. Tail damage was scored after tail posture using the German Pig Scoring Key to assess wound freshness and severity. A generalised linear mixed effects model was developed to quantify the association between the number of pigs in a pen with low tail posture and tail damage period prevalence.

The final data set comprised 20 observations of pigs 4-10 weeks of age (tail posture/damage scored 3 times/week from 4-9 weeks, and 2 times/week at 10 weeks) in 24 pens. A positive association was found between low tail posture (hanging or tucked) and tail damage period prevalence ($p < 0.05$).

These findings support those of others in showing that low tail posture is associated with tail biting in pigs. More detailed analyses are necessary to examine the sensitivity of tail posture as a measure of tail damage in pigs of different ages. With further research, direct observations of tail posture at a pen level have the potential to be incorporated into routine health and welfare inspections on-farm, and may be a fast, practical way for stockpeople to identify possible tail damage. This may be particularly useful in situations where visual inspections of pigs' tails are difficult.

Pick your company: pen-level tail health affects tail lesion development in the individual pig during the finishing phase

No 75

Thursday, 3rd August - 15:30: Poster presentations in oral format (Bolero hall) - Poster

Ms. Camilla Munsterhjelm [1], ***Ms. Miina Tuominen-Brinkas*** [1], ***Ms. Hilkka Koskikallio*** [1], ***Prof. Mari Heinonen*** [1], ***Ms. Kristina Ahlqvist*** [1], ***Prof. Anna Valros*** [1]

1. *Research Centre for Animal Welfare, Department of Production Animal Medicine, Faculty of Veterinary Medicine, University of Helsinki*

Purpose and methods

Tail-biting is a significant welfare problem in commercial pig production. This study aimed to establish effects of individual and pen-level tail health at introduction to the finishing unit (W0) on the change in tail length during 9 weeks (ΔL) in non-docked pigs. ΔL may include cumulating information on received tail biting given that the variation was large. The data included one complete batch on four finishing farms. Tail health was assessed at W0 and 9 weeks later (W9) in terms of length (iL), position (hanging vs not hanging), shortening (loss of flattening of the distal tail) as well as lesion type (TLT; 0 = no lesion, 1 = minor lesion on intact skin; or with skin penetration 2= <0.5 cm, 3 = 0.5-2 cm, or 4 = >2 cm).

A linear mixed model predicting ΔL was built with pig (n=1395) as statistical unit and pen (n=94) nested within farm as random effect.

Results and conclusion

At W0 14.5% of tails were hanging. iL varied from 6 to 33 cm ($\bar{x}$=21 ± st.dev. 3.0) at W0, with the corresponding values being 0-38; $\bar{x}$=26 ± 4.7 at W9. ΔL varied from -17 to 18 cm ($\bar{x}$=5 ± 3.5). The TLT distribution was 43.9, 12.9, 23.0, 15.2 and 5.0% for category 0-4 , respectively. Individual-level factors at W0 predicting a larger ΔL included barrow (vs female), larger iL, non-hanging tail posture, no tail shortening and any other TLT as compared to 4. Pen-level factors at W0 predicting a larger ΔL included a smaller percentage of hanging tails, a larger average tail length in the pen (p$\bar{x}$L) and an interaction between iL and p$\bar{x}$L. According to the interaction effect two different scenarios predicted a smaller ΔL: 1) smaller iL and p$\bar{x}$L, or especially 2) larger iL and p$\bar{x}$L. Scenario 2) may be two-stage tail-biting where the longest tails were the most attractive objects for exploration, whereas scenario 1) appears to be re-targeting of previous victims by individuals accustomed to an environment with tail biting.

We conclude that pigs with better tail health at introduction to the finishing unit in general receive less injurious biting during 9 weeks. The average level of tail health in the pen at introduction does, however, have a profound effect that is very different at extremes of tail length.

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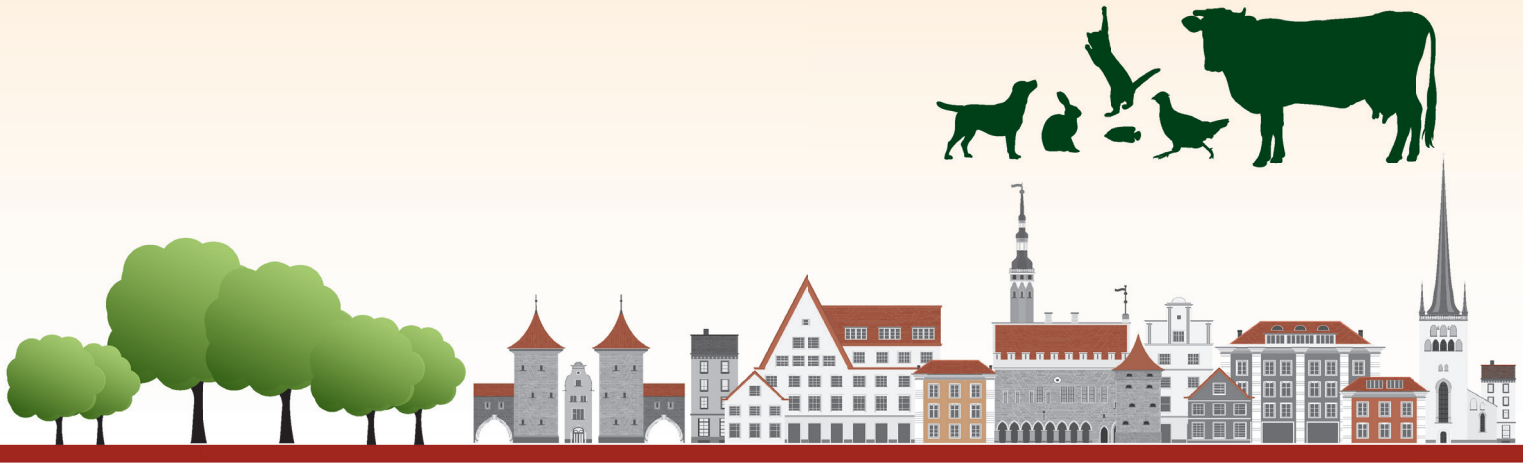

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