



# **Nordic ISAE 2014**

Proceedings of the  
25<sup>th</sup> Nordic Regional Symposium of the  
International Society for  
Applied Ethology

15-17 January 2014  
Oscarsborg Fortress, Drøbak, Norway



*Photo: Oscarsborg Hotel*

## **Organising Committee**

Knut E. Bøe  
Bjarne Braastad  
Ruth C. Newberry

Proceedings of the 25th Nordic Regional Symposium  
of the International Society for Applied Ethology  
15-17 January 2014  
Oscarsborg Fortress, Drøbak, Norway

*Edited by:* Knut E. Bøe, Bjarne Braastad & Ruth C. Newberry  
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# Nordic ISAE 2014

15th - 17th January 2014, Oscarsborg Fortress, Drøbak, Norway

## Programme

Wednesday 15th January		
10:00–12:00	Registration	Ferry departures from Sundbrygga, Drøbak at 09:20, 10:50, 11:50
<b>12:00</b>	<b>Lunch</b>	
<b>13:00</b>	<b>Welcome</b>	Opening of the conference
<b>13:10-15:10</b>	<b>Chair:</b> Knut E. Bøe	<b>Topic: Housing environment</b>
13:10	Grete H.M. Jørgensen	Moving dairy cattle from tie-stalls to fully automated loose housing
13:30	Lise Aanensen	Do dairy cows in loose housing need access to pasture?
13:50	Inger Hansen	Differences in animal welfare between organic and conventional sheep and goat farming in Norway
14:10	Anna Valros	Developing chewable and rootable low-cost objects for commercial pig farms
14:30	Inger Lise Andersen	Development of a new farrowing pen for individually loose-housed sows: preliminary results from “The UMB farrowing pen”
14:50	Grete H.M. Jørgensen	Horse thermoregulation during winter weather
<b>15:10</b>	<b>Coffee</b>	
<b>15:40-17:00</b>	<b>Chair:</b> Bjarne O. Braastad	<b>Topic: Behavioural development</b>
15:40	Rachel Chojnacki	The effects of prenatal stocking densities on the emotional reactivity and social recognition abilities of goat ( <i>Capra hircus</i> ) kids
16:00	Lina Olofsson	Social interactions in mink kept in groups or in pairs in climbing cages
16:20	Anne Lene Hovland	Additional flooring for young silver fox cubs: cub locomotory behaviour on different floor types
16:40	Fernanda M. Tahamtani	Does rearing in aviaries adversely affect the long-term welfare of laying hens following transfer to furnished cages?
<b>17:00 – 17:20</b>		<b>ISAE Nordic regional meeting and PhD course announcements</b>
<b>19:00</b>	<b>Dinner</b>	

## Nordic ISAE 2014 - Programme

Thursday 16th January		
<b>08:30-10:10</b>	<b>Chair:</b> Laura Hänninen	<b>Topic: Animal welfare</b>
08:30	Elin N. Hirsch	A snapshot of stress levels and occurrence of infectious diseases at Swedish cat shelters
08:50	Bjarne O. Braastad	Behaviour in cats three months after rehoming from cat shelters
09:10	Sarah-Lina Aa. Schild	Are slaughter pigs with umbilical hernia fit for transport?
09:30	Anne Marit S. Rød	Temperament assessment in farmed foxes and mink in Norway
09:50	Knut E. Bøe	The effect of frozen silage on feeding behaviour and feed intake in ewes
<b>10:10</b>	<b>Coffee</b>	
<b>10:40-12:05</b>	<b>Chair:</b> Anna Valros	<b>Topic: Motivation and emotions 1</b>
10:40	Randi Oppermann Moe	<b>Invited lecture:</b> Behavioural and physiological expressions of cue-induced «wanting» in fowl
11:25	Claes Anderson	Effects of an anticipation period before opportunity to play
11:45	Ruth C. Newberry	A cognitive bias task based on positive reinforcement indicates anticipation in grizzly bears
<b>12:05</b>	<b>Lunch</b>	
<b>13:05-14:05</b>	<b>Chair:</b> Inger Lise Andersen	<b>Topic: Motivation and emotions 2</b>
13:05	Daiana de Oliveira	Comparisons of body language of dairy cows at different locations in a loose housing system
13:25	Heidi Maarit Brisk	Dog owners' perceptions of behaviour and the emotional state of the dog during animal-assisted activities
13:45	Line Peerstrup Ahrendt	Motivation for a treat and learning in horses
<b>14:10-15:40</b>	<b>Guided tour</b>	<b>Tour of the fortress</b>
<b>15:40</b>	<b>Coffee</b>	
<b>16:10-17:35</b>	<b>Chair:</b> Lena Lidfors	<b>Topic: Cow and calf behaviour</b>
16:10	Margit Bak Jensen	<b>Invited lecture:</b> Welfare of the dairy cow around the time of calving
16:55	Julie Føske Johnsen	Milk production, udder health and calving interval in dairy herds practicing suckling
17:15	Kristian Ellingsen	Determining the abomasal capacity of Norwegian Red calves
<b>19:00</b>	<b>Dinner</b>	<b>Conference dinner in the fortress</b>

## Nordic ISAE 2014 - Programme

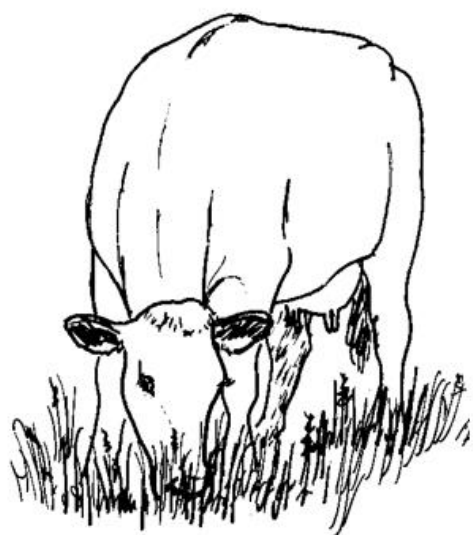
Friday 17th January		
<b>08:30-09:50</b>	<b>Chair:</b> Andrew M. Janczak	<b>Topic: Methods in applied ethology 1</b>
08:30	Sari Kajava	Validation of RumiWatch noseband sensors measuring feeding behaviour of cattle
08:50	Tarja Koistinen	Evaluation of a less laborious method for observation of stereotypic behaviour in the WelFur welfare assessment protocol for foxes
09:10	Sofie Lillebø	Link between hair whorl characteristics and reactivity traits in dogs ( <i>Canis familiaris</i> )
09:30	Judit Vas	A user-friendly, flexible and free behavioural event recorder software: the Solomon Coder
<b>09:50</b>	<b>Coffee</b>	
<b>10:20-11:30</b>	<b>Chair:</b> Margit Bak Jensen	<b>Topic: Methods in applied ethology 2</b>
10:20	Salla Ruuska	Reliability of instantaneous sampling in measuring feeding behaviour of dairy cows
10:50	Janicke Nordgreen	The effect of the fish anaesthetic MS-222 on zebrafish ( <i>Danio rerio</i> ) behaviour: relevance for the acetic acid pain test
11:10	Cecilie M. Mejdell	To wear or not to wear a blanket? A new method for asking the horse
<b>11:30</b>		<b>Closing of the conference</b>
<b>11:40</b>	<b>Lunch</b>	
12:45, 13:45...		Ferry departures (hourly)





# Abstracts

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*Drawings by Grethe Tuven. NMBU*



## **Moving dairy cattle from tie-stalls to fully automated housing**

*Grete H.M. Jørgensen\**, *Lise Aanensen and Vibeke Lind*

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We investigated dairy cattle welfare during transition from tie-stalls to a fully automated loose housing barn by looking at health-, production-, cleanliness and behaviour during 22 weeks.

We used video surveillance to record animal movement in the barn, scoring number of animals using the mechanical brush, concentrate feeders, automated milking system (AMS) and eating roughage. We used instantaneous sampling every ten minutes from 48 hour videos. Activity sensors (IceTag) on focal animals recorded cow activity. A total of 52 dairy cows from two different herds were introduced.

During the first 24 hours, there were many social interactions (running, mounting, head-butting, chasing), the cows had increased activity and spent less time lying (< 8 h.). Within the first week, the average lying time increased to 12 hours per day, but some individuals were lying in the dirty traffic areas. During the first two weeks, some individuals seemed confused, exhausted and were reluctant to move. Within a month, most of the dairy cows used the lying cubicles regularly and the average lying time increased to 14.5 hours per day. The number of dirty cows increased from 50 % to 70 % after moving, but improved cleaning routines and increased use of resting cubicles reduced the number of dirty cows within the 22 weeks. Some individuals increased their milk yield, while others failed to reach the expected milk yield. In addition to this, some cows refused to use the AMS, resulting in many productive cows being culled.

We identified several bottlenecks that might affect health, production and animal welfare. We conclude that moving dairy cows directly from tie-stalls to loose housing combined with herd mixing is challenging for the individual cow. Farmers need to closely monitor all individuals and their ability to adjust to the technology, during the first four weeks.

## Do dairy cows in loose housing need access to pasture? Preliminary results

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From January 1<sup>st</sup> 2014 Norwegian animal welfare legislation requires all dairy cows, including cows in loose housing, to have access to pasture minimum 8 weeks/year. Dairy barns are often located far from pastures. Farmers and dairy industry question the technical and practical challenges. The aim of this pilot project was to investigate dairy cows' activity, behaviour and use of pasture under different weather conditions.

Fifty dairy cows in a loose housing system with AMS were given access to a pasture of four hectares on days with less than 3 mm rain. We used direct observations and video surveillance to register cow behaviour and social interactions. Activity sensors (IceTag) on focal animals recorded cow activity. A weather station logged temperature, wind, precipitation and sunshine. We compared the activity between 9 am and 4 pm on days with (8) and without (8) use of pasture.

The cows displayed significant higher activity on “pasture-days”; they were standing/walking 80% of the time, lying 20 % of the time, walking in average 275 steps per day. A total of 71.5% of all observations were spent grazing. On “indoor-days”, cows were standing/walking 53 % of the time, lying 47 % of the time and walking 100 steps. Milk yield was however lower ( $P<0.01$ ) and number of visits to the AMS fewer ( $P<0.001$ ), on days with access to pasture. Fewer cows went out on rainy/drizzly (14) or bright sunny /hot days (18) compared to cloudy days (30). We observed several agonistic social interactions in the doorway. Wary individuals were often hesitant to enter this area.

We conclude that access to green pasture has a positive effect on animal welfare, as grazing fulfils a behavioural need in dairy cows, even though the weather affected time spent outdoors.

## **Differences in animal welfare between organic and conventional sheep and goat farming in Norway**

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Regulations concerning animal health and welfare are stricter in organic than in conventional sheep and goat production in Norway. Differences regarding space allowance for sheep and goats, solid lying floors in goat pens and the milk feeding strategy of goat kids may have an impact on animal welfare. The purpose of this work is to document differences between animal welfare in organic versus conventional sheep and goat farming in Norway.

The documentation is based on results cited in peer-reviewed articles the past 10 years. The risk assessment method described by EFSA Panel on Animal Health and Welfare (AHAW) was applied and hazards were identified. According to AHAW risk assessment is a process that evaluates the likelihood that positive or negative animal welfare effects will occur following exposure to a particular scenario.

It was documented that space allowance of 1.5 m<sup>2</sup> per animal in organic sheep and goat production gives increased animal welfare compared to the most commonly used space allowance of 0.7-0.9 m<sup>2</sup> in conventional sheep and goat farming. When given access to an outdoor yard sheep and goats will spend about 50 % of their time outdoors. Some behavioural benefits of being outdoors are documented as well.

The specification of at least 0.75 m<sup>2</sup> solid floor area per head in organic goat housing, preferably in two levels, is positive to animal welfare. However, flooring materials with low thermal conductivity are not necessarily of welfare concern in insulated goat buildings. Due to missing documentation, we are unable to conclude whether different milk feeding strategies of goat kids in organic and conventional production have any impacts on animal welfare.

## Developing chewable and rootable low-cost objects for commercial pig farms

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Chewable and rootable materials can reduce tail and ear biting and partly fulfil behavioural needs in commercially farmed pigs. Slatted floors allow little straw, therefore well-functioning objects also need to be designed. The aim of this project was to develop and test low-cost objects that sustain pigs' interest over a long time and are easy to construct on-farm.

Four experiments were carried out on three commercial farms in Finland. In total, 303 suckling piglets, 1436 finishing pigs and 167 breeder gilts participated in the experiments, all crosses of Norwegian Landrace to Hampshire, Duroc or Yorkshire. All were undocked. For suckling piglets, suspended sisal ropes were tested. For finishing pigs, fresh birch and polythene pipe in a horizontal position were tested in one experiment, and these as well as branched metal chains in another experiment. For breeder gilts, birch as above was tested. The control pens had, depending on the farm, a straw rack or daily provisions of straw or wood shavings; two farms also had chains. These were also present in the experimental pens. The median number of pens per treatment was 14, ranging from 12 to 17 pens. Data collection included video recording, scoring of tail and ear damage, and testing for latency to approach an unfamiliar object or person. Statistical analyses were performed using SPSS 21.

The main results were that pens with 30cm of wood per pig had a higher percentage than controls of tails with no observable damage (mean 55% vs. 34%,  $P=0.04$ ) and more object manipulations per minute per pig (mean 2.7 vs. 0.5,  $P=0.008$ ). Furthermore, as little as 10cm of wood per pig reduced the latency to approach an unfamiliar person (mean 8.8s vs. 15.4s,  $P=0.01$ ). It was concluded that horizontally suspended pieces of fresh birch wood can improve welfare in commercial pig farming.

## **Development of a new farrowing pen for individually loose-housed sows: Preliminary results of “The UMB farrowing pen”**

*Inger Lise Andersen*<sup>1\*</sup>, *Cathinka Trøen*<sup>1</sup>, *Marko Ocepek*<sup>1</sup>, *Donald M. Broom*<sup>2</sup>, *Knut E. Bøe*<sup>1</sup>  
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The objective of the present work was to collect preliminary production data on a newly developed farrowing pen for individually loose-housed sows, with the purpose of using these results to produce a pen for commercial practise that lead to a higher piglet survival rate and improve sow and piglet welfare.

Altogether, 40 clinically health sows (28 Australian sows and 12 Norwegian, balanced on parity), were used in the experiment. Except for not using rubber coating on the activity area in The Australian pens due to heat problems during summer, the pens in the two different countries were equal. Both pens consisted of a nest area that was separated from a dunging area with a threshold in between, and hay and straw for nest building were supplied from a hay rack. Floor heating and sloped walls were used to stimulate sows and piglets to rest in preferred positions in order to reduce the likelihood of crushing.

The preliminary results show that the production results were similar or even better than previously reported for other types of pens for individually loose-housed sows, and that a piglet mortality rate of 12-13% was achieved in both countries without birth assistance or any particular surveillance around the time of farrowing. The location of the sows and piglets in the pen at the onset of parturition and nursing, indicates that the pen was functioning as predicted, except that too many sows were resting towards the unprotected threshold.

In conclusion, this pen produced good production results under experimental conditions, and the nest design appeared to be satisfactory except that some changes in the threshold design and the depth of the nest area are needed for finishing the commercial version of the pen.

## Horse thermoregulation during winter weather

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The aim of this experiment was to investigate the effects of different winter weather conditions on shelter seeking behaviour of horses and their preference for additional heat.

A total of 17 horses from different breeds were habituated to an experimental paddock with a double-room shelter. In one of the rooms a 1500 W infrared heater provided radiation heat, the other room was not heated. The horses were turned out in their regular paddocks for two hours and then moved to the experimental paddock, where they could stay either in the heated room, in the non-heated room or outside in the 10x6 m paddock. Using instantaneous sampling at one-minute intervals for one hour, a present observer recorded horse's behaviour and location. A weather station recorded data on wind (directions and speed), precipitation, temperature and sunshine. We registered the horses' breed, exercise level, body weight, height and body condition, and samples of the horses' coats were taken for length and quality registration. A Kruskal Wallis test was performed on the preliminary data.

We observed great individual differences in the horses' preferred location under different weather conditions. Horses increased their activity during low temperatures, combined with wind and/or rain ( $P<0.05$ ). Ponies and warmblood horse breeds used the heated room to a greater extent than cold blood horse breeds ( $P<0.05$ ). Horses with a low coat sample weight used the shelter more than horses with a large coat sample weight ( $P<0.05$ ), and individuals with a large body condition score moved around more than individuals with a low body condition score ( $P<0.05$ ). Muscle shivering was only observed during mild weather and rain.

In conclusion, not only the horses breed but its body condition and coat characteristics also affect thermoregulation during winter weather. General activity also seemed to increase with wind, low temperatures and rain.



## **The effects of prenatal stocking densities on the emotional reactivity and social recognition abilities of goat (*Capra hircus*) kids**

*Rachel Chojnacki<sup>1\*</sup>, Judit Vas<sup>1</sup> and Inger Lise Andersen<sup>1</sup>*

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Prenatal stress and its effects on offspring have been comprehensively studied in rodents and non-human primates but relatively little research has been done on farm animals though routine farming practices and recent intensification of animal production has put great strains on farm animals. Social stress may be one of the most effective and ecologically relevant stressors, particularly for farm animals. Goats are sensitive to aspects of their social environments such as group size, stability, and density. The aim of this study was to investigate the prenatal effects of different herd densities on the behavioral and social recognition abilities of goat kids.

Pregnant Norwegian dairy goats were held in treatments of 1.0, 2.0 or 3.0 m<sup>2</sup> per animal from the confirmation of pregnancy throughout the gestation period. One kid per litter was subjected to a ‘social recognition test’ and a ‘separation test’ at the age of 5 weeks to assess the behavioral strategies and social recognition skills when presented with a familiar and unfamiliar kid (social recognition test) and the behavioral coping skills when separated from group mates (separation test).

While the goat kids did not discriminate between familiar and unfamiliar stimuli, kids from the highest density spent the least amount of time in the vicinity of the stimuli in the social recognition test and vocalized and attempted to escape the most in the separation test indicating a loss of sociality and an increase in stress related reactivity. Additionally, females approached the stimuli kids faster, spent more time in the vicinity of the test kids and tended to nose contact the stimuli kids more than males and females in the high density treatment vocalized twice as the other kids.

These results indicate the possibility of detrimental effects due to prenatal stress on goat kids. Greater attention and precautions should be taken to avoid stress and improve the well-being of goats during gestation.

## Social interactions in mink kept in groups or in pairs in climbing cages

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Climbing cages for farmed mink will be the rule in Sweden from 2017, but there is an ongoing discussion about the effect on animal welfare of keeping pairs or three mink during the growing period. The aim of this study was to compare social interactions in climbing cages in growing mink when housed in pairs or groups of three.

The study was conducted on a private farm where brown mink were kept in pairs (one male, one female, n=12 cages) or in groups (one male, two females, n=12 cages). Cages consisted of a lower (0.281 m<sup>2</sup>), and upper floor (0.142 m<sup>2</sup>), a nest box with saw dust and straw, a shelf on each floor, and a chain hanging from the ceiling of the lower floor as enrichment. There was *ad lib* access to water in nipples and fresh food on the roof. Direct observations of the frequency of biting behaviour, wrestling and chasing another mink were done during one day every second week for ten weeks from September-November in two periods 1.5 h around sunrise and 1.5 h before lunch. Data were analysed per animal with Generalised Linear Model and mean  $\pm$  SE are shown.

There were no differences between treatments in biting behaviour (11.11 $\pm$ 1.29, p=0.781), wrestling (7.56 $\pm$ 1.08, p=0.150) and chasing (0.85 $\pm$ 0.20, p=0.766). Biting behaviour was affected by week (p<0.001) and decreased significantly from week 1 to weeks 3, 4 and 5 (W1 3.31 $\pm$ 0.45, W2 2.69 $\pm$ 0.45, W3 1.44 $\pm$ 0.23, W4 1.64 $\pm$ 0.38, W5 2.03 $\pm$ 0.51). Pairs of mink performed significantly more biting behaviour during week 5 (p<0.05), but not during the other weeks. Biting behaviour was more frequent in the period around sunrise (9.08 $\pm$ 1.36) than before lunch (2.03 $\pm$ 0.36, p<0.001).

In conclusion, housing of mink in groups of three did not lead to higher occurrence of social interactions than pair housing.

## **Additional flooring for young silver fox cubs: cub locomotory behaviour on different floor types**

*Anne Lene Hovland<sup>1\*</sup>, Anne Marit S. Rød<sup>1</sup>, Jaakko Mononen<sup>2</sup> and Leena Ahola<sup>2</sup>*

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Farmed foxes are housed on floors consisting of hexagonal wire mesh. To support young cubs' locomotion, additional flooring could be used for a certain period. The aim of this study was to examine how 3 different floor types affect the cubs' locomotion at 3-6 weeks of age.

A total of 30 silver fox cubs were chosen for the experiment. From 3 to 6 weeks, the cubs' locomotion was video recorded for 3 min in a test apparatus on 1) standard 5/4 inch hexagonal mesh, 2) 1 x 1/2 inch square mesh and 3) a solid, wooden surface.

Cubs that successfully completed the test increased with age: 60% of the cubs successfully crossed the test arena when tested on the smaller meshed surface compared to 36% at hexagonal and 43% at solid floor at 3 weeks of age ( $P=0.07$ ). However, there was no significant effect of floor type on the cubs' total activity ( $P=0.911$ ). The cubs' age affected the frequency and duration of all the recorded behaviours and the overall activity level of the cubs ( $P=0.025$ ). There was a significant interaction effect between age and floor type for walking ( $P=0.020$ ) showing that the cubs' ability to walk on various floors was dependent on their age. Hexagonal mesh affected locomotion to a larger extent because the cubs' feet regularly stepped through the mesh ( $P=0.024$ ).

The number of times the cubs stepped through the mesh increased during the 4<sup>th</sup> and 5<sup>th</sup> week of age but was then reduced at 6 weeks, indicating that their ability to walk on this type of floor improved with age. As cubs start to move about in the cage at 3 weeks of age our findings, despite some methodological issues, support the idea that access to additional flooring will support their locomotion until at least 5 weeks of age.

## Does rearing in aviaries adversely affect the long-term welfare of laying hens following transfer to furnished cages?

*Fernanda M. Tahamtani<sup>1</sup>, Rachel Orritt<sup>1,3</sup>, Tone Beate Hansen<sup>2</sup>, Christine Nicol<sup>3</sup>, Randi O. Moe<sup>1</sup>, Andrew M. Janczak<sup>1\*</sup>,*

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Due to current Norwegian legislation, laying hens destined to produce in furnished cages must be reared in aviaries as there are no furnished rearing cages available on the market. This causes concern that rearing in aviaries may result in reduced welfare when hens are transferred to furnished cages. Others support rearing in aviaries because these birds are vaccinated against coccidiosis. We compared the effect of aviary and cage rearing on the welfare of laying hens housed in furnished cages.

15000 birds were hatched together and reared in aviaries (n=7500) or cages (n=7500). The birds were distributed at 16 weeks of age to two different farms and housed thereafter in furnished cages, each containing 8-9 birds. Welfare indicators used were comfort behaviour and alert responses to novel object. Behaviour of a focal animal was scored for 8 min in 22-29 cages per treatment. This was done at 19 and 21 weeks of age. The number of birds showing comfort behaviour was analysed using ordinal logistic regression and the duration of time spent alert in response to the novel object was analysed using ANOVA.

At farm 1, a higher number of aviary reared birds (59%) than cage reared birds (36%) showed comfort behaviour at 19 weeks of age ( $\chi^2(df=1; N=51)= 5.81; p<0.02$ ). Treatment effect on duration of alert behaviour in the novel object test was significant ( $F_{5,44}=2.65; p<0.04$ ). Aviary reared birds spent more time showing alert behaviour in this area ( $80.93 \pm 9.64$  sec) than cage reared birds ( $40.85 \pm 10.91; p<0.01$ ). No further treatment effects were found at 21 weeks of age at farm 1 or any age at farm 2.

These effects were significant three weeks after moving to furnished cages but not five weeks after moving. Any longer term effects of aviary vs. cage rearing remain to be investigated.

## **A snap-shot of stress levels and occurrence of infectious diseases at Swedish cat shelters**

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A previous survey of Swedish cat shelters indicates a vast range in husbandry practices, and low occurrence of diseases. No previous study has monitored stress levels or occurrence of disease at Swedish cat shelters.

To provide a snapshot of the effect of group and shelter size on stress levels and infectious disease, we visited 11 shelters and sampled maximum 10 cats per shelter (n=89) for; saliva and plasma (cortisol levels), eye-swab (feline herpesvirus, chlamydia and *Mycoplasma felis*) and mouth-swab (metagenomic analysis - reported elsewhere). Eleven saliva samples yielded enough for individual cortisol assay, the rest were pooled per shelter before analysis. Plasma was collected and cortisol assayed for 83 cats, of which 10 had individual salivary cortisol assayed.

Preliminary results showed no correlation between individual salivary and plasma cortisol levels. In shelters with larger number of cats, individual cortisol levels were significantly lower ( $p=0.043$ ). However, there was no correlation between number of cats/group and cortisol levels in this study. There was a difference between shelters ( $p=0.009$ ). The eye-swab resulted in 2 herpes and 3 chlamydia positive cats. Due to the low frequency, no statistical analysis was performed. The low positive outcome from the eye-swabs was likely caused by difficulty in detection of low levels of pathogen and the assay technique (multi-PCR). Lack of correlation between saliva and plasma cortisol might have been caused by several factors e.g. confounding factors at the different shelters, stress effects due to handling, blood contamination of saliva samples, too small amount of saliva, and low number of participating individuals.

In conclusion, cortisol sampling from plasma and saliva is difficult to perform on cats. It is difficult to obtain enough saliva and the effect of handling during blood collection can affected the cortisol levels per se.

## Behaviour in cats three months after rehoming from cat shelters

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The behaviour of 65 domestic cats (*Felis silvestris catus*) and their relationship with owners were characterized three months after being rehomed from two cat shelters outside Oslo.

The new owners submitted an online questionnaire on the owners' experience with cats, expectations about their cat, the cat's living conditions and its behaviour. 5-point Likert scales were used to describe frequencies of behavioural categories, behaviour problems, and the cat-human and cat-cat relationships. Sixty-two percent of the cats were feral or found abandoned before being brought to the shelter. The others were rehomed or taken by authorities from previous owners. 15 % were 3-6 months old, 35 % were 6-18 months and 50 % were adults. Most cats (71 %) were allowed outdoor.

The cats more than fulfilled the owners' expectations concerning its personality, affection, independence, and friendliness towards visitors. The most frequent behaviour problem was scratching furniture (65 % did this), which was most pronounced among cats with previous experience with human homes. Toilet problems and indoor marking were rare (3 %) and only found in cats rehomed from previous owners. Cats with free outdoor access had the highest frequencies of defecating outside the cat toilet and showing fear of strong noise. Cats in multi-cat households exhibited less aggressive biting and scratching humans, and less fear of strong noise. Owners with longer experience with cats experienced less behaviour problems. Eighty percent of the owners were very satisfied with their new cat and 18 % were well satisfied.

The most important reason for choosing one particular cat at the shelter was its personality. Those who had chosen the cat according to its appearance were less satisfied with the cat and they developed a lower social bond to the cat. The bond was also lower if the cat showed more fear or social conflicts.

# **Are slaughter pigs with umbilical hernia fit for transport? Description of an on-going study of pig behaviour at selected elements on the day of slaughter**

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For Danish pigs, the day of slaughter typically involves exposure to several potential stressors such as: Mixing with unfamiliar conspecifics, fasting for hours, transport, handling and introduction to novel environments. In order to maintain animal welfare, pigs selected for slaughter must be suited for these experiences.

More than 100,000 times a year, in Denmark alone, it has to be considered whether or not a pig with porcine umbilical hernia is suited for transport to the abattoir. According to Danish practice, pigs with hernias larger than 15 cm in diameter are unsuited for mixing and transport (Vet. Sundhedsråd 2008). However, to the best of our knowledge, no data are available regarding the welfare of pigs with umbilical hernia prior to, during and/or following transport for slaughter. Here, we describe two ongoing studies focusing on effects of the presence of umbilical hernia on the behaviour of pigs during the day of slaughter, together aiming to gain new knowledge about the suitability of pigs with umbilical hernia for transport and associated stressors on the day of slaughter.

Experiment 1: In an observational study conducted under Danish commercial conditions (8 herds), pigs were followed from home pen to slaughter at one of 2 abattoirs. We used a matched pairs design, involving 31 pigs with clinically evident umbilical outpouchings (UH) and 29 clinically healthy controls. The diameter of the UHs ranged from 9 – 20 cm with a median of 15 cm. The behaviour of the pigs was recorded during loading and unloading from the vehicle and twice at the abattoir (at the veterinary inspection and in the race).

Experiment 2: We conducted an experimental study of the behaviour of 28 pairs of UH- and control pigs during a 6 h experimental stay in a pick-up facility (no access to feed or enrichment, 0.65 m<sup>2</sup> per animal and mixed at entry). One day later, UH-pigs were euthanized and the UHs sent to pathological examination. Prior to (and following) the 6 h experimental period, the pigs were subjected to a clinical examination. The size of the UHs varied from 5 to 20 cm, with a median diameter of 12 cm.

## Temperament assessment in farmed foxes and mink in Norway

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Temperament assessment in farmed foxes and mink is an important basis for improving animals' confidence. The effort towards improving temperament in fur animals should initially focus on reducing fear towards humans. The aim of this study was to assess fear towards humans in a representative sample of the fur animal population based on 'the feeding test' in foxes and 'the stick test' in mink.

The study was completed during autumn 2011. Two main areas for fur breeding were chosen in Norway: South – Trøndelag county and Rogaland county with 30 fox and 15 mink farms randomly selected respectively. In total, 6,902 fox cubs (3,538 blue and 3,364 silver foxes) and 13,821 mink were tested. Ten observers completed the tests. Whether a fox ate within 30 seconds while the observer stood in front of the cage or if the fox did not eat, the position of the fox in the cage was recorded. The mink were characterized as curious, fearful, aggressive or undecided in a stick test, where a wooden spatula was inserted in the cage for 15 seconds.

In total,  $39.3 \pm 18.6\%$  of all foxes ate in the presence of a human. However, this differed between the two fox species where  $50.8 \pm 13.8\%$  of blue foxes and  $32.7 \pm 18.0\%$  of the silver foxes ate ( $P=0.005$ ). In the stick test,  $37.1 \pm 14.0\%$  of the mink were curious towards humans,  $34.5 \pm 8.1\%$  were undecided,  $28.2 \pm 12.6\%$  were fearful and  $0.2 \pm 0.2\%$  were aggressive.

There was a large variation in response for both foxes and mink between farmers. This variation is interesting and the underlying cause could prove to be useful in the fur industry's future work towards improving confidence in fur animals.



## The effect of frozen silage on feeding behaviour and feed intake in ewes

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The aim of the current study was to investigate the effect of frozen grass silage on feeding behaviour, feed preferences and feed intake in ewes.

Two experiments, each involving 8 pregnant ewes, were conducted during January and February of 2012 and 2013 respectively. Both experiments had four treatments: 1) Frozen silage, 2) Partly frozen silage, 3) Frozen chopped silage, 4) Unfrozen silage, control with a 4 x 4 Latin squares design. After experiment 1 had been completed, the ewes were exposed to a feed preference test in which they could choose between two of the experimental feed treatments for one day in a change-over design. On one day of each experimental period in experiment 1, the feeding behaviour of each individual ewe was scored by direct observation for four hours starting when new feed was provided.

Time spent eating normally was longer on the control treatment and shorter on the frozen silage treatments ( $P < 0.0001$ ) whereas for time spent eating by tearing off feed from the frozen block followed the opposite pattern ( $P < 0.0001$ ). Both in experiment 1 ( $P < 0.0001$ ) and in experiment 2 ( $P = 0.03$ ), the feed intake in the first four hours after feeding was lowest on the frozen silage treatment and highest on the control treatment. The total daily feed intake in experiment 1 was lowest on the frozen, chopped silage and highest on the unfrozen, control silage treatment ( $P = 0.02$ ), but the differences were small. In experiment 2, there was no significant effect of silage treatment ( $P = 0.32$ ). There was no difference in the preference for the different feed treatments, either when considering the first four hours or the whole 24 h period.

We conclude that frozen silage has some effect on feeding behaviour of ewes but a rather moderate effect on feed intake.

## **Behavioural and physiological expressions of cue-induced «wanting» in fowl**

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Behavioural and physiological components of emotions may be studied as indirect indicators of affective states in animals. It has been proposed that anticipation of signalled valued rewards induced by conditioned learning most likely elicits an appetitive “wanting” type of positive affective state related to activity in dopaminergic pathways. It has therefore been argued that species-specific behavioural responses during anticipation of rewards may provide indirect information about appetitive types of positive emotions in animals. The main objective in the project “HappyHens” was to increase the knowledge about positive emotions in laying hens by systematic studies of cue-induced anticipatory behaviour induced by classical conditioning. The project was completed in 2013.

In the presentation, we will summarize the most important findings which have indicated that: 1) Laying hens can be trained to anticipate a palatable reward using trace classical conditioning, and they express a species-specific sequence of anticipatory behaviour which involves a high frequency of head movements. 2) The dopaminergic system may be involved in the control of anticipatory behaviour in laying hens. 3) Anticipatory behaviour in hens is modulated by the incentive value of the announced feed reward and the hens’ physiological state. 4) Cue-induced anticipation is associated with an emotional arousal in hens as assessed by a peripheral temperature drop during anticipation and consumption of an attractive reward. 5) Domestication has resulted in a changed threshold for expressions of anticipatory and consummatory behaviours in response to attractive rewards in fowl.

In conclusion, behavioural and physiological expressions of cue-induced «wanting» represent promising tools that may contribute to a better understanding of emotions in fowl.

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## Effects of an anticipation period before opportunity to play

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Anticipatory behaviours have been described as preparatory behaviours for the anticipated event. Play behaviour is believed to have rewarding properties due to its intrinsic value to animals. These behaviours may therefore be suitable positive events for studies on anticipatory behaviour, but also if an anticipation period would facilitate the anticipated event. The aim of this study was therefore to investigate if an anticipation period before being offered opportunities to play would result in higher levels of play behaviours.

The behaviours of ten focal lambs, one from each of ten pairs of males, were studied. In order to retrieve baseline behavioural data, behaviours were recorded when the lambs had entered into a small pen (holding pen) for five minutes prior to being conditioned to anticipate play. This procedure was repeated after the lambs had been conditioned to anticipate play (anticipation period). The conditioned lambs then entered into an adjacent larger pen (play arena), containing toy objects (platform, volley ball, two hanging chains), for 14 minutes. Finally, lambs entered into the play arena without the anticipation period. Behaviours were recorded continuously in the holding pen and play arena using video. Lambs were used as their own controls and data were statistically analysed using Wilcoxon Signed ranks test.

We found no treatment effect on number of behavioural transitions ( $51.8 \pm 4.3$ ), percentage of time spent exploring ( $27.4 \pm 2.1\%$ ), walking ( $12.8 \pm 1.5\%$ ), engaging in play behaviour ( $5.8 \pm 2.0\%$ ) or standing still ( $50.4 \pm 3.9\%$ ) when comparing lambs before and after they had been conditioned to anticipate play. Percentage of total amount of play ( $\pm$ SE) in the play arena tended to be higher ( $33.8 \pm 0.04\%$ ) when the lambs did not experience the anticipation period prior to play compared to when they did ( $27.1 \pm 0.02\%$ ;  $S=18.5$   $P>0.1$ ).

In conclusion, contrary to what we had expected, the lambs played more without an anticipation period.

## **A cognitive bias task based on positive reinforcement indicates anticipation in grizzly bears**

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Cognitive bias tasks purport to assess affective states via responses to ambiguous stimuli. We hypothesized that differences in affective states of captive grizzly bears (*Ursus arctos horribilis*) produced by 30-min exposures to different environmental enrichment conditions would be revealed by differences in optimism in cognitive bias tests based on positive reinforcement.

We clicker-trained bears (n=6) to respond differently (nose or paw touch) to two stimuli (light or dark gray cue cards), with responses counterbalanced across bears. The two cues signaled a small or large food reward, respectively. Responses to ambiguous probe stimuli intermediate to the two trained stimuli were classified as either optimistic, appropriate for the larger food reward, or pessimistic, appropriate for the smaller food reward.

Level of optimism did not differ significantly across enrichment conditions but tended to be lower following interaction with a more preferred food-based enrichment item (cow hide) than less preferred non-nutritional enrichment items (traffic cones). Moreover, there was a negative correlation between optimistic response bias and weight gain. Omission of food rewards during cognitive bias testing (extinction) resulted in a significant decrease in willingness to participate in testing compared to reinstatement sessions when food rewards were returned. Thus, rather than exhibiting a reduction in optimistic response at the central probe cue during extinction followed by a rise during reinstatement, bears rapidly learned that no food was being offered and stopped responding.

We conclude that optimistic response bias following interaction with different environmental enrichment items was not a reliable indicator of relative satisfaction with the different enrichments. Instead, the cognitive bias task appears to have been measuring anticipation of food rewards during testing.

## **Comparisons of body language of dairy cows at different locations in a loose housing system**

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Subtle behaviour, as indicated by body postures, can be an indicator of an animal's emotional state. Previous studies carried out with different species have shown that changes in ear and tail postures, licking and showing the white of the eyes are related to animals emotions, and are expressed differently according to the animal's experience. This study compared the body language of dairy cows related to different activities in a loose housing system.

We observed a mixed group of 60 Swedish Red and Black Holstein cows in their second and third lactation. Using scan sampling the body language of cows were observed while they were using a mechanical brush (De Laval swinging cow brush SCB), while eating at one of the individual roughage feeding bins and while queuing for the voluntary milking system (De Laval VMS<sup>TM</sup>). Observations were performed during 8 different periods per day, for 20 days over a 9 week period in autumn 2013. The prediction was that different activities would elicit different emotional states which would be expressed by subtle changes in body language.

The observations consisted of noting ear posture (axial, forward, backward up, backward down, asymmetric left and asymmetric right), neck posture (horizontal, below horizontal, above horizontal and down) and tail posture (relaxed wagging, directed wagging, vigorous wagging, bent sideward and no wagging). The part of the body being brushed (head, neck, trunk and rump) and the duration of the bout of brush use were also noted.

These observations are part of a pilot study for a larger project on indicators of positive welfare in dairy cows and the observations will be confirmed under more controlled experimental conditions in combination with physiological measures. Initial results will be presented at the conference along with plans for other analyses.

## **Dog owners' perceptions of behavior and the emotional state of the dog during animal-assisted activities**

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The aim of this study was to investigate dog owners' ability to assess the behavior and emotions of their dogs during animal-assisted activities (AAA).

The investigations were carried out by video-recording the behavior of 11 dogs in the first ten minutes of AAA visits at nursing homes in Finland. During that time the owners themselves also made observations of the behaviors as well as emotions of their dogs, which they documented in the questionnaires immediately after the observation period. A total of 38 video-recordings and questionnaires were included in the study, and Spearman correlation coefficient was used to measure the strength of the relationships.

Firstly, the relationship between the owners' evaluations of dog behavior and the behavior registered from the video-recordings was measured. We found a significant correlation between the level of yawning, panting, tail wagging, standing, sitting and lying down as assessed by the owner and from the video ( $R_s > 0.55$  and  $P < 0.001$  for all behaviors). Secondly, the relationship between the dog behavior from the video-recordings and the owners' evaluations of the dogs' emotions during the visit was measured. Thirdly, the relationship between the owners' evaluations of dog behavior and the owners' evaluations of the dogs' emotions was measured. For the second and third relationship, panting, tail wagging and standing were significantly associated with positive emotional state ( $R_s > 0.40$ ,  $P < 0.05$ ), whereas, sitting was associated with a negative emotional state ( $R_s > 0.36$ ,  $P < 0.05$ ).

Overall, the owners interpreted dog behavior mostly based on displacement and contact seeking behaviors, while they were best at observing postures, yawning and tail wagging. It is suggested that the organizations involved with AAA should provide guidance and information regarding dog behavior for dog owners. The long-term consequences of this study would be securing dog welfare in AAA through better observational skills and interpretation of dog behavior.

## Motivation for a treat and learning in horses

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Most scientific investigation of horses' ability to learn has applied tasks based on positive reinforcement, the positive reinforcer mainly being food. Studies on other species have shown that anticipation of a reward can have a proactive influence of the behaviour of the animal which may influence trial-and-error learning of new behaviours. The aim of this study was to investigate horses' motivation for a treat and how it influences their ability to learn an operant task.

Eleven geldings and stallions (1-5 years old) participated in the study. After being habituated to obtain rewards (approx. 10g of a pelleted horse feed) from an operant apparatus, the horses' voluntary intake of rewards was investigated by how many rewards they were willing to ingest. Next they were trained through a standardised method to press a panel on the apparatus with their muzzle to obtain a reward. The training was done in three steps allowing for evaluation of the horses' ability to learn to press the panel. When the horses had learned the task and continuously pressed the panel to obtain rewards, the horses were subjected to a fixed ratio schedule requiring two presses (FR2) on the same operant apparatus to obtain one reward and a progressive ratio schedule where the number of required presses for a reward increased by two (PR2), in a crossover design.

It is hypothesised that the PR2 schedule will show greater variation between horses in response rate than the FR2 schedule which shows greater variation than the voluntary intake. Treat motivation will be evaluated by the maximum price (number of presses) a horse is willing to pay to obtain food rewards and it is hypothesised that horses willing to pay a larger maximum price will learn how to press the panel faster. Experiments for the study are currently being conducted.

## **Welfare of the dairy cow around the time of calving**

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Ensuring high standards of welfare of the dairy cow at calving is vital, but the area has not received much research focus. Since the time of calving often deviates considerably from expected, there is a need to identify objective means of determining when cows are about to calve.

Recent work indicates that behavioural changes show much promise, for example the number of lying bouts increases and peak during the final hours before calving as uterine contractions intensify. These changes in posture can be collected automatically using accelerometer technology, and thus these types of measures collected using automated technologies warrants further investigation.

Parturition is normally subdivided into 3 stages, including the onset of labour (1), the birth of the calf (2) and, expelling of the foetal membranes (3). Cows are often moved to a maternity pen immediately before the birth of the calf, but new research suggests that this practise may prolong labour. Cows that were moved to an individual maternity pen during late stage I labour experienced longer stage II labour and spent less time lying during the last hour before calving compared to cows moved earlier. Studies of dairy cows under semi-natural conditions suggest that cows seek isolation from the herd during calving if they have the opportunity. We provide the first evidence that that cows housed indoors will also isolate if given the opportunity but more work remains to disentangle the factors that can affect her ability to do so. Lastly, the presence of the newborn calf results in a reduction in resting and feeding by the mother in the hours immediately following parturition. Furthermore, the dam did not seek social contact with other cows until days after calving if the calf was present.

Clearly, in practices where cows and calves are housed together, providing ample space and limiting competition during the first few weeks after calving may prove beneficial.



## Milk production, udder health and calving interval in dairy herds practicing suckling

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Although suckling in dairy production may be perceived as a more animal welfare friendly husbandry system, more details on long-term effects of this management practice is of importance when discussing its economic viability. The purpose of this study was to evaluate possible associations of suckling (*no suckling*, *long suckling* =suckling for 2-3 weeks or more, or *short suckling*=suckling during colostrum period, n=79) and herd milk production, udder health and calving interval.

Norwegian organic producers were recruited through Questback surveys asking for how long suckling was managed. Production and health data are available through the Norwegian Dairy Herd Recording System (97% of Norwegian herds are report). In a cross-sectional manner, results from 2008-2013 were analyzed with ANOVA (Milk production/cow, somatic cell-count and calving interval) or Kruskal-Wallis (Mastitis).

Preliminary results show a significant difference ( $p < 0.017$ ) in milk production  $F_{2, 77} = 5.477$ ,  $p = 0.006$ ). *Long suckling* herds produced less (Mean $\pm$ SEM, 4803.0 kg $\pm$ 550.7) than *other* (6389.9 $\pm$ 149.8), and *no suckling* (6429.7 kg $\pm$ 452.1). Incidence rate of mastitis also differed among the 3 suckling groups  $\chi^2(2, n=79) = 8.608$ ,  $p = 0.014$ ). *Long suckling* herds registered less mastitis (Md=3), than *no suckling* (Median=24) and *other* (Median=11). No associations were found between level of suckling and somatic cell count nor calving interval. The results are based on herd level data, and cannot make reference to causality.

A suckling calf drinks 10-15 liters daily, and some producers estimate this added value when reporting milk/cow. A poor milk ejection in a suckling system may negatively affect residual milk, but many studies find no effect of a longer suckling period on total milk production. Several experiments show that suckling decreases the risk of mastitis during the suckling period. Mastitis is a multifactorial health problem, and may be correlated with increased milk production. Such association-analyses may serve as a starting point for causal studies.

## Determining the abomasal capacity of Norwegian Red calves

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During the first weeks of life, calves are functionally monogastrics and milk is the primary source of nutrition. It is commonly believed that young calves should not be fed more than two litres of milk/meal. Otherwise the capacity of the abomasum may be exceeded and milk leak into the rumen. This can disturb the microbial flora/fauna of the rumen and enhance the risk of diarrhoea and reduced growth. The aim of this study was to determine the abomasal capacity of Norwegian Red calves.

Six calves (23-27 days of age) were fed two litres of warm sweet milk three times/day by teat bottle. The calves were given free access to hay, concentrates and water. During three morning feeding sessions, each separated by 48 hours, all calves were offered meals of up to seven litres of milk. The offered amounts were calculated according to the Response Surface Pathway design. The milk given these mornings contained a contrast medium, barium sulphate, and the animals were X-rayed before, during and immediately after intake.

The highest voluntary intake was 6.8 litres/meal (13% of BW). Medical imaging showed that the abomasum has great capacity for expansion. Leakage into the rumen was not revealed in any of the calves, regardless of intake. For two hours after intake the calves were also observed for signs of abdominal pain, but none were seen.

The results are of great importance as they show that farmers can safely increase the amount of milk they offer their calves/meal without risk of adverse effects.

## Validation of RumiWatch noseband sensors measuring feeding behaviour of cattle

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Automated monitoring of dairy cattle's feeding behaviour can provide important information about cows' health and welfare. RumiWatch noseband sensor (Itin + Hoch GmbH, Switzerland; RWS) is a new system measuring automatically not only cows' eating (ET), rumination (RT) and drinking time (DT) but also frequencies of the eating and rumination chews and boluses as well as the drinking gulps. The aim of this study was to validate the RWS feeding behaviour measurements against continuous behaviour recording (CR).

Six nonlactating dairy cows in tied stalls were equipped with RWS. The RWS measurements are based on a pressure sensor fastened in a halter over the cow's nose. The RWS data was processed as min/h for each behaviour class. ET, RT and DT (min/h) of the cows were monitored from videos continuously for 12 hours, and each individual hour was used as a separate observation in the statistical analyses. The agreement between RWS and CR was assessed for the ET, RT and DT by Mixed procedure of SAS 9.3 using the random coefficient regression model clustered by cow. In the model, Y was RWS ET, RT or DT while X was CR ET, RT or DT, respectively. Coefficients of determination ( $R^2$ ) were performed between adjusted Y and X.

$R^2$  between ET and RT of RWS and CR were high (for ET intercept = 3.2,  $P > 0.05$ ,  $R^2 = 0.94$ ; for RT intercept = 1.8,  $P > 0.05$ ,  $R^2 = 0.93$ ,  $n = 6$ , 72 observations). On the contrary,  $R^2$  between DT of RWS and CR was low (intercept = 0.6,  $P < 0.01$ ,  $R^2 = 0.2$ ,  $n = 6$ , number of observations 72).

In conclusion, RWS is an appropriate method for measuring rumination and eating times of cows. However, the drinking measurements of RWS were not reliable.

## **Evaluation of a less laborious method for observation of stereotypic behaviour in WelFur welfare assessment protocol for foxes**

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Occurrence of stereotypic behaviour is one of the measurements in the WelFur on-farm welfare assessment protocol for foxes. The observation is adjusted to a delay in feeding, and alone takes 60-90 minutes out of the 5-7 hour assessment, hence being laborious. Here we evaluate whether the observation could be done during the assessment day, in the course of other measurements, instead. Besides the full WelFur assessment, stereotypic behaviour was also observed by using a New method on 12 Finnish fox farms in October 2013.

In the WelFur-method, (stereotypic) behaviour was observed for one minute after a three minute habituation to the presence of the assessor, on 6-8 separate locations on the farm. In the New method, an observation lasting 30-60 seconds was done in several locations during the assessment day. Before the observation in each location, the assessor had stayed in the vicinity of the foxes for 2-3 min while accomplishing a set of other measurements. The farm-level results were compared between methods.

Of the observed  $223 \pm 31$  (mean $\pm$ SD) and  $246 \pm 68$  foxes,  $70.2 \pm 12.1$  % and  $66.3 \pm 12.0$  % were active, and  $0.4 \pm 0.5$  % and  $0.5 \pm 0.5$  % of the active animals behaved stereotypically (SBA), according to the WelFur and New method, respectively. Correlation between methods was found in the percentage of active animals ( $r=0.879$ ,  $P<0.001$ ,  $n=12$ ), but not in the SBA ( $r_s=-0.174$ ,  $P>0.05$ ). However, the methods led to the same general SBA result (observed/not) on 9 out of the 12 farms. On three farms, SB was recorded using only one method.

The difference in the WelFur scores obtained using the two methods ( $4.2 \pm 3.7$ ) diverged from 0 ( $t=3.697$ ,  $P<0.05$ ), but not from 5 ( $t=-0.739$ ,  $P>0.05$ ), which is considered meaningful. The two methods will be further discussed in relation to the validity of the measurement and feasibility of the WelFur assessment protocol.

## **Link between hair whorl characteristics and reactivity traits in dogs (*Canis familiaris*)**

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Reactivity as a behavioral trait is the intensity of reaction to stimuli and is regarded as a key trait of personality in dogs. Hair whorls (special formulation of hair follicles manifesting in organized hair patterns) have been associated with reactivity, activity and ease of being handled in horses and cattle. The aim of this study was to investigate the possible links between numbers and directions (clockwise or counterclockwise) of hair whorls according to reactivity in dogs, with focus on the dogs' chest and upper part of the left and right leg (shoulders).

A quantitative research method was used with an online questionnaire containing two Negative scales of reactivity (reaction to possible fearful stimuli), Positive scale of reactivity (heightened state of arousal) distributed in two countries; Norway (N=915) and Hungary (N=194). To validate the questionnaire a direct observation test was also conducted to correlate the owners' view of the dogs' behavior to an observer's view (N=24).

We found differences between countries in the Negative scale scores, in breed composition and orientation of hair whorls. The several differences between the Hungarian and Norwegian sample may indicate cultural differences, but the variation in breeds could also have an effect on the results. There were only a few correlations between the behavior of dogs directly observed by an observer and the owners' opinion. These results can indicate that a questionnaire is not the proper tool for assessing the link between behavior and hair whorl characteristics.

The second counterclockwise hair whorl and multiple whorls on the right leg were related to higher Positive scale score in the Norwegian sample. This can indicate that there is a connection between several whorls and a counterclockwise direction of hair whorls to a higher state of energy and excitability.

## **A user-friendly, flexible and free behavioral event recorder software: the Solomon Coder**

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Solomon Coder is a program developed for Microsoft® Windows™ to code behavior from pre-recorded video files and is freely accessible ([www.solomoncoder.com](http://www.solomoncoder.com)). It is actively developed by an ethologist since 2006 based on the demands of users working on behavior analysis. Numerous labs around the world have adopted it. The program is designed to be simple to use and to make the basic functionality easily accessible.

The program can handle a wide array of video/audio formats. It is possible to code multiple individuals and interactions between them. During coding the video can be paused, stepped or played back with different speeds. The coding process can be stopped, the coding sheet can be stored, reopened and modified at a later point. With the possibility of using hotkeys for behaviors, arranging and coloring the behavioral elements according to categories, the coding process is easy to follow. The coded behaviors can be instantly checked and with the reopening of or navigation in a coding sheet mistakes can be quickly corrected. The software is flexible enough to handle modifications in ethogram or beginning/end of observation. It is possible to export the raw behavioral data table from the program (e.g. to an Excel file) or to calculate simple statistics: Frequencies, Durations, Percentages, Latencies.

Oscillogram or spectrogram of the audio can be displayed to facilitate coding of vocal events. The program can open and display heart rate data that was recorded with the video (Polar® HRM files).

A short introduction into the way of use and applicability of the software will be presented at the conference.

## Reliability of instantaneous sampling in measuring feeding behaviour of dairy cows

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Instantaneous sampling (IS) is a less labour intensive behaviour recording method than continuous recording (CR), but gives only an approximation of the true frequency or duration of behaviour. We studied the effects of the IS sampling interval on the reliability of feeding behaviour measurements in dairy cows.

The behaviour of 16 cows was video-recorded for three 24-hour periods, and analysed with CR from altogether 29 'animal days' (1-3 days per animal). The accuracy of IS protocols with 1, 2, ..., 30 min sampling intervals were estimated from the CR data for drinking, eating and rumination. The effect of different IS starting points was studied by simulating a 24h IS from all possible starting points (seconds) of an animal day using a specific C-program. From these simulations, the errors between the IS and CR results were calculated and expressed by three indexes. The average error magnitude (AEM, %) estimates the expected error magnitude from a random starting point with a given IS range, averaged over all 29 animal days. The error magnitude range (EMR, %) and the probability of an error magnitude exceeding 10% (PEM10, %) measure the effect of a starting point.

The AEM, EMR and PEM10 percentages (the latter two in parentheses) for the IS-1, IS-5, IS-15 and IS-30 min, respectively, were: eating 1.4 (0.0-8.7, 0.0), 5.3 (0.0-37.2, 13.6), 13.4 (0.4-76.8, 55.1), 21.2 (0.0-133.5, 69.8); ruminating 0.4 (0.0-3.0, 0.0), 1.8 (0.0-12.4, 0.0), 4.8 (0.0-29.3, 10.3), 8.8 (0.0-61.0, 35.7); and drinking 16.6 (0.1-117.5, 59.9), 45.3 (1.8-442.2, 85.1), 87.4 (0.5-707.6, 94.5), 122.8 (12.2-138.3, 100.0).

As expected, the reliability of the IS results decreased with the increasing sampling interval. Surprisingly, the starting point had a dramatic effect on the IS accuracy (EMRs). The PEM10 graphs aid researcher to choose appropriate intervals which guarantees only small errors with a high probability.

## **The effect of the fish anaesthetic MS-222 on zebrafish (*Danio rerio*) behaviour: relevance for the acetic acid pain test**

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The pros and cons of using anaesthesia when handling fish for an experiment are debated. The paucity of studies of the effects of anaesthetics on fish behaviour makes this issue difficult to resolve. A widely adopted practice is to wait thirty minutes after anaesthesia to start registering behaviour, but this may lead to loss of information about the immediate effects of a treatment. We therefore used Ethovision® to describe the effect of MS-222 on zebrafish behaviour. We expected the MS-222 to decrease swimming distance in the fish. We also predicted that the control fish would become more stressed by being netted and transferred between test-tank and treatment tank, and would show an increase in stress-related behaviours compared to the MS-222 group.

Following one hour of acclimatization to the test tank, baseline behaviour was recorded for ten minutes before immersion in either MS-222 (168 mg l<sup>-1</sup>, N = 8) or tank water (N = 7). Then the fish was replaced into the test tank. From the moment when equilibrium was regained (or at the time of being put back in the test-tank for the control fish) to five minutes after replacement into the tank and at five, thirty and sixty minutes after replacement into the test tank, behaviour was again recorded for ten minutes.

Contrary to our predictions, neither group changed their behaviour from baseline for the following variables: distance swum, time spent in the lower third of the tank, time spent in the centre of the tank, latency to leave lower third of the tank and number of transitions between the lower third and upper part of the tank.

These results indicate that MS-222 has little effect on several behavioural parameters, and that it is most likely not necessary to postpone registrations until 30 min after anaesthesia.



## **To wear or not to wear a blanket? A new method for asking the horse**

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Blanketing of horses is a very common management routine. Sometimes, this practice may seem unjustified. Therefore, we wanted to investigate the preferences of the horses themselves.

First we developed a method by which the horse learned to communicate its wishes. Thirteen horses were trained to associate three different neutral visual symbols presented to them on a board with the actions 1) blanket is taken off, 2) blanket is put on, and 3) stay as is, and subsequently to communicate their wish by pointing at the relevant symbol. These horses had experience of wearing a blanket, but daily routines varied. All individuals which started the training programme succeeded in learning the task.

Second, we tested the horse' opinion under differing weather conditions. Horses normally wearing a blanket were tested with the blanket on, and those which normally did not, without. At the test days, the horse was taken out of its group and placed in a round pen. To be allowed to leave the round pen and join its pals again, the horse first had to make a choice among two symbols presented to them; to stay as is or to have the blanket removed/put on. The test was repeated under different climatic conditions (from -15 to + 20°C, sunny days and days with precipitation and wind) for each horse during winter, spring and autumn 2013.

Preliminary results show that all horses made "sensible" choices. Nine out of the 13 horses wanted to remove the blanket for at least one test day. Naturally, cold blooded horses more often preferred to stay without, and shaved warm blooded horses more often preferred to stay blanketed. However, there were individual differences in both groups, showing that owner perception and the horse's own opinion are not always matched.



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