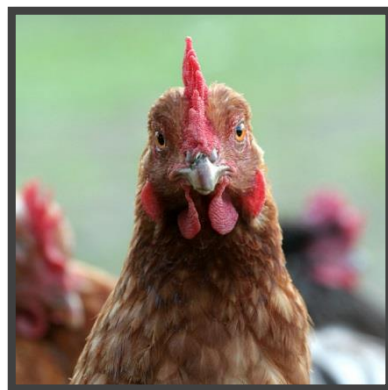


ISAE_{Benelux}



Proceedings of the ISAE Benelux conference 2018

10th October

Experimental Poultry Centre, Geel, Belgium



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Programme ISAE Benelux regional meeting 2018

09h00 - 09h30 **Walk-in and registration**

09h30 - 09h40 **Welcome**

Session 1 **From fearful hens to impulsive cats: individual differences** *Chair: Inonge Reimert*

09h40 - 09h55 Fearfulness and keelbone damage in laying hens - does one lead to the other? **Elske de Haas**

09h55 - 10h10 Birth weight and holeboard performance of first- and last-born piglets **Vivian Witjes**

10h10 - 10h25 Effect of birth order on performance and affective state of pigs **Yara Slegers**

10h25 - 10h40 Impulsive cats **Bonne Beerda**

10h40 - 10h55 Individual side preferences of domestic chickens in a learning task **Nina Thierij**

10h55 - 11h15 **Coffee break & posters**

Session 2 **Methodologies in ethology** *Chair: Ellen Meijer*

11h15 - 11h30 Methodological considerations about whinnies playbacks **Maud Remacle**

11h30 - 11h45 Ethograms in applied ethology: room for improvement!? A test case in equitation science **Marc Pierard**

11h45 - 12h00 Testing the performance of the Sow Stance Information System (SowSIS) to automatically detect lameness in breeding sows **Petra Briene**

12h00 - 12h15 Sleepy shelter dogs: Evaluating nocturnal activity as an indicator of adaptability of dogs to a shelter environment **Janneke van der Laan**

12h15 - 13h15 **Lunch**

13h15 - 13h45 **Keynote lecture:** Integrating animal welfare into sustainable development of livestock systems **Eddie Bokkers**

Session 3 **The discreet charm of the gut - about microbiota and nutrition** *Chair: Claire Diederich*

13h45 - 14h00 Early-life microbiota transplantation affects fearfulness in layer-bred chickens **Yvonne van de Weetering**

14h00 - 14h15 Effects of probiotic feeding of sows during late gestation and lactation on sow and litter performance and welfare **Severine Parois**

14h15 - 14h30 Nutritional needs during lactation and playfulness at the creep feeder ease weaning in piglets **Anouschka Middelkoop**

14h30 - 16h00 **Coffee break and tour of the Experimental Poultry Centre**

Session 4 **Interactions with conspecifics and humans - effects on welfare and behaviour**

Chair: Monique Bestman

16h00 - 16h15 Killing individual poultry on farm: a matter of animal welfare and feasibility **Anneleen Watteyn**

16h15 - 16h30 Non-beak trimmed hens versus beak trimmed hens in aviary housing system **Nathalie Sleenckx**

16h30 - 16h45 Group observation and paired contest hierarchy in layer hens **Marieke van der Meijden**

16h45 - 17h00 Dog-directed parenting as a candidate determinant of dog to owner attachment **Kerstin Bouma**

17h00 - 17h15 **Closing and student presentation prize**

17h15 - 18h00 **Reception**

18h00 **Dinner**

SESSION 1 – INDIVIDUAL DIFFERENCES

Fearfulness and keelbone damage in laying hens – does one lead to the other?

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In laying hen flocks keelbone damage (KBD) is often at a high prevalence. KBD affects bird welfare. Some researchers have argued that high fearfulness increases the risk for KBD. Here, we compared fearfulness by tonic immobility duration (TI) of birds that developed KBD with birds that did not develop KBD over a period of 8 months. We used 200 Novogen brown hens housed in two mobile chicken houses with an extensive outdoor range of approximate 3200m² (2 groups of 50 birds in each house). KBD of fractures and deviations was assessed at 28, 48 and 60 weeks of age by palpation by one person. TI was assessed at 32, 49 and 60 weeks of age. At each sampling point 25 individual birds per group were assessed (n=100). KBD was highly present, even in this extensive system with 23, 42 and 55% of the birds having KBD at 28, 48 and 60 weeks of age respectively. Comparison between first TI at 32 weeks and development of KBD at 49 or 60 weeks was possible for 60 hens. Here we focus on TI prior to KBD to exclude difference in TI response as caused by pain due to fracture or deviation. Our preliminary analysis consist of hens which developed KBD or not, excluding birds that already had KBD at 28 weeks of age. TI at 32 weeks of age was shortest for birds that developed a fracture and longest for birds that developed a deviation compared with birds that did not develop KBD in between (deviation: 138.8 s ± 51.8s, no KBD:, 81.4s ± 2.5s, fracture: 36.5 s ± 13.1s). Difference in TI between birds with a deviation or fracture is interesting, indicating that these are different type of birds based on fearfulness. An explanation may be that highly fearful birds spend more time perching leading to keelbone deviations, and that non-fearful birds take more risk in their jumps or flight attempts which could lead to keelbone fractures. This limited dataset will be extended with more data on fearfulness and KBD to assess the causes and consequences on KBD.

SESSION 1 – INDIVIDUAL DIFFERENCES

Birth weight and holeboard performance of first- and lastborn piglets

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Decades of selective breeding have resulted in increased litter sizes in domesticated pig breeds, since the commercial industry strives to enhance productivity. However, this expansion will reach an inevitable limit, in which production levels will decline due to accompanying issues and welfare related problems. Large litter sizes, in addition to the presence of stillbirths, prolong parturition durations. Accordingly, the last-born (LB) piglets may be at greater risk of birth complications compared to firstborn (FB) piglets, resulting in cognitive deficits and a distorted stress-response. Furthermore, more LB- than FB piglets may have low birth weight, which has been correlated to impaired memory functioning. Therefore, in this study, FB- and LB piglets from twelve different litters were selected, weighed at birth and subsequently tested in a cognitive holeboard task, in which animals learn the locations of hidden food rewards. During the first reversal trial, in which piglets are confronted with a reversed reward configuration, saliva cortisol samples were taken. We hypothesized that LB piglets would have lower birth weight, lower reference- and/or working memory scores and longer trial durations than FB piglets. Furthermore, we expected LB piglets to have elevated cortisol levels after experiencing acute stress. The average amount of piglets born alive was 14 (13.75 ± 3.62), with a minimum of 10 per litter. The mean farrowing duration was 191.45 ± 88.94 minutes and in five litters, 1-2 stillbirths occurred. Surprisingly, none of the LB-, while one of the FB piglets had low birth weight (< 0.96 kg) and the average weight of the FB- and LB piglets was 1.50 ± 0.46 kg and 1.49 ± 0.25 kg respectively, which did not differ significantly ($p=0.75$, Mann-Whitney U test). Therefore, if any difference in holeboard performance exists, this cannot be due to difference in birth weight. The main results of the holeboard experiment are currently being analysed and will be presented at the conference.

SESSION 1 – INDIVIDUAL DIFFERENCES

Effect of Birth Order on Performance and Affective State of Pigs

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In pigs, high birth order is associated with higher pre-weaning mortality. However, knowledge on the effect of birth order on welfare of surviving piglets is limited. The aim of the present study was to investigate the possible link between birth order and both piglet performance and affective state. Firstly, the following data was collected from 393 piglets: stillbirth rate, intactness of the umbilical cord, cyanosis, drinking time, birth weight, teat order and weaning weight. Secondly, an active-choice judgement bias test was performed with low birth order (n=10) and high birth order (n=10) piglets to assess affective state. During the preceding discrimination training, the pigs learned to associate two tone cues (200/100 Hz) with either a high reward (4 M&Ms) or low reward (1 M&M), provided at different locations. After training, three ambiguous tones were introduced: near-negative (299.97 Hz), middle (447.21 Hz) and near-positive (668.87 Hz). Optimistic choice was defined as a choice for the location normally containing the high reward. The sows included in the study had a mean litter size of 17 ± 3.0 (range 11 to 23). Statistical analysis using mixed models showed that last-born piglets had a higher birth weight than middle-born piglets (1.47 ± 0.06 vs. 1.25 ± 0.08 , $t=2.7$, $p=0.01$). Last-born piglets also drank from more caudal teats than first-born piglets (4.4 ± 0.41 vs. 3.4 ± 0.46 , $F=5.4$, $p=0.04$). In the judgement bias test, low and high birth order piglets showed a similar number of optimistic choices ($47\% \pm 4.6\%$ vs. $48\% \pm 4.0\%$) and latency (15 ± 5.7 vs. 16 ± 2.0). In conclusion, last-born piglets might receive less colostrum and milk than first-borns, which is thought to adversely affect their health and welfare. However, no effect of birth order on affective state was found. Additional test are needed for validation.

SESSION 1 – INDIVIDUAL DIFFERENCES

Impulsive cats

Bonne Beerda¹ and Guido Bosch²

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Impulsivity facilitates problematic behaviours such as overeating, at least in humans. If this applies to cats too is unknown and, first, we aim to further the concept of feline impulsivity. Our present findings underline that trait assessments require repeated measurements and that feline impulsivity comprises distinct facets. Colony living cats were tested repeatedly for impulsiveness across a period of about 2 years, with trial intervals of days (defining a set) up to 1.5 year. Action cancellation tests were done to measure action impulsivity, in terms of the inability to suppress prepotent conditioned responses. Numbers of lever presses after these were no longer reinforced with food, varied from a mean(\pm stdev) 50 ± 36 ($N=16$, 2 trials, first set) to 27 ± 19 ($N=28$, 3 trials, second set). Time intervals between measures mattered less than the number of measures underlying trait scores. Scores (rank) correlated stronger for averages per set ($r>0.9$, $P<0.001$, $N=13$) than for trial scores within a set ($r\leq 0.8$, $N=16-28$). Action impulsivity was measured also as the inability to withhold lever pressing for food at the (progressively longer) time that a tone sounded. This differential reinforcement of low rates of response test was performed 4 times (2 trials per set). Correct responses occurred at an average $27\pm 10\%$, with again stronger correlations for individual set averages ($r>0.7$, $P<0.001$, $N=24$) than for trial scores within a set ($r\leq 0.6$, $N=24-29$). Impulsivity divided into facets. Action impulsivity measures correlated with each other ($r=-0.5$, $P=0.01$, $N=26$), but not with the choice impulsivity measure of preferring small instantaneous rewards over big delayed rewards. Traits are consistent patterns in behaviour and present findings underline the importance of repeated measurements. The predisposition to become overweight varies between individual cats and should impulsivity explain part of this variation, there could be different roles for action impulsivity and choice impulsivity.

SESSION 1 – INDIVIDUAL DIFFERENCES

Individual side preferences of domestic chickens in a learning task

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Cognition and cognitive capacity are increasingly gaining attention as potentially important for farm animal welfare. The original goal of the present project was to study the working memory of 10 Brown Nick hens and 10 Lohmann LSL layer hens using a delayed matching-to-sample task. First, a green or red coloured sample square was presented to the chicken. Second, the chicken gained access to two food containers, each of which was marked by a red or green square. Only the container matching the sample colour contained a food reward. To measure the working memory of these chickens, the time between sample presentation and container access could be manipulated. After a total of 112 trials, none of the chickens seemed to have understood the matching-to-sample principle without delay. None of the chickens had a significant colour preference (binomial tests, $p > 0.1089$). Instead, preliminary analysis shows strong individual side preferences. Out of 20 chickens, 9 showed an overall left preference, 6 an overall right preference and 5 chickens did not have a significant side preference at Bonferroni correction level. Further analysis will explore the origin of these preferences. If the side preferences existed from the start of the experiment, they could be innate, individual, side preferences. However, if preference developed after trial-and-error, it is possible that the preference was learned. This is made possible since the left/right reward position was not evenly distributed in the first half of the experiment. In this first stage, the chicken could have learned the more frequently rewarded side. Later, this preference was presumably maintained by a 50% reward on that side. If this is the case, the chickens more readily learned the rewarded side than the rewarded colour. This would indicate that location is a more instinctive learning cue than colour for these laying hens.

SESSION 2 – METHODOLOGIES

Methodological considerations about whinnies playbacks

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Vocal and non-vocal signals belong to horse's communication. The acknowledgment of sentience in animals has led researchers to decipher the message carried by those signals, especially in whinnies: their emotional content and the perception of the familiarity of the sender. Studies show that nearly 70% of the acoustic characteristics of a whinny help for individual identification (sex, hierarchical status, potential sexual partner). It was also found that they differ according to the situations of emission: shorter duration and lower fundamental frequency for whinnies with positive valence (e.g. at feeding or when meeting a pen mate) than for whinnies with negative valence (e.g. mare-fowl separation, pen mates separation). And they differ according to the social link that exists between the sender and the receiver of the signal. Horses are able to learn and to react accordingly to the emotional and individual vocal signatures and to remember the level of the social link they share with the sender. However methodological considerations have to be taken into consideration when preparing whinnies playbacks: (1) For the emitting horse: situations to induce emotional content in whinnies, assessment of familiarity, temperament and sexual activity, duration of the acoustic signal, and recording distance. (2) For the receiver: testing location, background noise, duration of the playback (repetition), selection of a control noise/signal, broadcast volume, distance from the speakers, testing position of the horse, environmental olfactory control (feces), temperament and sexual activity, period of the year and period of the day. This presentation will discuss about methodology and rationale when using whinnies playbacks to assess the influence of the housing environment (outside in a group or alone in a box) in horse auditory communication signals.

SESSION 2 – METHODOLOGIES

Ethograms in applied ethology: room for improvement!? A test case in equitation science

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An ethogram, being the behavioural repertoire used in a particular study, is crucial for every study or application that measures behaviour. The ultimate goal of an ethogram for a particular species is an almost exhaustive list of behaviours and their functions. However, agreement on function, causation or ontogeny cannot be reached without valid, reliable and widely applied descriptive definitions of the various behaviour units. Working towards a reference descriptive ethogram for species that are used regularly in research, would increase validity, reliability and compatibility of studies, allowing more efficient meta-analyses. Reference ethograms should and would not prevent the necessary flexibility in individual studies. At this point there is little literature on methodology of ethograms and behavioural definitions. A test of the feasibility and reliability of a descriptive reference ethogram for horses was performed. A test panel of 13 researchers in equitation science and 10 high level practitioners scored behaviours in 30 short video clips, using a partial ethogram with descriptive definitions. The ethogram provided contained 21 behaviours, including locomotor behaviours, lying down, getting up, rolling, striking and kicking. Statistical analysis of the results with logistic mixed models showed that the variability between observers was very low (covariance parameter estimate <0.0001) and much lower than the variability between video clips (covariance parameter estimate 0.15, standard error 0.05), indicating a high interobserver reliability. Scoring by researchers and practitioners did not differ ($p=0.74$), but simple video clips did differ from more complex ones ($p<0.0001$). This first test did not include training of participants and it would be useful to investigate how training focused on the interpretation and use of an ethogram influences its application. Ethograms and their behavioural definitions represent the measuring units for behaviour. The work on horses shows it is feasible to develop descriptive ethograms with high reliability.

SESSION 2 – METHODOLOGIES

Testing the performance of the Sow Stance Information System (SowSIS) to automatically detect lameness in breeding sows

Petra Briene¹, Olga Szczodry¹, Pieterjan De Geest¹, Stephanie Van Weyenberg¹, Annelies Van Nuffel¹, Jürgen Vangeyte¹, Bart Ampe¹, Frank A.M. Tuytens^{1,2}, Sam Millet¹, Jarissa Maselyne¹

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Lameness is a very common problem in breeding sows, which often goes undetected for long periods of time. This can have severe consequences for animal welfare and has impact on the productive performance of sows. Automatic lameness detection could help pig farmers to recognize and treat the problem sooner. The SowSIS consists of 4 force plates, built into an electronic sow feeder, providing non-invasive force-output for each leg from which stance variables can be calculated. In a previous study stance variables that could discriminate between 4 lame and non-lame sows were identified. In the current study data was automatically collected for 3 groups with 53 gestating group-housed sows in total for 74 days/group. All sows' gait were visually scored twice a week using a 150mm tagged visual analogue scale to determine their lameness status. This gait score (GS) was used as a reference and compared to the SowSIS data. Using Multilevel Linear Regression (MLR), with sow as random factor to correct for repeated measurements, 32 stance variables were tested using univariable analysis to identify those with significant association with GS. Subsequently, these 10 variables were tested using multivariable MLR, leaving four significant variables to use for the prediction model: mean relative weight (RW) on the left, minimum RW on the left, mean of all leg weight ratios (weight of lightest leg/heaviest leg per pair of legs) and the kick frequency of all legs (kicks/min). With the model estimates, it was determined whether the model would classify a sow as lame or non-lame using $GS \geq 55\text{mm}$ as the cut-off value. Performance of the model was 69% sensitivity, 86% specificity, 67% lame predictive value and 87% not-lame predictive value. Further analysis to refine interpretation of the model is currently ongoing. The final results will be presented at the conference.

SESSION 2 – METHODOLOGIES

Sleepy shelter dogs: Evaluating nocturnal activity as an indicator of adaptability of dogs to a shelter environment

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Shelter dogs are faced with the challenge to adapt to their kennel environment, doing so in their individual way. To measure the adaptability of individual dogs, physiological and behavioural parameters need to be evaluated as useful indicators. In this study, we aimed to evaluate canine nocturnal activity patterns next to physiological measures, as recovery of disturbed rest is hypothesized to be an indicator of adaptability to the environment. We measured nocturnal activity (3-axial accelerometer, the Actical®), urinary cortisol/creatinine ratio (UCCR) and weight in 32 shelter dogs. Measurements were taken on three moments: the first two days after intake at the shelter (n=32), after a two-week acclimatisation period in the shelter (n=31) and post-adoption (n=17). A control group of pet dogs at home (n=32), matched to the characteristics of the shelter dog group (breed, age), was also assessed for nocturnal activity and UCCR. Mixed models were used to analyse the measured variables over time. Shelter dogs had a higher total nocturnal activity ($P=0.013$) and total activity duration ($P=0.003$) the first two days after intake than after two weeks. Compared to the matched control dogs they also showed a higher total nocturnal activity ($P<0.01$) and total activity duration ($P<0.001$). No 'First-night effect' was observed as nocturnal activity measures did not significantly decline from night 1 to 2 in the shelter. In line with former studies, UCCRs were higher short after intake than after two weeks and after post-adoption in shelter dogs ($P<0.005$). UCCRs were higher in shelter dogs than in the matched control dogs both after intake and after two weeks ($P<0.001$), but no difference was found between post-adoption shelter dogs and matched control group. Shelter dogs lost on average 5% of their weight between intake and after two weeks ($P<0.001$). Therefore, nocturnal activity as measured by an accelerometer may be a valid and cost-effective additional parameter to monitor canine adaptability in a shelter environment.

KEYNOTE LECTURE

Integrating animal welfare into sustainable development of livestock systems

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Sustainable development of livestock systems involves innovations and the adaptation of these systems in a manner that a change on one aspect does not go at the expense of another aspect. Examples of innovations are novel feeding strategies, breeding goals or technologies and farm designs. To prevent unforeseen consequences, innovations should be studied in a broad context with an integrated research approach that must combine three key domains for livestock systems: animal welfare, environmental impact (e.g. use of resources and emissions to air, water and soil) and economic viability (e.g. profitability). Nowadays there are several tools to assess welfare as well as to assess environmental impact and economic performance of livestock systems. Though integrating these three domains to make livestock production systems more sustainable is in its infancy, but urgently needed. An integrative approach is required to identify trade-offs and synergies of innovations. Several examples will be given to illustrate what has been achieved so far, but also to demonstrate what kind of problems we are facing when integrating different domains. Describing and analysing livestock systems based on more than one domain of sustainability creates complex, but more complete pictures, which are required to address future perspectives for livestock production systems. It is critical that researchers in animal welfare also consider the impact of innovations on environmental and economic performance if innovations are to be long-lasting.

SESSION 3 – MICROBIOTA AND NUTRITION

Early-life microbiota transplantation affects behavioural responses in feather pecking selection lines

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Feather pecking (FP) is a major welfare and economic problem in the laying hen industry, as it can cause feather damage and could lead to injuries or even mortality of victims. FP is multifactorial and has been related to behaviours such as fearfulness. Gut microbiota might contribute to FP, as it influences behaviours in rodent models that have been linked to FP such as anxiety. Moreover, recent studies have found that high and low FP lines differ in their cecal microbial metabolites and composition. However, it is unknown whether a causal link between the gut microbiota and FP exists. Therefore, we orally administered adult microbiota to newly hatched chicks (daily, day 0-14 of age). We used genetic lines selected for high (HFP, n = 288) and low (LFP, n = 288) FP. The microbiota transplants were collected from pooled gut content of 30 week old HFP and LFP donor birds. Each line received either HFP microbiota, LFP microbiota or control treatment. FP behaviour was observed via direct observations on pen-level between 0-5, 8-10 and 13-15 weeks of age. Furthermore, birds were tested in two behavioural tests; the Novel Object (NO) test at 3 days and 5 weeks of age and the Open Field (OF) test at 13 weeks of age. Although we did not find an effect of line*treatment interactions or treatment on FP, we did observe that birds treated with LFP microbiota stepped sooner ($P < 0.01$) and more and vocalized sooner compared to the control treated birds during the OF test ($P < 0.05$). Additionally, they stepped sooner during the OF, yet took longer to approach the NO compared to HFP microbiota groups ($P < 0.05$). Therefore, we conclude that early-life microbiota treatment affects behavioural responses, which might be related to fearfulness, social motivation or coping style.

SESSION 3 – MICROBIOTA AND NUTRITION

Effects of probiotic feeding of sows during late gestation and lactation on sow and litter performance and welfare

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Feed additives have demonstrated beneficial effects on stress, health and recovery from adverse events in pigs. Our objective was to determine if a supplement given to the sow can positively affect both the sow and her litter. A total of 32 sows were supplemented during late gestation and lactation with *Bacillus subtilis*. The 2 heaviest males and females of each litter were selected at 3d. On sows, we measured: reproduction performance, recovery from farrowing, colostrum composition, fecal microbiota, maternal ability and stress around parturition and at weaning. On piglets, we measured: growth, fecal microbiota, response to stress during processing, weaning, open-fields (OF) at 11d and 3 months, aggressiveness at weaning and brain stress hormones 1w after weaning. Data were analyzed using linear models. For sows, the probiotic increased the weaning-estrus interval ($P=0.020$), changed fecal acetate and propionate percentage both before ($P=0.011$ and $P=0.057$, respectively) and 10d after farrowing ($P=0.049$, $P=0.023$). It decreased the percentage of time looking at her own piglet in a recognition test ($P<0.01$), decreased the number of posture changes 2d before weaning ($P=0.030$), decreased the heart rate 4.5h post-weaning ($P=0.052$) and overall affected sympathetic and vagal activities both 30min and 4.5h after weaning ($P<0.05$). For piglets, the supplementation increased the mean heart rate 15 to 75 min after the farm procedures up to 15%, decreased the time spent in periphery on the OF at 11d ($P=0.022$) and overall affected sympathetic and vagal activities during both OF, had a tendency to increase the hypothalamus 3,4-Dihydroxyphenylacetic acid ($P=0.087$) and the hippocampus norepinephrine concentrations ($P=0.093$). The supplementation of sows during late gestation and lactation did affect the sows themselves and their offspring over both short- and long-term. The results seem to demonstrate less stress for *Bacillus*-supplemented sows around weaning but a higher sensitivity of their piglets to pain and stress.

SESSION 3 – MICROBIOTA AND NUTRITION

Piglet nutritional needs during lactation and playfulness at the creep feeder ease weaning in piglets

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A proportion of piglets do not familiarize themselves with solid feed before weaning, often resulting in post-weaning anorexia and a growth lag. We studied the effects of piglet nutritional needs during lactation and a foraging-stimulating 'play-feeder' on piglet performance. In a 2x2 experimental design (n=37 litters), litters either received creep feed in a conventional feeder (**CON**) or play-feeder (**PL**, with canvas, cotton rope and PVC spiral tube attached) from d4 and their sows were either full-fed (**FF**) or restrictedly-fed (**RF**, 50 % of full-fed) from d10 to create a contrast in piglet nutritional needs. Indigo carmine was added to the feed (5g/kg) to determine creep feed eaters via anal swabs. Feeding behaviours were studied at d9, 16 and 23 with 2-min scan sampling for 6 h/d. Piglets were weaned at d24 by grouping four piglets from the same treatment (n=9 pens/treatment) and were studied until d39. Data were analysed using mixed models and presented as mean \pm SEM. Sow feed restriction reduced piglet growth by 566 g from d10 to weaning (RF:2.97 \pm 0.05 vs. FF:3.54 \pm 0.05 kg, $P<.0001$). Percentage of eaters was higher in litters of RF-sows at weaning (RF:48.5 \pm 8.6 vs. FF:26.5 \pm 6.5 %, $P<.05$) and PL-piglets doubled their time at the (play)feeder compared to CON-piglets before weaning ($P<.01$). Both treatments increased daily feed intake during the first 5d post-weaning (PL:0.22 \pm 0.01 vs. CON:0.18 \pm 0.01 kg, $P<.01$; RF:0.23 \pm 0.01 vs. FF:0.17 \pm 0.01 kg, $P<.0001$), and for the play-feeder also between d24-39 (PL:0.34 \pm 0.01 vs. CON:0.30 \pm 0.01 kg, $P<.01$). Accordingly, both treatments improved daily growth between d24-29 (RF:0.19 \pm 0.01 vs. FF:0.13 \pm 0.01 kg, $P<.01$; PL:0.19 \pm 0.01 vs. CON:0.13 \pm 0.01 kg, $P<.01$) and d24-39 (RF:0.28 \pm 0.01 vs. FF:0.26 \pm 0.01 kg, $P=.08$; PL:0.29 \pm 0.01 vs. CON:0.25 \pm 0.01 kg, $P<.01$). To conclude, piglets' nutritional needs during lactation and playfulness at the creep feeder are two factors that motivate piglets to familiarize themselves with feed and thereby ease their weaning process.

SESSION 4 – SOCIAL INTERACTIONS

Killing individual poultry on farm: a matter of animal welfare and feasibility

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The regulation to kill sick and injured poultry on-farm allows cervical dislocation for small poultry (<3kg), while larger poultry (<5kg) can be killed by a percussive stroke on the head. However, for birds with a body weight above 5 kg, e.g. turkeys, there is no legally accepted method. The aim of this research was to investigate several killing methods for turkeys and to evaluate the feasibility of those methods using them on-farm. In 12-week-old turkey, three methods were experimentally tested, namely mechanical cervical dislocation with neck crusher (NC, n=10), captive bolt gun with Zephyr[®] (CB, n=10), and nitrogen gas in foam (N2, n=10). The evaluation of the methods was based on efficacy rate and time measurements when reflexes started (wing flapping) or stopped (pupil reflex) and the bird remained motionless. Besides, three farmers performed and evaluated the three methods during two weeks each. Before and after performing, they were surveyed regarding the feasibility on farm. The efficacy was 90%, 100% and 100% for CB, NC and N2, respectively. The pupil reflex after CB (33.89s) was significantly shorter compared to NC (137.80s) and could not be determined during N2. Wing flapping started immediately after shooting with CB (0s), whereas this was 40 s after NC. The time to remain motionless after CB and NC was comparable and was significantly longer compared to N2. Although NC received the highest scores from the farmers, the later onset of wing flapping after NC suggests a slower onset of loss of brain stem functioning. A method in which the brain is immediately destroyed would be a good method from an animal welfare perspective, since pain can no longer be perceived. In this regard, CB would be a good method to kill individual turkeys on farm. Despite the promising results of N2 for animal friendliness and the high success rate, the feasibility of the method will be low due to the high price.

SESSION 4 – SOCIAL INTERACTIONS

Non-beak trimmed hens versus beak trimmed hens in aviary housing system

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Sleenckx Nathalie and Kempen Ine equally contributed to this research

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Feather pecking is an important welfare and economic problem in laying hens. Because of national legislation or market demands, more hens in Europe are non-beak trimmed. It has been shown that the consequences of feather pecking in non-beak trimmed (NBT) hens can be much larger compared to beak trimmed (BT) hens. In addition, a serious decrease of animal welfare and health together with a negative influence on flock performance can be seen. Field studies show different outcomes of NBT flocks and conclusions are often contradictory. 3840 BT hens with 3840 NBT hens were held in a controlled set-up. All hens (Isa Brown) were from the same breeder flock, born on the same day, reared in identical conditions in the same rearing house and placed in 4 identical aviaries (2 NBT, 2 BT). Production data were recorded, a flock behavior checklist was performed and feather cover was assessed to evaluate the onset and evolution of feather pecking. The hens encountered high ambient temperatures, discouraging a sufficient feed intake during the first weeks, together with the increasing nutrient needs this caused an imbalance and stress. Already at 22 weeks of age feather pecking and feather damage was detected in the NBT hens while all BT hens were still intact. Feather damage increased rapidly in the NBT hens which resulted in hens with obvious signs of feather pecking and cannibalism. The financial return, calculated as the income of egg production minus the costs for feed and pullets, was €2,4 per hen housed lower for NBT hens compared to BT hens at 77 weeks of age. In conclusion, even when hens have identical origin, youth and housing, differences can be detected between NBT and BT hens in the onset of feather pecking.

SESSION 4 – SOCIAL INTERACTIONS

Group observation and paired contest hierarchy in layer hens

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It was with domestic chickens where intraspecific dominance relations were first described. Ever since a great many studies have examined the hierarchy in flocks of chicken using one of the most common methods; group observations or paired contests. The examined hierarchy will then be compared with other attributes such as egg production. However, both methods have not been compared reciprocally. To find out if both methods produce identical results this study will compare these methods in two groups (n=10) of layer hens. In all methods only the agonistic behaviours were noted, this includes; jumps, pulls (holding the comb and pulling on it) pecks, threats and avoidances. For the analysis the behaviour between all pairs were separately noted. Whoever showed the most agonistic behaviour was determined the dominant one. The problem with group observations quickly became apparent as some pairs never interacted, thus of both groups the dominance ranks were only examined of 43 out of the initial 45 pairs. During testing with paired contests, containers were used that the hens already associated with rewards (grapes), thus hens defended the containers as well as the food itself. Tests were conducted in an area in which the hens could see and hear other members of the group and later in one where they could not. This was to see whether the presence of flock members had any effect on the behaviour of the focal animals. The two focal animals were always the only animals able to access the grapes. Besides the agonistic behaviour, time spent eating and time spent near the container were scored as well. Results of this study were that all methods produced not identical but highly similar results. Paired contest does seem to influence the group dynamic, causing agitation and perhaps over time even changes in the hierarchy.

SESSION 4 – SOCIAL INTERACTIONS

Dog-directed parenting as a candidate determinant of dog to owner attachment

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Attachment between dog and owner should establish that the owner acts as a secure base from which the dog can freely explore and interact with the environment. Insecure attachment may cause problem behaviour and poor welfare, and is possibly prevented by appropriate dog-directed parenting. Recently, we identified three dog-directed parenting styles, which were authoritarian correction oriented (AUN), authoritative training oriented (AUT) and authoritative intrinsic value oriented (AUI). We studied how these styles associate with dog to owner attachment as measured with a Strange Situation Test (SST) protocol with different test episodes. In these episodes the dog was either alone in an unfamiliar room, with a stranger, the owner or both. Dog behaviours were grouped by principal component analysis (PCA). Online questionnaires were used to calculate owner-report based scores for parenting styles and these were related to SST dog behaviour scores, as grouped in the PCA. A preliminary analysis of 35 dog-owner dyads correlated AUT dog-directed parenting to behaviours indicative of secure attachment (N=35, $r=0.38$, $p=0.025$), which included dogs exploring more during owner presence. Insecure attachment scores were also derived from PCA, and included behaviours such as vocalisations during owner absence. These scores correlated negatively with AUN parenting (N=35, $r=-0.48$, $p=0.004$) and positively with AUI parenting (N=35, $r=0.46$, $p=0.006$). Our preliminary findings are in agreement with what is known about the parent-child bond, suggesting that for dogs the authoritarian parenting style is most optimal as it is for children. Though the causality of dog-directed parenting and dog to owner attachment remains to be evidenced. Here we find that dog-directed parenting styles may be a route for facilitating appropriate dog to owner attachment and thereby protects dogs from negative emotional states and impaired welfare.

POSTER SESSION

Dogs in the classroom: learning children to interact with dogs

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Dogs are often misinterpreted by children, leading to sometimes hazardous situations for both parties. This is mainly due to a lack of knowledge. Informing children about dog communication and needs may help to avoid such misunderstandings. First, we developed an educational interactive workshop about dogs for pupils (first grade elementary school). Because interacting with live animals increases learning impact, the dog expert (first author) giving the workshop was accompanied by two Bernese Mountain Dogs. To guarantee dog welfare, the dogs were selected for interacting with children and during the workshop their welfare was constantly monitored. The workshop reflected on dogs' senses and perception of the environment, body language and how to approach and pet them. Secondly, we evaluated our workshop in a class of 15 pupils with no previous education on dog behavior. All children were eager to interact with the dogs (combing, petting, ...), even the five pupils with a self-reported fear of dogs. When evaluating emotions in a quiz with dog pictures, children had difficulties recognizing negative emotions like fear. Even a teeth-baring chihuahua was interpreted as a smiling dog. Afterwards these pictures were discussed, learning to recognize stress in dogs. The final exercise was to apply a correct approaching procedure and all pupils performed well. The teacher gave a positive evaluation on content, teaching methods and educational value of the workshop. Dog welfare was positively evaluated by the dog expert. For future use by dog handlers or teachers, the written notes of the workshop not only include detailed instructions for the educational part, but also guidelines for dog visits in the classroom based on www.zorgbeest.be, and an overview of relevant scientific background information on dogs. Furthermore, this workshop will be used in www.beestenbril.be, a study aiming at stimulating empathy in children by observing and reflecting on animals.

POSTER SESSION

Stress during manipulation of cattle on farms

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We studied the relationship between the farmer's behaviour and the animal's behaviour during cattle manipulations. Can observed stress behaviour during on-farm manipulations in cattle (*Bos taurus*) be related to the behaviours of the caretaker? We also questioned the attitude of farmers towards manipulations and their animals. How stressful do farmers find manipulations for their animals? On five farms, the farmers and the animals (average: 18.6, range: 2-46) were filmed during on-farm manipulations to examine the relationship between human and cattle behaviours and traits. A mixed linear model was performed to study the effect of breed, age, number of people, number of negative behaviours (running, hitting, yelling, standing close by) on the observed stress behaviours. Farmers (n=25) were also interviewed to study their attitude towards their animals and their behaviours during manipulations in cattle. During the observations, we found a significant positive relationship between the observed negative behaviours of the farmer and stress behaviour of the animals ($p < 0.001$). The higher number of people present during the manipulation, the higher number of stress behaviours were observed ($p < 0.01$). The group of younger cattle (0.5 – 1 year old) showed significantly more stress behaviours than older animals ($p < 0.01$). On average the 25 interviewed farmers had 170 animals that were manipulated (e.g. weighed, ear-tagged, vaccinated) 4 times a year. On a scale of 0 to 5, caretakers estimated the manipulations to be moderately stressful to their animals (score 2.76), they were aware of the potential negative impact of stress on productivity and meat quality (score 3.84), and were frustrated when manipulations did not go smoothly for the animals (3.48). The behavioural results are in line with other studies in farm and slaughter context. The attitudinal data show that, similar to other countries, low-stress manipulation is an actual concern to the Flemish farmers. Education about the animals' behaviour and perception in relation to human behaviour and infrastructure design may help the farmers to reach this goal.

POSTER SESSION

Preliminary results on the characterization of alternative horse housing systems in Belgium and France

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In Western countries, horses are frequently kept in individual stable despite related health and welfare concerns. Alternative systems are of growing interest among horse's owners (e.g. "active stable", "Paddock Paradise[®]", "equi-tracks"). These organised outdoor areas provide group housing, day long feeding and intend to enhance movement, even via automated processes. Further investigation is needed regarding eventual effects of the design and management choices on horse's behaviour, health and welfare. Belgian and French horse owners with such systems were recruited via social media, website and pairs recommendation, to answer a questionnaire regarding herd structure, available areas, management and horse health. Data were collected from 35 herds (2 to 49 horses): 74.3% of the herds were for commercial boarding and 85.7% were mixed gender herds. The mean available area per horse was 614.8 ± 728.8 m² (pasture excluded) comprising 9.8 ± 13.4 m² of shelter. Forage distribution methods varied among herds; strategies to slow down ingestion included adding a net on top of the forage (51.9% of herds) or using individual nets (45.7%). Some herds (25.7%) did not receive other feed than roughage and 48% received homemade mix rather than commercial feed. Summer grass pasture was mostly available (97.1% of herds). To increase locomotion, at least one forage dispenser was away from the shelter (51.5% of herds), water isolated from other resources (42.9%) or tracks used (91.4%). Most herds did not receive traditional trimming foot care nor shoeing (60.0 %) and 21.8% did not receive any chemical deworming. Over the last year, 18.6% of the horses received veterinary care, including for foot abscesses (5.3% of horses), wounds (2.7%), skin problems (2.4%) or colics (2.2%). This study is a first step to characterise these alternatives in Belgium and France. Collecting welfare indicators and behaviour observations in these systems will highlight strengths and weaknesses, allowing comparisons between systems and with stable housing.

POSTER SESSION

Leaving home: does the *in situ* reintroduction of the two young bison affect the behaviour of the remaining herd?

Rosaria Santoro¹, Silvia Mazzola², Richard Preziosi¹, Jennifer Rowntree¹, Giovanni Quintavalle Pastorino², Camillo Sandri³, Caterina Spiezio³

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European bison, when part of a breeding programme, live in groups that change regularly, due to individuals being exchanged between zoos or released to the wild. The aim of this study was to monitor the effect of the departure of two individuals on the remaining bison herd in a group of five bison. The subjects of this study were a pair of European bison and the offspring, a female calf born in 2018, a young male born in 2017 and young female born in 2016. Their behaviours were observed before and after the removal of the two individuals, the 2016 young female and the 2017 young male, from the group to be released on Tarcu Mountains. In both periods, a continuous focal animal sampling method was used to collect behavioural data (2 daily 30-min live observation sessions per subject). Non parametric tests were used to analyze the data with significance level set at $p < 0.05$. Comparing post- to pre-removal of the two young bison from the herd, results show a significant increase of inactivity for both the father (7,7%, 71,8% pre- and post-respectively; $p < 0.05$) and the mother (14,3% and 80,8% respectively; $p < 0.05$). Moreover, both the father and the mother performed more individual behaviours in pre- (84% and 77% respectively) than in post removal of the bison (26% and 17% respectively) ($p < 0.05$). In conclusion the presence of juveniles in a herd of bison might affect the activity and the behaviour of the herd.

ATTENDEES

Adinda Sannen - Adinda Sannen is researcher at Odisee University College (Belgium). Recent project topics range from reptile welfare to animal assisted interactions in healthcare facilities and in schools. She is trained as biologist and her PhD studied the relation between hormones and behaviour in bonobos. She lectures ethology and is part of the organizing committee of two postgraduate courses in Applied

Allyson Ipema - Allyson Ipema is a PhD researcher at Wageningen University in the Netherlands, studying the use of live insect feeding to livestock as nutritional and environmental enrichment. Previously, she was involved in research on the relationship between judgement bias and birth weight in pigs.

Anne van den Oever - Anne van den Oever studied Biology at Wageningen University, during which she developed an interest for animal behaviour and welfare in captive environments. Since 2016 she works as a researcher for Vencomatic Group, a company specialised in creating sustainable and poultry friendly housing. In collaboration with Wageningen University, she started her PhD project on nesting behaviour of broiler breeders in 2017.

Anne van Seters - My name is Anne and currently I'm a MCs student at Utrecht University where I study Behavioural Ecology. Before that, I did a BSc in Den Bosch at HAS University. I studied Applied Biology there with a focus on animals. My graduation project was with poultry, which turned out to be a likeable topic!

Anneleen Watteyn - Anneleen Watteyn is a postdoctoral researcher at the Institute for Agricultural, Fisheries and Food Research (ILVO) in Belgium, studying humane methods for killing individual poultry on-farm. Besides, she is developing scans to measure the animal welfare of poultry and pigs on-farm.

Anouschka Middelkoop - Anouschka Middelkoop is a PhD candidate at Wageningen University & Research in the Netherlands, working on early nutrition and the weaning transition in pigs. Her project aims to develop innovative strategies that stimulate early feeding in suckling piglets whilst promoting behavioural development, microbial colonization and concomitant maturation of the gastrointestinal tract and immune system.

Bas Kemp - Bas Kemp is a professor in Adaptation Physiology and head of the chair group Adaptation Physiology at Wageningen University. Our group aims to facilitate and support adaptation of domestic animals to their changing and challenging environment in order to optimize their welfare and health. Long-term effects of early life conditions on adaptive capacity, health and welfare in later life, and support during critical transition periods (e.g. weaning of piglets, onset of lactation in dairy cattle) are key elements in the research of the group.

Bjorge Laurensen - Bjorge Laurensen is a research assistant at Wageningen University in the Netherlands. He is mainly involved in research on pigs (reproduction and behaviour) and studying the metabolism of chicken embryos and hatchlings. He also supports PhD's and students with their practical and technical activities, including behavioural observations.

Bonne Beerda - Bonne Beerda is a lecturer at Wageningen University and conducts research on animal behaviour and welfare, focussing on companion animals. Areas of interest are owner dog relationships and cat personality traits.

Céline Haring - Céline Haring is an Applied Biology student at HAS Hogeschool Den Bosch (The Netherlands). Currently, she is conducting an internship at the Faculty of Veterinary Medicine at Utrecht. She is going to study the effects of conditioning goats on the welfare of goats.

Claire Diederich - With a veterinary background, Dr. Claire Diederich is Professor of Ethology and Animal welfare at the University of Namur. Along to teaching, she is conducting researches on animal behaviour and welfare, with dogs, cats, horses, laboratory animals as models. Claire is also Diplomate of the ECAWBM (WSEL), President of the Walloon Council for animal welfare and member of her University's ethical committee for laboratory animals.

Cynthia Verwer - Cynthia Verwer (Ph.D) is senior scientific researcher and project leader of research projects related to farm animal health and welfare in sustainable animal production systems at Louis Bolk Institute. She has special expertise in the field of rearing management of dairy cattle, livestock antibiotics, liver fluke in ruminants, insects as sustainable protein sources and welfare of laboratory animals.

Eddie Bokkers - Eddie Bokkers is an associate professor at the Animal Production Systems group of Wageningen University and Research in the Netherlands, working on animal welfare in relation to sustainable development of animal production systems.

Elise Gieling - Elise Gieling is an Animal Scientist and conducted her PhD research at the Veterinary Faculty in Utrecht, the Netherlands. She studied pigs as animal model for low birth weight using cognitive tests. She is currently working at Aeres Applied University (NL) as a lecturer and researcher within the education Biology, Food and Health, focussing on the biology and behaviour of humans.

Ellen Meijer - Ellen Meijer is junior assistant professor at the Behaviour and Welfare group of the faculty of Veterinary Medicine, Utrecht University. Her PhD thesis was on the detection of lameness in pigs. Nowadays she is interested in the behaviour, welfare and neurology of farm animals, especially pigs and small ruminants.

Elske de Haas - Elske works studies behaviour of chickens. Here she focuses on welfare risks and solutions. Currently she works at ILVO and UU on a EU called FreeBirds. Looking at ranging behaviour and the, hopefully, positive effects on hen welfare

Emma Rietveld - My name is Emma. I study Animal Sciences at the University of Wageningen, focussing on Adaptation Physiology. Before my master in Animal Sciences, I studied Wildlife Management focussing on Ecology. I did two research projects, one with great tits and one with African cichlids. Both studies focussed on the response in behaviour/physiology of animals related to environmental change.

Emmy van Houtert - Emmy van Houtert is a PhD student at the faculty of Veterinary medicine of Utrecht University in the Netherlands, studying the interaction between PTSD service dogs and Dutch military veterans with PTSD. This specific project is known as the V-PWR project, and is performed in collaboration with The Dutch Ministry of Defense and 'Stichting Hulphond Nederland'.

Esther Majoor - Lecturer at HAS Hogeschool / HAS University for Applied Sciences. Main focus on companion animals.

Eva Van laer - Eva Van laer is a scientific employee, whose work at the department of Animal Welfare of "Leefmilieu Brussel" includes the secretary of the Brussels' Council for Animal Welfare (AW). This council advises the regional Secretary of State about her policy regarding AW. In 2015 she finished her doctoral research at the ILVO, which was about thermal (heat and cold) stress and sheltering behaviour in cattle. At present, her job focuses partly on farm animals (mainly slaughter and transport) but more so on companion animals.

Fabrice Lepot - Veterinary for awé (Walloon Breeding Association) in charge for animal welfare, fight against antimicrobial resistance and communication with veterinary practitioner on field.

Frank Tuyttens - Frank Tuyttens is head of the research group Farm Animal Welfare & Behaviour at the ILVO, Belgium. He is also visiting professor at the Faculty of Veterinary Medicine, Ghent University, Belgium (teaching & researching farm animal ethology).

Frank van Eerdenburg - Frank van Eerdenburg is a veterinarian who did his PhD about sexual differentiation in the pig hypothalamus. Since 1993 he studies cattle behaviour and how to measure welfare at dairy farms. Currently active in the project sense of sensors in the transition period.

Hilde Vervaecke - Hilde Vervaecke is researcher and teacher at Odisee University College. She works on applied animal welfare and behaviour in different species and is member of advisory groups on animal welfare.

Inonge Reimert - Inonge Reimert is a postdoctoral researcher at Wageningen University & Research in the Netherlands, working on a range of behaviours and affective states in pigs. She is also involved in education by giving lectures in MSc courses and supervising BSc and MSc students with their thesis.

Janneke van der Laan - Janneke van der Laan is a PhD student working on the welfare of shelter dogs. The aims of the project are: 1) to evaluate methods to monitor the welfare of sheltered dogs, such as measuring activity patterns with accelerometers, and 2) to evaluate whether differences in how individual dogs adapt to a shelter environment can be classified.

Jeroen Snijders - Jeroen Snijders is a Master student at Wageningen University in the Netherlands, working on his MSc major thesis focussing on the effects of pre-weaning feed intake on early post-weaning behaviour of pigs. After finishing his master program he would like to pursue a career in applied pig behaviour and welfare.

Julie Leblois - I'm a researcher at awé (Belgium) since June, 2018 and just finished my PhD in pig health at Gembloux agro-bio tech (Liège university). I've been hired on a project aiming at producing a welfare score for dairy cows at the individual level on a regular basis.

Kerstin Bouma - Kerstin Bouma is a Master student at the Wageningen University. This September she started her second year of the Master Biology, with her specialisation in animal adaptation and behavioural ecology. Last spring, she did a thesis on the effects of dog-directed parenting styles on dog to owner attachment at the Behavioural Ecology group of the Animal Science Department.

Laura Webb - Laura is currently working as postdoctoral researcher at the Animal Production Systems group, Wageningen University, the Netherlands. Her current research interests include positive and negative affective states, including methods to assess them, abnormal behaviours, mother-young bonds, and resilience, all this mostly in cattle.

Liesbeth Bolhuis - Liesbeth Bolhuis is associate professor at the Adaptation Physiology group of Wageningen University, the Netherlands. She teaches and supervises MSc and PhD students on a broad range of topics in the field of animal welfare and adaptation. Her main expertise is the welfare and behaviour of pigs.

Linsey van de Reep - Linsey van de Reep is a junior teacher at the Department of Farm Animal Health of Utrecht University in the Netherlands. She is involved in Bachelor and Master education of Veterinary Medicine students.

Lisanne Stadig - Lisanne is currently working as policy officer Farm Animals at the Dutch Society for the Protection of Animals (Dierenbescherming). She obtained a PhD in Veterinary Science, which focussed on welfare and behaviour of free-range broiler chickens.

Lisette van der Zande - Lisette van der Zande is PhD student at Wageningen University in the Netherlands, working on automated individual characterisation and prediction of resilience of pigs. Previously, I was researcher at a pig breeding company.

Lu Luo - Lu is a PhD from Wageningen University, working on the effect of environmental enrichment on behaviour and immune response in pigs.

Maaïke Cox - Maaïke Cox is a teacher at the Aeres University of Applied Science in Almere (the Netherlands), faculty of Applied Biology.

Maïlis Humbel - I'm a PhD candidate working at the veterinary faculty of the University of Liège, Belgium. My work focus on alternative housing systems for horses, their characterization and eventual effects on social interactions, locomotion, welfare and health.

Malou van der Sluis - Malou van der Sluis is a PhD candidate at Wageningen University & Research in The Netherlands. Her research focuses on tracking and monitoring of individual animals that are housed in groups.

To this end, she will apply sensor technologies to assess activity in chickens, social interactions in pigs and individual spatial patterns and deviations in cattle.

Manon de Kort - Lecturer at HAS Hogeschool. University for applied sciences. Background: WUR, ethology and welfare. Main focus on companion animals.

Manon van Marwijk - Manon van Marwijk is a research assistant at Wageningen University in the Netherlands, involved in research on the behaviour of pigs. She supports PhD's and students with their practical and technical activities, including behavioural observations and setting up equipment. She is involved in education as well; guiding students in courses and giving practicals about reproduction in pigs.

Marc Pierard - Marc Pierard is a postdoc researcher in equitation science and applied ethology of horses and other animals. His PhD included studies on behavioural testing of police horses, social interactions in group housed horses and a reliability study of a descriptive reference ethogram for horses. His ongoing interest is to support management and training of horses that is more evidence based.

Marieke van der Meijden - Marieke van der Meijden is a third year biology student at the Aeres university of applied sciences in the Netherlands. Currently she is studying the different methods used to examine hierarchy in small flocks of layer hen.

Marije de Haan - Marije de Haan is a first-year master student Biology (specialisation: animal adaptation and behaviour) at Wageningen University.

Mathilde Coutant - Mathilde Coutant is a master student at Wageningen University (NL). After a cursus in agricultural engineering in France, she started the master Animal Sciences, where she specialized in animal behaviour. Her previous research focused on the effects of prebiotics on cognition in piglets, and she is currently studying the relations between early play and adaptive capacities of piglets.

Maud Remacle - I'm a master student at Life and Earth Institute in l'Université catholique de Louvain (UCL) in Belgium, studying the link between the housing conditions and the auditive communication in horses.

Monique Bestman - Monique Bestman works as a researcher at the Louis Bolk Institute in Bunnik, the Netherlands. She has been working on a broad range of health and welfare topics in organic and free-range laying hens. Keywords: feather pecking, rearing, design and use of free-ranges, mortality caused by predators, avian influenza risk birds in free-ranges. Now we start to investigate management of free-ranges in relation to poultry parasite eggs in the free-range soil.

Monique Ooms - Monique Ooms is a research assistant at Wageningen University in the Netherlands. She is mainly involved in research on the behaviour of pigs and studying the metabolism of chicken embryo's and hatchlings. She also supports PhD's and students with their practical and technical activities, including behavioural observations, setting up equipment and performing laboratory activities.

Nathalie Sleenckx - Nathalie Sleenckx (DVM, PhD) is a researcher at the Experimental Poultry Centre in Belgium, mainly working on laying hens. Current projects focus on pecking behaviour, red mites and extending production cycle.

Nina Thierij - Nina Thierij is a master student of behavioural ecology at Utrecht University, currently finishing her 9-month internship studying laying hen behaviour. In January, she will go to Lund University to work on a project at the Cognitive Science group. There, she will study the cognition of crocodylians and paleognaths to unravel some cognitive abilities of dinosaurs.

Petra Briene - Petra Briene is a research assistant currently involved in the IOF2020 project working on individual monitoring and the use of group level data to improve production and welfare in fattening pigs. At the same time, Petra is finishing up her master's degree in Livestock Health and Production, including a research project on automatic lameness detection in breeding sows.

Rhana Aarts - Rhana Aarts is a MSc student at Wageningen University with a specialisation in Animal Nutrition & Adaptation Physiology. Currently she is working two research projects regarding the effect of diet on domestic cats and calf health. During her BSc she looked at the control and prevention of equine strangles in the Netherlands.

Sarah Daanen - Sarah Daanen is a Msc student at Wageningen University and research, specialization animal nutrition and adaptation physiology. Currently studying the influence of nutrition on tail biting in pigs. During her Bsc thesis, a literature study was conducted onto the possibility of matching a dog breed towards a client behavioural disorder.

Severine Parois - Severine Parois is a post-doc researcher at Wageningen University in the Netherlands, studying resilience and welfare in pigs. Her PhD thesis was about the effects of genotype, aggressiveness and hygiene on the concentration in odorous compounds of the meat of entire male pigs. She has also worked on the effects of feed additives on welfare, cognition and microbiota in pigs.

Sharine Smeets - Sharine Smeets is an MSc student at Wageningen University in the Netherlands. She is studying Animal Science and specializing in 'Adaptation, Health and Welfare' and 'Breeding and Biodiversity'. Since the start of this academic year, she is working on her second thesis about improving the welfare and health of a dog breed.

Silvia Mazzola - Dr. Silvia Mazzola is a researcher of University of Milan, Department of Veterinary Medicine with expertise in Veterinary Medicine. In 2003 and 2004 She was a research fellow at Beth Israel Deaconess Medical Center, Department of Surgery United States, Boston.

Vivian Witjes - Vivian Witjes is a master's student in Environmental Biology, track Behavioural Ecology at Utrecht University, the Netherlands. During her bachelor's Psychobiology at the University of Amsterdam, her interests shifted from biomedical neuroscience to animal behaviour, intelligence and welfare. The past year, she has been focussed on researching cognitive differences between first- and last-born piglets in a spatial holeboard task.

Yara Slegers - Yara Slegers is a Veterinary student at Utrecht University. She studied the effect of birth order on performance and affective state of pigs. At present, she is following the master's programme Medical Sciences of Companion Animals.

Yvonne van de Weetering - Yvonne van de Weetering is a MSc student at the Behavioural Ecology Group of Wageningen University in the Netherlands, where she studies animal genomics, biodiversity and behavioural ecology. Her MSc thesis was about the effects of microbiota treatment on feather pecking and fearfulness in layer-bred chickens.