

NORDIC ISAE 2018

17. – 18.1.2018

PARK HOTEL FINLAND, HELSINKI



International
Society for
Applied
Ethology



Research Centre for Animal Welfare & Faculty of Veterinary Medicine
University of Helsinki
Finland

Laura Hänninen, ed.

PROGRAM AT GLANCE

DAY 1

11:00 - 12:00	<i>Registration and rooms</i>
12:00 - 13:00	<i>Lunch</i>
13:00 - 14:00	Housekeeping and welcome, Laura Hänninen Plenary: A review of possible effects of the use of pain relief for post-disbudding analgesia in calves, Mette Herskin, p3
14:00 - 14:10	<i>Biobrake</i>
14:10 - 14:30	The age of surgical castration affects the healing process in beef calves, Marianna Norring, p4
14:30 - 14:50	Neophobia of calves housed individually in hutches or pair housed in modified hutches, Laura Whalin, p5
14:50 - 15:20	<i>Coffee</i>
15:20 - 15:40	Dam rearing of dairy calves - challenges and lessons from beef cattle, Margit Bak Jensen, p6
15:40 - 16:00	Delayed weaning practice: a simple way to improve companion feline welfare, Milla K Ahola, p7
16:00 - 16:10	<i>Biobrake</i>
16:10 - 16:30	Temperature influences mink females - maternal nest building and nest site preference, Toke Munk Schou, p8
16:30 - 17:00	The interaction with a wooden activity object in the juvenile Finnraccoons, Sini Raatikainen, p9
17:30 - 19:30	<i>Sauna</i>
19:30 -	<i>Dinner</i>

DAY 2

8:00 - 9:00	<i>Breakfast</i>
9:00 - 9:20	Use of judgement bias tests in livestock welfare assessment, Guilherme Amorim Franchi, p10
9:20 - 9:40	Welfur on-farm welfare assessment of foxes: development of behavioural tests, Eeva Ojala, p11
9:40 - 9:50	<i>Biobrake</i>
9:50 - 10:10	Behaviour in chickens contaminated with Salmonella Enteritidis, Leterrier Christine, p12
10:10 - 10:30	Influence of the gut microbiota on the emotional behaviour of the Japanese quail (<i>Coturnix japonica</i>), Narjis Kraimi, p13
10:30 - 11:00	<i>Coffee, check out</i>
11:00 - 11:20	Behaviour of the Finnraccoon females during winter, Tarja Koistinen, p14
11:20 - 11:40	Foot condition and welfare in blue foxes, Hannu T Korhonen, p15
11:40 - 12:15	<i>Future meetings, Nordic co-op</i>
12:15 -	<i>Lunch and good bye</i>

PLENARY: A REVIEW OF POSSIBLE EFFECTS OF THE USE OF PAIN RELIEF FOR POST-DISBUDDING ANALGESIA IN CALVES

Mette S. Herskin & Bodil H. Nielsen

Department of Animal Science, AU-Foulum, Aarhus University, 8830 Tjele, Denmark

In modern dairy production, almost all female calves are dehorned during the first months of their life. Farmers choose to dehorn the animals for different reasons, the majority of which relates to easier handling and reduced risk of injuries in animals and staff. This paper reviews potential effects in terms of animal welfare of the use of long-term pain relief for calves after disbudding under commercial conditions. The review focuses on animal-based measures, covering the following categories of welfare indicators: calf behaviour, physiology, clinical signs, production parameters and indicators of the affective states of the calves. It aims at including major welfare concerns such as measures of affective states, basic health and functioning and also the possibility to behave naturally. Across indicators, the majority of available evidence suggest that the use of NSAIDs in combination with a local anaesthetic is advantageous in terms of animal welfare, and no studies suggest that NSAIDs are a disadvantage to animal welfare. However, irrespective of the welfare concern, use of NSAIDs does not fully eliminate the welfare challenge from disbudding. Further research is needed in order to fully understand the effects of NSAIDs on calf welfare, including knowledge of the duration of healing and the possibility for long-term pain. At present, this lack of knowledge challenges the precise formulation of the adequate pain management in terms of duration, medication choice, dosage and route of administration.

THE AGE OF SURGICAL CASTRATION AFFECTS THE HEALING PROCESS IN BEEF CALVES

Marianna Norring¹, Erin M. Mintline² & Cassandra B. Tucker²

¹Research Centre for Animal Welfare, Faculty of Veterinary Medicine, University of Helsinki, FI-00014 Helsinki, Finland

²Center for Animal Welfare, Department of Animal Science, University of California, Davis, USA, 95616

Castration is painful for calves. Castrating at an earlier age is often recommended, but little is known about how this affects the healing process or the pain experienced. We compared incision closure, swelling and pain sensitivity of beef calves surgically castrated at 3 (n = 16) or 73 (n = 15) d of age. Closure of the incision was evaluated, and weight gain, and inflammation were recorded on 13 time points after the procedure. Pain sensitivity was assessed by applying von Frey hairs at the edge of the castration wound and at a control site. The incisions of younger calves healed more quickly than older ones (39 (32-61) vs. 61 (61-77) d; $P = 0.002$), however, they had relatively more swelling in the days after castration ($P < 0.001$). Younger animals reacted to lighter pressure of von Frey hairs compared to older calves especially in the first stages of healing process ($P < 0.001$), and there were other signs indicative of inflammation processes in this region at this time. However, there was no differences in control site. In addition, it took longer for older calves to recover their daily weight gain after the procedure ($P < 0.001$). Taken together, results paint a mixed picture about the effects of age of surgical castration. Calves castrated soon after birth experience more tissue swelling and show more signs of pain, but their incisions heal sooner and their weight gain is less affected, when compared to animals castrated around 73 d of age.

NEOPHOBIA OF CALVES HOUSED INDIVIDUALLY IN HUTCHES OR PAIR HOUSED IN MODIFIED HUTCHES

Laura Whalin , Dan M. Weary & Marina. A. G. von Keyserlingk

Animal Welfare Program, Faculty of Land and Food Systems, University of British Columbia, Vancouver V6T 1Z4

During their life, dairy cows undergo numerous transitions, including changes in diet. Social rearing is known to reduce responses to novelty, but many pre-weaned dairy calves are housed individually. The objective of this study was to test how calves react to the introduction of a novel feed, and compare this response in calves raised socially (in pairs) versus individually. Holstein heifers on a commercial dairy farm were alternately assigned (based on birth order) to either pair housing in modified hutches (n=8 pairs) or individual hutches (n=14). Calves were fed approximately 10 L/d of milk replacer from a nipple bottle, and had ad libitum access to starter, hay, and water. When calves were 60 d they were subjected to a 30-min food neophobia test where they were exposed to 900 g of a novel feed (total mixed ration) placed in the hutch so that calves could not see their neighbors completing the test. During the test, pairs were separated using a gate. Latency to approach the feed (muzzle <5cm from the bucket) and the amount of feed consumed (measured by disappearance) were recorded. Pair housing did not affect the latency to approach the novel feed, but pair-housed calves consumed nearly three times more feed (150 ± 27 vs. 58 ± 20 g/30 min) than individually housed calves. We conclude that social housing on a commercial farm decreases fearfulness of new feeds in dairy calves. Social housing during the milk-feeding period may improve how cattle cope with feed related changes later in life.

DAM REARING OF DAIRY CALVES - CHALLENGES AND LESSONS FROM BEEF CATTLE

Margit Bak Jensen

Aarhus University, Department of Animal Science, Denmark

There are beneficial effects of dam rearing of dairy calves, but separating dairy calves when 2-3 months old represents a challenge. In beef cattle, methods to mitigate separation stress in 5-6 month old calves involve first preventing suckling and subsequently breaking the bond. Fence-line-weaning prevents calves from suckling, while offering some social contact to the dam; and nose-flap-weaning prevents suckling, while allowing all other contact. Both steps reduce the calves' responses compared to abrupt separation. However, calves' responses to fence-line-weaning were strongest after the first step, while the response to nose-flap-weaning was strongest after the second step (Enriquez et al. 2010, *Livest. Sci.* 128: 20-27). In dairy cattle, two-step-methods reduced the response to separation in 8-10 week old calves (fence-line-weaning: Johnsen et al. 2015, *Appl. Anim. Behav. Sci.* 166: 11-19; nose-flap-weaning: Loberg et al. 2008; *Appl. Anim. Behav. Sci.* 111, 222-234), but calves' response to the second step also have to be considered, and future research should evaluate the impact of both steps of each of the 2 two-step procedures. One argument for separating the calf at birth is to avoid separation stress, but this argument ignores the beneficial effects of dam rearing. Once a maternal-filial bond is formed, both the benefits of maternal care and the stress of separation are hypothesized to be higher the younger the calf. However, it is difficult to assess whether the positive effects of dam rearing outweigh the negative effects of separation, and future research should also address this question.

DELAYED WEANING PRACTICE: A SIMPLE WAY TO IMPROVE COMPANION FELINE WELFARE

Milla K. Ahola^{1,2,3,4}, Katariina Vapalahti^{1,2,3} & Hannes Lohi^{1,2,3}

¹ *Department of Veterinary Biosciences, University of Helsinki, 00014, Helsinki, Finland*

² *Research Programs Unit, Molecular Neurology, University of Helsinki, 00014, Helsinki, Finland*

³ *The Folkhälsan Institute of Genetics, 00290, Helsinki, Finland*

⁴ *Section of Ecology, Department of Biology, University of Turku, FI-20014, Turku, Finland*

Early life stress, for example, early weaning, is known to influence behavior of laboratory animals and livestock. In these animals, early life stress often leads to increased aggression, anxiety, and stereotypic behavior. Early weaning is common in pet animals as well, but in these animals the consequences are not that well known and often studied in laboratory settings. The domestic cat is the world's most popular pet, with over 100 million cats living in Europe alone. Weaning at 7-9 weeks of age is common practice, even though in nature kittens stay with their mothers for the first four months of their lives and the effects of weaning at this age are unknown. Therefore, we studied the behavioral correlations of weaning age in home-living cats, and collected a survey data of 5726 cats in 40 breeds. Taking into account multiple other variables with multivariate logistic regression, we found that, compared to widely recommended weaning age of 12 weeks, early weaning (before 8 weeks of age) increased aggression, whereas delayed weaning (at or after 14 weeks of age) decreased aggression and stereotypic behavior. Our findings indicate that early weaning causes adverse effects on behavior, even in enriched home environment, and suggests delayed weaning as a simple way to improve companion cat welfare.

TEMPERATURE INFLUENCES MINK FEMALES - MATERNAL NEST BUILDING AND NEST SITE PREFERENCE

Toke Munk Schou & Jens Malmkvist

Department of Animal Science, Aarhus University, Denmark

We aim to investigate whether nest box temperature affects the amount of maternal nest building and preferred nest site in pregnant mink females through to Day 7 relative to birth. Two experiments were conducted in climate-controlled rooms of 7 °C: Exp. 1: 15 mink had a non-heated nest box (Room7C), and 15 mink had an artificially heated nest box at 25°C (Heated25C); Exp. 2: 16 mink had free access to three nest boxes, one unheated (7 °C) and two artificially heated to 16°C and 25 °C. Every second day a bulk of 80 g of straw was allocated in the cages. In Exp. 1, mink with Room7C nests built more advanced nests with higher nest score (4.0 vs. 2.9, $P < 0.001$), nest weight (250 vs. 178 g, $P = 0.029$) and thicker bottom layer (18.2 vs. 2.1 mm, $P < 0.001$) compared to Heated25C. Nest temperature also affected the kits' behaviour as more kits huddled (82.7 % vs. 59.8%, $P = 0.021$) and they vocalized for longer (70.0 vs. 50.2 s, $P = 0.010$) in cold nests (Room7C) compared to Heated25C. In Exp. 2, the maternal nest building decreased with nest box temperature, i.e. 7 °C > 16 °C > 25 °C ($P < 0.05$). Mink dams preferred the colder nest boxes for their litter (7 °C > 16 °C > 25 °C) with the nest site preference significantly different from random on Day 0 to 7 ($P < 0.05$ all days). The results clearly show that both maternal nest building and nest site preference are influenced by temperature feedback in mink.

THE INTERACTION WITH A WOODEN ACTIVITY OBJECT IN THE JUVENILE FINNRACCOONS

Sini Raatikainen¹ & Tarja Koistinen²

¹University of Eastern Finland, Department of Biology and Environmental Sciences

²Natural Resources Institute Finland (Luke), Green Technology

In the present study we measure the interaction with the wooden activity object in Finnraccoons (*Nyctereutes procyonoides*). Juvenile Finnraccoons were housed in eight male-female pairs in 1.2 m² cages and in eight groups of two males and two females in 2.4 m² cages. All cages were furnished with wooden blocks as activity objects (one per two animals). Interaction with the wooden blocks was analysed in three time points, i.e. in September, November and December, by using continuous recording for the first 15 mins of each hour from 6 am to 10 pm (total of four hours of continuous recording per day). Linear Mixed Models of SPSS was used for statistical analysis. The individuals interacted with the wooden block 0.3-0.8% of their time, mean of 2.3 times in an hour. No difference between pair and group housed animals was found in duration ($F_{1,11.5}=0.152$, $P=0.704$) and frequency ($F_{1,14.7}=0.697$, $P=0.417$) of interaction with the wooden block. Both duration ($F_{2,25.2}=4.509$, $P=0.021$) and frequency ($F_{2,28.8}=26.8$, $P=0.000$) of interacting decreased as the autumn proceeded, in both group sizes (interaction between group size and month: $F_{2,25.2}=1.208$, $P=0.316$, $F_{2,28.8}=0.959$, $P=0.395$). Oral interactions, elimination and oral interaction combined with the use of paws were the longest duration interactions, whereas oral interactions and elimination were most frequent. The results show that Finnraccoons do not use the wooden block much. Interactions are short in duration and mainly related to olfactory communication within the group, rather than play and gnawing. Interest towards the wooden block decreases as autumn proceeds and the animals mature.

USE OF JUDGEMENT BIAS TESTS IN LIVESTOCK WELFARE ASSESSMENT

*Guilherme Amorim Franchi, Mette S. Herskin & Margit Bak Jensen
Aarhus University, Department of Animal Science, Blichers Alle 20, 8830 Tjele, Denmark*

Cognitive processes, such as judgement, can either trigger or be influenced by emotional states. Thus, judgement bias tests have been increasingly used to assess animals' cognition and emotions and promote positive animal welfare. As part of an ongoing project, we are developing a judgement bias test to assess the affective state of drying-off cows. Up to date, three main types of judgement bias tests have been mostly employed: go/no-go -task, active choice -task, and natural behaviour -task. The first one consists of training animals to approach a positive cue and avoid a negative one. Thereafter, animals are introduced to unreinforced ambiguous cues. Despite the broad use, this test does not allow for differentiation between lack of motivation and negative emotional state, usually requires an extensive training period, and sometimes involves discard of unsuccessfully trained animals. In the active choice task - test, subjects are trained to respond to cues signaling high reward and low reward; subsequently, they are also offered intermediate cues. Despite both cues requiring similar responses and being equally influenced by changes in animals' motivation, this approach still demands a long training phase. Conversely, the natural behaviour -task test is based on animals' spontaneous responses of approaching or avoiding specific cues and does not require training except for an environment habituation. However, this test strongly depends on the effectiveness of the chosen cue to induce an emotional response. In this presentation, we discuss pros and cons of each type of judgement bias test.

WELFUR ON-FARM WELFARE ASSESSMENT OF FOXES: DEVELOPMENT OF BEHAVIOURAL TESTS

Eeva Ojala^{1,2}, Jaakko Mononen³, Hannu T. Korhonen³ & Tarja Koistinen³

¹University of Helsinki, Finland

²Kannus Research Facility Luova Ltd., Finland

³Natural Resources Institute Finland (Luke), Green Technology, Finland

Firstly, we studied associations between the two behavioural tests in the WelFur on-farm welfare assessment protocol for foxes. The well validated Feeding Test (FT) measures human-animal relationship (HAR), whereas the more poorly validated Stick Test (ST) is assumed to measure explorative behaviour. Results from the breeding animals of one commercial farm with blue foxes (n = 690 females, 43 males) and silver foxes (n = 81 females, 24 males) show, however, that also the ST is probably rather a HAR test than a test of explorative behaviour. Accordingly, the less-laborious ST could probably substitute for the more laborious FT in the WelFur-Fox protocol and quite obviously a new test for assessing exploratory behaviour or positive emotional state in WelFur-Fox is needed. Secondly, we compared the results of the FT to the results of a new test, a Subjective Evaluation of HAR (SE). In the less-laborious SE the assessor recorded on a six-point scale a fox's response to him/her (0 = approaches, 5 = withdraws). The SE score distributions overlapped to some extent between the eaters and non-eaters in the FT. This indicates either i) that the SE requires further development to increase its discriminative power before it could replace the FT, or ii) that the SE has more fine-tuned discriminative power than the FT.

BEHAVIOUR IN CHICKENS CONTAMINATED WITH SALMONELLA ENTERITIDIS

Leterrier Christine¹, Kraimi Narjis¹, Velge Philippe², Constantin Paul¹, Menanteau Pierrette² & Dawkins Marian³

¹UMR PRC, INRA Centre Val de Loire, 37380 Nouzilly, France

²UMR ISP, INRA Centre Val de Loire, 37380 Nouzilly, France

³University of Oxford, OX1 3PS Oxford, Great Britain

Salmonella Enteritidis (S.E) is a bacterium that is involved in foodborne toxi-infection in human, particularly via the intake of contaminated chicken meat or eggs. It is difficult to identify the contaminated chickens since this pathogen induces no illness cue at animal level in this species (asymptomatic carrier state). In order to detect the contamination in chickens, we then looked for changes in general activity and in social behaviour at group level. Four flocks containing eight non-inoculated chicks reared in cages were progressively contaminated (aerial contamination) by two other flocks that were close to these cages and that were orally inoculated with S.E (5x10⁴ bacteria /chick). Individual faecal samples were collected to establish the contamination by S.E. Analysis of behavioural parameters showed that the mean distances between birds were reduced in the target flocks between 3 and 8 days after inoculation of the neighbour flocks and they rose up to the initial value thereafter. The analysis of focal birds showed that the mean duration of quick walk bouts was lower in contaminated birds than in birds from the same target flock that were not contaminated yet. The differences in displacements and in inter-individual distances suggest that behaviour at group level would enable the detection of contamination with S.E. We will go on looking for changes in flock movements. The present results also suggest that these changes may be detected by automated analyses of behaviour in commercial flocks with devices such as Optical Flow (Dawkins et al 2012). Funding: EraNet ANIHWA

INFLUENCE OF THE GUT MICROBIOTA ON THE EMOTIONAL BEHAVIOUR OF THE JAPANESE QUAIL (COTURNIX JAPONICA)

Narjis Kraimi¹, Ludovic Calandreau¹, Sylvie Rabot², Edouard Guitton³, Philippe Velge⁴ & Olivier Zemb⁵, Manon Biesse¹ & Christine Leterrier¹

¹*UMR PRC INRA - CNRS - University of Tours - IFCE, Team « Comportement, Neurobiologie, Adaptation, 37380 NOUZILLY, France.*

²*MICALIS Institute, INRA, AgroParisTech, Université Paris-Saclay, 78350 JOUY-EN-JOSAS, France.*

³*UE PFIE INRA, 37380 NOUZILLY, France.*

⁴*ISP, INRA, Université François Rabelais de Tours, UMR 1282, 37380 NOUZILLY, France.*

⁵*UMR TANDEM INRA, 31326 CASTANET-TOLOSAN, France.*

Works on the influence of gut microbiota (GM) on behaviour and the microbiota-gut-brain axis concept are severely lacking in birds. Consequently, the aim of this study was to test the hypothesis that the GM of the Japanese quail (*Coturnix japonica*) has consequences on emotional behaviours. In a first experiment, we compared the behavioural responses of 36 germ-free quails (devoid of GM) and 36 germ-free quails colonised at birth with GM in various emotional situations. Compared to germ-free quails, the colonised quails had a higher tonic immobility duration and traveled a greater distance during the social isolation test, suggesting that the absence of GM reduces the emotional reactivity of the quails. In a second experiment, we hypothesised that the GM of a quail line selected for its low emotionality trait (GM E-) would reduce the emotional reactivity of a quail line with a high emotionality trait (E+ line). Chicks of the E+ line hatched in germ-free conditions and were distributed in two isolators. In one, they were inoculated at Day 1 with the GM of quails of their line (group E+ / GM+) and in the other with the GM of the less emotional line (group E+ / GM-). The tonic immobility duration of the group E+ / GM+ was higher than that of the group E+ / GM- at Day 15. In conclusion, the absence of GM or the colonisation with a GM of a line with a low emotionality trait line reduces the emotional reactivity of quails E+.

BEHAVIOUR OF THE FINNRACCOON FEMALES DURING WINTER

Tarja Koistinen¹, Juhani Sepponen¹, Sini Raatikainen² & Hannu T. Korhonen¹

¹Natural Resources Institute Finland (Luke), Green Technology,

²University of Eastern Finland, Department of Biology and Environmental Sciences

The aim of the study is to document the wintering behaviour in Finnraccoons (*Nyctereutes procyonoides*). A total of 40 juvenile Finnraccoon females were divided into four housing groups in mid-December: singly housing in a small cage (SC), singly housing in large cage (LC), singly housing in the large cage with access to a winter nest (WN) and social (pair) housing in the large cage (SH). All cages were furnished with an activity object, straw and platform. The behaviour of Finnraccoons was analysed for 24 hours in January and February by using instantaneous sampling. Linear mixed model was used for statistical analysis. Finnraccoons rested 69-75% of their time, without difference between groups ($F_{3,36}=0.33$, $P=0.806$) or recordings ($F_{1,36}=2.15$, $P=0.151$). The Finnraccoons in the SC and LC groups rested mainly on the cage floor (74-85% of the resting observations), WN group rested in the winter nest (95-98%) and SH group allohuddled (91-95%). More activity was observed in the SC and LC groups (11-12% of time) than in the WN group (9% of time), the SH group being in between ($F_{3,36}=3.90$, $P=0.016$); but no difference between recordings ($F_{1,36}=2.66$, $P=0.112$) was found. No difference between groups ($F_{3,36}=0.63$, $P=0.602$; $F_{3,36}=0.64$, $P=0.595$; $F_{3,36}=0.53$, $P=0.662$), or recordings ($F_{1,36}=1.84$, $P=0.183$, $F_{1,36}=0.13$, $P=0.724$; $F_{1,36}=0.24$, $P=0.625$) were found in sitting (9-15% of time), standing (5-7%) or stereotypic behaviour (<1-2%), respectively. The results show that Finnraccoon females prefer resting in the nest and allohuddling in winter. They are more active without these preferred resting options, but do not show more stereotypic behaviour.

FOOT CONDITION AND WELFARE IN BLUE FOXES

Hannu T. Korhonen¹, Eeva Ojala⁴, Anna-Maria Moisander-Jylhä⁵, Riitta Kempe³, Juhani Sepponen², Tarja Koistinen² & Jussi Peura⁵

Natural Resources Institute Finland (Luke), Green Technology, ¹Kokkola, ²Maaninka, ³Jokioinen;

⁴Luova Research Farm, Kannus

⁵Finnish Fur Breeders' Association

Condition of feet is related to health and welfare in farm animals. Pronounced bending of forelegs is in blue foxes (*Vulpes lagopus*) an escalating phenomenon which has been recognized on farms and measures to understand its background, etiology and welfare implications has been initiated. The purpose of the present study was to clarify to which extent feeding intensity (ad libitum vs restricted) influences on foot condition and welfare in growing-furring blue foxes. The subjects were 200 sibling pairs divided into two groups: (1) Ad libitum (Ad Lib) and (2) Restricted feeding (Restr). Feeding arrangements were started on July 29. Restricted portion was raised from Sept 22 onwards on ad libitum level. The statistical analyses were done by using the Fishers exact test, Tukeys test, Spearman correlations, Logistic regression and Mixed model of the SAS software for Windows version 9.4. Initial body weights of groups were similar. From Aug 11 onwards body weights of Ad Lib remained significantly ($P<0.001$) higher compared to Restr ones during the restricted period. Thereafter, compensatory growth occurred in Restr groups ($P<0.05$). Final body weights at pelting (Dec 8) were significantly higher ($P<0.001$) in Ad Lib than Restr animals. Body condition score (BSC) followed the same pattern. Foot condition was better in Restr than Ad Lib both at the end of restricted period as well as at pelting. Moving difficulties, patellar luxation and veering were slight in both groups. Angulation of rear angle was more pronounced in Ad Lib animals ($P<0.001$). Weight of right adrenal gland was significantly heavier ($P<0.01$) in Ad Lib than Restr groups. Weight of thymus was heavier in Restr than Ad Lib animals ($P<0.01$). Animals in Restr group, particularly females, used platforms typically significantly more than animals in Ad Lib group ($P<0.01$). The conclusions of the present study are; (1) that foot bending is the best method to evaluate foot condition even in large, fat animals. (2) Moving difficulties are most common in heaviest animals. (3) Excessive obesity declines platform use. (4) Prolonged intensive feeding may jeopardize foot condition and welfare.

