PROCEEDINGS

ISAE UK and Ireland Regional Meeting

22 January 2014

Royal (Dick) School of Veterinary Sciences, Edinburgh, Scotland


**Location and transport**

We are delighted to welcome you to the UK and Ireland Regional Meeting of the International Society for Applied Ethology (ISAE) at Royal (Dick) School of Veterinary Sciences on 22\textsuperscript{nd} January. The Royal (Dick) School of Veterinary Sciences is located in the University of Edinburgh’s Easter Bush Campus approximately 8 miles south of the Edinburgh city centre on a site it shares with SRUC, and the Roslin Institute. The vet school can be easily reached by bus from Edinburgh city centre or Waverley train station, or is a 20 minute taxi ride from Edinburgh airport. More information on travelling to the campus can be found here:  

The meeting will be held in room G01. Please register for the meeting in the foyer at the Vet School and you will be directed to the meeting room.
### ISAE UK and Ireland Regional Meeting
**Wednesday 22 January 2014**

Room G01, Royal (Dick) School of Veterinary Sciences, University of Edinburgh, Easter Bush Campus

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<td>Welfare assessment in laboratory zebrafish Dr Nacho Vinuela, <em>University of Edinburgh</em></td>
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<td>The development of a facial grimace score in adult sheep. Krista M. McLennan, C.J. Rebelo, M. Holmes, M.J. Corke, and F. Constantino-Casas, <em>University of Cambridge</em></td>
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<td>Detailed behavioural observations of farrowing sows. Sarah Ison and K.M.D. Rutherford, <em>SRUC</em></td>
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<td>Managing non-beak trimmed hens in furnished cages. Krysta Morrissey¹, ², T. Widowski¹, L. Baker¹, and V. Sandilands², ¹<em>University of Guelph</em>, ²<em>SRUC</em></td>
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<td>Characterising activity patterns of dairy herds over long periods of time. Jill MacKay¹, M.J. Haskell¹, K. Van Reenan², ¹<em>SRUC</em>, ²Wageningen UR</td>
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<td>Seasonal effect of white clover inclusion in grass only swards rotationally-grazed on dairy cow feeding behaviour. Daniel Enriquez-Hidalgo1,2, T. Gilliland2,3 and D. Hennessy1, 1Teagasc, 2Queens University Belfast, 3Agri-Food and Biosciences Institute</td>
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<td>12:15 – 12:30</td>
<td>The effect of herbage allowance and previous experience on dairy cattle preference to be indoors or at pasture. Priya Motupalli, M. Rutter, E. Bleach and L. Sinclair, Harper Adams University</td>
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<td>12:30 – 12:40</td>
<td>Feeding behaviour of dairy cattle at individual feed bins Maria Soonberg, and D.R. Arney, Estonian University of Life Sciences</td>
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<p>| 13:55 – 14:10| The inter-observer reliability of fixed list QBA assessments during on-farm welfare assessments of hill sheep Susan Richmond, F. Wemelnderfelder and C.M. Dwyer, SRUC |
| 14:10 – 14:25| Healthy and chronically ill dogs show no significant differences in their hair cortisol concentrations, or chronic stress behaviours determined by questionnaire Sandra Nicholson and J.E. Meredith, Bishop Burton College |
| 14:25 – 14:40| Interactions between management and personality traits in the Labrador Retriever dog. Marie J Haskell1, S. Lofgren2, S. Blott2 and P. Wiener2, SRUC, University of Edinburgh |
| 14:40 – 14:55| Barriers to horse owners adopting management practices to improve horse welfare. Anna Zarb1, M. Connors2, A.B. Lawrence2, 1University of Edinburgh, 2SRUC, |
| 14:55 – 15:10| A behavioural assessment of activity budgets and resting behaviour in captive Asian elephants (Elephas maximus). Ellen Williams1, S. Brenner-Harrison1, N. Harvey2, E. Evison3, L. Yon2, 1Nottingham Trent University, 2University of Nottingham, 3Chester Zoo |
| 15:10 – 15:25| Farmers’ and veterinarians’ perceptions of lameness and Pain in sheep. Carol Thompson1,2, K.M.D. Rutherford1, J. Williams2, A.J. Zanella3, 1SRUC, 2University of Edinburgh, 3Universidade de São Paulo |
| 15:25 – 15:45| Tea/coffee break and posters                                          |</p>
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<td>Workshops (each will run concurrently, please choose which workshop you would like to attend)</td>
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| Workshop 1 | **Too much or not enough? The ethics of feeding and nutrition in companion and farm animals.**  
Facilitator: Laura Dixon, SRUC  
Speakers:  
**Hunger in farm animals.** Rick B D’Eath, SRUC  
**Obesity in pets.** Claire Corridan, Nathen Valley Veterinary Centre |
| Workshop 2 | **PLANET: Using sensor technology to monitor animal behaviour**  
Facilitator: DK Arvind, Centre for Speckled Computing, University of Edinburgh  
Speakers:  
**Tracking and monitoring animals in the wild.** D K Arvind, University of Edinburgh  
**Wireless sensor platforms for continuous monitoring of animal behaviour.** Janek Mann, University of Edinburgh  
**Analysis of animal behaviour from high resolution sensor data.** Emilian Radoi, University of Edinburgh  
**Automated and integrated sensing and monitoring of behaviour and physiology - an effective and holistic assessment of welfare of livestock?** Malcom Mitchell, SRUC  
**Automatic recording of ruminant foraging: from research to farm.** Mark Rutter, Harper Adams University |
| 17:25-17:30 | Meeting closes |
ABSTRACTS
Ouch that hurts! Assessing pain in mammals using behaviour and facial expressions

Dr Matt Leach
Newcastle University
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Pain in animals is of considerable public concern. Pain compromises not only animal welfare, but also raises considerable ethical concern. In order to alleviate pain, we need to be able to assess its severity and duration effectively. Considerable advances have been made in assessing pain in animals through the evaluation of behavioural and postural changes. Behaviour-based schemes have been developed for a range of species. They are considered more effective than those of the more subjective assessments of appearance and demeanour (i.e. clinical signs) and offer a more immediate cage/pen side assessment of pain than objective measures of food/water intake, bodyweight change etc.

However, behaviour-based measures also have limitations including: being time consuming to develop and carry out, only offering an ‘direct’ measure of an animals’ physical reaction to pain rather than how it makes them ‘feel’, and often being subtle and difficult to detect. The assessment of facial expressions exhibited in response to pain may offer a solution to these limitations. Facial expressions are used in clinical assessments of pain in humans, particularly in those who are unable to communicate verbally. There is now an increasing body of literature demonstrating that facial expressions change in response to painful procedures in rodents (Langford et al. 2010, Sotocinal et al. 2011, Leach et al. 2012), rabbits (Keating et al. 2012) and horses (Dalla Costa et al. 2014). If these facial expressions are a direct response to pain, then this may offer a new method of assessing pain in animals.


Welfare assessment on laboratory zebra fish (*Danio rerio*)

Nacho Vinuela-Fernandez,

*University of Edinburgh*

Zebra fish (*Danio rerio*) has become increasingly popular as a model organism in biomedical research and is often viewed as a replacement for mammalian models. However, standard refinement strategies used in mammals (such as use of analgesia or environmental enrichment) are often not implemented in zebra fish. This situation is a reflection of the paucity of research investigating the impact of housing, husbandry practices and research procedures on the welfare of this species.

This talk will briefly discuss the natural behaviour of zebra fish, the methodologies that are being developed to assess the welfare of zebra fish and the results from recent studies looking at the potential welfare issues associated with their use in research, with a particular emphasis on:

- Environmental enrichment. A growing body of work indicates that zebra fish prefer complex environments and that housing factors induce behavioural stress responses. However, there is still debate over the extent to which zebra fish benefit from environmental enrichment and, particularly, what form it should take.

- Anaesthetic protocols. Results from behavioural preference tests indicate that zebra fish find the commonly used anaesthetic agent, tricaine methanesulphonate (MS222) aversive.

- Investigation of potential pain indicators following fin-clipping. Tissue samples for genetic analysis are obtained through surgical removal of part of the caudal fin under anaesthesia but without provision of analgesia. We examined potential physiological parameters (ventilation rate and holding-water cortisol) as well as behavioural indicators and responses to anxiety related behavioural tests (light-dark and novel object tests). Preliminary results show no difference between fin-clipped and handled and anaesthetised treatment groups, although an increase in cortisol levels is apparent in all groups.
The development of a facial grimace score in adult sheep

Krista M. McLennan, Carlos J. Rebelo, Mark Holmes, Murray J. Corke, Fernando Constantino-Casas

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Due to the stoical nature of farm animals such as sheep, identifying and managing pain can be difficult resulting in a reduced welfare state. The use of facial expression to assess pain in animals is a relatively new technique with promising results in laboratory animals. The facial expressions of sheep are being studied to assess pain resulting from naturally occurring diseases, and these have been used to create a ‘facial grimace score’ for sheep. 58 adult sheep (mean =1.4yrs) categorised as either treatment only group (n=20), treatment plus NSAID’s group (n=20) or matched pair non-diseased control group (n=18) were observed. Multiple photographs of each sheep were taken on the initial day of disease identification (day 1) and three months later (day 90). After initial identification of the five facial action units (FAU) (orbital tightening, cheek bulge, ear position, lip tightness and nose position), two photographs for each sheep were used to perform the evaluation. Each photograph was randomly assigned to a single excel spread sheet so the observer was blind to treatment group. Photographs were scored twice for each FAU on a 3-point scale (0= not present, 1= moderately present, 2= obviously present) for day 1 and day 90. An overall pain judgement was made and an overall pain score was assigned on a 3 point scale (1= mild pain, 2= moderate pain, 3= severe pain) for day 1 and day 90. Initial global accuracy of the pain assessment was 78% with misses at <1% and false positives at 15%. The overall intra-rater reliability was α = 0.81 with nose position being the highest reliable indicator with a correlation of α = 0.84. The results presented suggest that the sheep grimace score may be a practical tool to assess pain in sheep; however, it is still in developmental stages and thus the results should be treated as such.
Detailed behavioural observations of farrowing sows

Sarah H. Ison and Kenneth M.D. Rutherford

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Behavioural indicators, often termed ‘pain-specific’ behaviour, are frequently used in experimental research assessing pain in pigs. However, no studies have recorded ‘pain-specific’ behaviour associated with farrowing. The aim of this study was to identify potential behavioural indicators of pain by conducting detailed behavioural observations of sows around farrowing. Continuous focal observations of 11 sows were made from the birth of the first to the last piglet. These 11, along with another 8 sows were observed for five minutes every hour for 24 hours, starting one hour after the birth of the last piglet. Behaviour recorded included sow posture, piglet births and a set of other behaviours seen at this time. These behaviours were: 1) back leg forward duration (BLF: the sow pulls her back leg forward and/or in); 2) tremble duration (T: the body moves as if shivering); 3) back arch (BA: the sow stretches forming an arch with the spine); 4) paw (P: the sow scrapes the front or back legs in a pawing motion); and 5) tail flick (TF: the tail rapidly moves up and down). Two-minute extracts were taken before (B) and after (A) each piglet birth. Five-minute post-farrowing observations were combined to give totals for the first, second, third, and fourth six hour block. Behaviour was analysed using GLMM, results are presented as mean ± SE. The behaviours TF (B = 1.7 ± 0.2, A = 0.2 ± 0.1), BA (B = 2.3 ± 0.2, A = 1.3 ± 0.2), and P (B = 0.46 ± 0.12, A = 0.20 ± 0.057) were more (P < 0.05) frequent two minutes before compared to after a birth, whereas, T (B = 93.6 ± 4.7, A = 93.0 ± 4.6), and BLF (B = 94.1 ± 3.7, A = 98.6 ± 3.0) did not differ (P > 0.1). Post-farrowing, BLF and T were greater (P < 0.05) in the first 6 hour block, compared to the subsequent blocks (BLF: 1st = 601.1 ± 79.4, 2nd = 372.4 ± 85.3, 3rd = 304.7 ± 78.0, 4th = 280.7 ± 68.9; T: 1st = 768.5 ± 116, 2nd = 186.4 ± 72.6, 3rd = 170.1 ± 58.0, 4th 94.0 ± 32.5). These behaviours may be useful indicators of pain associated with farrowing, and could be used to identify individuals that could benefit from a post-farrowing non-steroidal anti-inflammatory drug.
Managing non-beak trimmed hens in furnished cages

Krysta Morrissey¹, T. Widowski¹, L. Baker², and V. Sandilands²

¹Animal and Poultry Science, University of Guelph, Guelph, Ontario N1G 2W1, Canada
²Avian Science Research Centre, SRUC, Auchincruive, Ayr KA6 5HW, UK

Infrared beak trimming in laying hens is a routine procedure used to reduce feather damage and cannibalism associated with intact beaks. This procedure is permitted under Scottish and UK law due to a derogation delaying the ban of all routine beak trimming, however, this is due to end on 1 Jan 2016. This study used a $2 \times 2 \times 2$ factorial design to assess the effects of breed (Lohmann Classic (L) or Hyline Brown (H)), beak treatment (trimmed (T) or not (NT)), and environment (extra enrichment or none) on mortality, behaviour, and feather condition. At 16 wk of age, hens were assigned to one of eight treatments. Each treatment had eight replicate cages (furnished with nest and scratch areas, and perches), with 80 birds/cage. This experiment was carried out on a large commercial farm in Scotland. Data for behaviour (specifically injurious bird-to-bird pecking), plumage condition and enrichment wear were collected every 4 wk from 19 wk until end of lay. In addition, mortalities were recorded daily by a stockworker. Data collection is currently ongoing and results presented here are preliminary. From wk 16 – 60, mortality appears to be lower for H hens (H: 1.09%, L: 2.23%), especially in regards to pecking related mortality (H: 0.04%, L: 0.70%). Two LNT cages had to be culled from the study at 48 wk due to pecking related mortalities (6.25% (EE) and 8.75% (NE)). Feather condition at 60 wk also appears to be affected by breed (H: 6.81 ± 0.36, L: 8.11 ± 0.67) and beak treatment (T: 6.34 ± 0.29, NT: 8.60 ± 0.66). Extra enrichment does not appear affect mortality or feather condition. Although data is preliminary, differences between breeds and beak treatment are apparent and the final results may help guide management styles for flocks of non-beak trimmed hens.
Characterising activity patterns of dairy herds over long periods of time

Jill R.D. MacKay¹, Marie J. Haskell¹, Kees Van Reenen²

¹SRUC, West Mains Road, Edinburgh, EH9 3JG, UK., ²Animal Sciences Group of Wageningen UR, Division Animal Resources Development, Research Group Animal Welfare, P.O. Box 65, 8200 AB Lelystad, The Netherlands; jill.mackay@sruc.ac.uk

Technological advances mean that data loggers are capable of recording data over several years. This presents welfare researchers with a new challenge: how best to characterise activity over long periods of time? We utilised techniques which allowed us to describe activity as a signal with time-varying properties. Autocorrelations allowed us to characterise significant patterns in herd lying behaviours and cross-correlate between individuals. Over 18 months two dairy groups kept on the same farm had an average daily lying duration of 682 minutes ± 14.74 (Group 1) and 648 minutes ± 26.64 (Group 2). The autocorrelation showed a significant (P < 0.05) peak of lying behaviour for Group 1 (n = 58 ± 3.4) at around 140 days. This suggests there is some seasonality to Group 1’s lying behaviour, with a significant negative correlation at 70 days. Therefore we can make predictions of Group 1’s lying behaviour, i.e. the Group 1 herd will likely not be lying for the same length of time 70 days from any given day. However Group 2 (n = 46 ± 1.4) showed no pattern. Group 2’s average lying time on a given day was not as useful to predict lying time months later.

Focal animals in Group 1 show similar weak cross-correlations (average r = 0.16 ± 0.08) between their individual daily lying duration and the herd’s daily lying duration pattern. However Group 2’s focal animals showed strong cross correlations (average r = 0.22 ±0.27) between their individual total daily lying time and the rest of the herd’s. Although there was an exception with Cow 269 (r = -0.51) which had a strong negative cross-correlation suggesting it consistently behaves differently from the herd.

In conclusion, signal processing techniques may be very useful for characterising data over long periods of time, but more research is needed to identify the relationship with welfare.
Seasonal effect of white clover inclusion in grass swards rotationally-grazed on dairy cow feeding behaviour

Daniel Enriquez-Hidalgo\textsuperscript{ab}, T. Gilliland\textsuperscript{bc} and D. Hennessy\textsuperscript{a}.

\textsuperscript{a}Teagasc, Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork, Ireland
\textsuperscript{b}Queens University Belfast, Belfast, BT7 1NN, Northern Ireland
\textsuperscript{c}Agri-Food and Biosciences Institute, Plant Testing Station, Crossnacreevy, Belfast, BT5 7QJ, Northern Ireland

Cows have a marked preference for white clover (WC) compared to grass, but this preference may be affected under rotationally-grazing systems. This experiment compared the seasonal effect of WC inclusion to grass swards with grass only (GO) swards rotationally-grazed on dairy cow feeding behaviour. Forty cows were randomly allocated to graze each sward. Cows received 17 kg herbage of DM/cow/day. Herbage mass and WC content were estimated 2×week. Feeding behaviour was estimated over a two-week period using 28 cows in late-spring and 36 cows (26 same + 10 additional) in summer and autumn. Each cow was fitted with a grazing behaviour recorder for two consecutive days in each period. Data were analysed independently for each period using PROC MIXED in SAS. Herbage mass and WC content were 1.51 ton DM/ha and 17%, respectively, in late-spring; 1.70 ton DM/ha and 30%, respectively, in summer; and 1.24 ton DM/ha and 31%, respectively, in autumn. In spring, cows spend 10% more time grazing when WC was present (608±15.6 and 551±15.6 min/d; p<0.05), with greatest night differences (17.1±0.84 and 13.8±0.84 min/h; p<0.01); but WC had no effect on ruminating time (418 min/d). In summer, cows had similar grazing times (590±11.1 min/d), but spent 8% less time ruminating when WC was present (443±11.2 and 480±13.8 min/d; p<0.05), with greatest differences at night (30.9±0.49 and 33.1±0.59 min/h; p<0.01). Similar daily grazing (594±10.1 min/d) and ruminating (448±13.5 min/d) times were observed in autumn, but cows spent 5% less time ruminating at night when WC was present (30.3±0.59 and 31.9±0.59 min/h; p<0.05). The WC inclusion into GO swards had an effect on cow feeding behaviour closely related to clover content, as WC increased grazing time when it was low, due to an increase in foraging behaviour and reduced ruminating time when it was greater.
The effect of herbage allowance and previous experience on dairy cattle preference to be indoors or at pasture

Priya Motupalli, Mark Rutter, Emma Bleach and Liam Sinclair

Animal Science Research Centre, Harper Adams University, Newport, Shropshire, TF10 8NB

There are many factors that influence dairy cow preference to be indoors or at pasture including milk yield and time of day. The studies reported here investigated whether herbage allowance and previous experience affected preference. The first study offered a high (3000 ± 200 kg DM) or a low (1800 ± 200 kg DM) herbage allowance at a near (38 m) or a far (254 m) distance to 16, in-calf, late-lactation, Holstein-Friesian dairy cows. Grass allowances were offered at two distances to determine motivation. Video recordings and scan-sampling with five-minute intervals revealed that herbage allowance did not affect preference (p > 0.05), but the proportion of time cows spent at pasture during the day declined as distance increased (73.7% vs. 28.8%, p < 0.05). Night-time pasture use was not affected by distance. Overall, dairy cows showed a partial preference to be at pasture (68.7% vs. 31.3%, p < 0.05). To determine the effect of previous experience, two groups of 12 Holstein-Friesian dairy heifers were reared with or without exposure to pasture and tested for their preference to be indoors or at pasture at an average of 16 months of age. Video recordings and scan-sampling with five-minute intervals revealed that indoor-reared heifers spent more time indoors (82.6 vs. 55.6%, p < 0.05), spent less time grazing (3.5% vs. 18.1%, p < 0.05), and spent more time investigating grass (5.07% vs. 2.39%, p < 0.05) than heifers with experience of pasture.

These studies show that herbage allowance is not a major factor in the preference of high-yielding dairy cows for pasture, but cows are more motivated for access to pasture at night. Heifers without experience of pasture show a lower preference for it, and there appears to be a learned component to grazing.
Feeding behaviour of dairy cattle at individual feeding bins

Maria Soonberg and D.R. Arney

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Estimating feed intakes of individual cows in a loose-housed system is difficult and unreliable. It is known that estimating intakes from the number of bites taken at grazing is unreliable. Feeding from a TMR is likely to have fewer confounding variables, so estimating intakes from bites at the barrier might be relatively reliable. The aim of this study was to examine if dairy cow intakes can be reliably estimated by measuring the feeding behaviour at the feeding bin, in particular by estimating the number of bites taken and time spent at the feeding bins in a cubicle-housed system. All cows were over 30 months old, of three breeds: Holstein Friesian, Estonian Red and Estonian native. There were 30 feeding bins and 66 cows. Cows were observed over the whole 24 hour period, from 1st July to October 22nd, and data from 37 cows were collected. Measures taken included: time spent at the feed bin, number of bites taken at each visit, weight lost from the bin, and evidence of stealing. Mean for the time spent at each visit to the feed bin was 4.4 minutes, (s.e. 0.68 minutes). Mean number of bites at each visit was 7.1 (s.e. 1.01). There was a significant correlation between number of bites and total time cows spent feeding (p< 0.001), regression R-sq value of 66.8%. No correlation was found between number of bites and feed removed at each visit (p= 0.851) and between time per visit and feed removed (p= 0.681). Therefore there is no evidence that either the number of bites taken per visit or time spent at bin per visit are related to intakes. There was no effect of age. Stealing was evident and widespread.
Animal welfare education is a relatively new field with particular application to veterinary and animal science programmes, yet it is a field which is ideally suited to an international approach.

Until recently, education in animal welfare science has focussed on traditional research, often based on the experimental laboratory data, or research in the agricultural industry, particularly in Europe. Whilst this theoretical and scientific basis for animal welfare education is vital in ensuring a sound scientific rationale for delivering education, it is important to recognise the limitations of basing international animal welfare education programmes entirely on such established fields.

For students enrolled in applied fields such as veterinary medicine or animal science outside of the EU, Eurocentric, experimental or industry-based data may be of limited value in improving animal welfare on a daily basis within their chosen field. Such students need to be empowered not just with a theoretical basis of animal welfare science, but also with the skills to apply this knowledge and solve problems in their own field, recognising the unique cultural, legal and economic limitations that may exist.

Additionally it is important that a holistic and unified approach is taken to developing education programmes to avoid inadvertent contradictions of animal welfare principles. Students may be educated in animal welfare theory, but if this knowledge is undermined by the inappropriate handling or use of animals in other areas of their education, then the practical applications of animal welfare science may become very disconnected from the theory. Essentially it is important that those of us working in animal welfare education, or in the teaching of animal science subjects, “Practise what we preach”.

Animal welfare science is a field of research with an increasingly international audience, and with increasingly relevant applications to a range of industries. Animal welfare science has implications for disease control, animal and human health, climate change, trade, and economics. Thus effective animal welfare education relies on empowering students with the skills to draw on the relevant skills and knowledge to create solutions to emerging global problems in these areas. Animal welfare education should be an integrated subject with an emphasis on practical solutions and the development of problem-solving skills and critical thinking, alongside established teaching of theoretical knowledge.
The inter-observer reliability of fixed list QBA assessments during on-farm welfare assessments of hill sheep

Susan E. Richmond, Francoise Wemelsfelder, Cathy M. Dwyer,

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Qualitative Behavioural Assessment (QBA) is a whole-animal approach using animals’ body language to obtain information on their welfare state (e.g. are they relaxed or tense) which can be difficult to collect with quantitative methods. QBA has been shown to be reliable and feasible in a number of on-farm studies on various species, with some studies showing mixed results. This study is the first to investigate observer reliability during a longitudinal field study of sheep welfare using a fixed list QBA approach. A list of 21 QBA descriptors for sheep was developed by an experienced focus group. The same 46 Scottish Blackface ewes were assessed individually on one hill farm during 13 subsequent visits over the spring and summer of 2013. The work presented here focuses on the inter-observer reliability of assessments made by three trained observers on two visits occurring one month apart. The observers’ QBA scores for the two visits were analysed together using Principle Component Analysis (correlation matrix, no rotation). Three meaningful Principle Components were identified explaining 55% of the variation between sheep (PC1: calm/relaxed-tense/wary; PC2: bright/content-subdued/apathetic; PC3: inquisitive/active-defensive/fearful). To assess inter-observer reliability, PC scores attributed by observers to observed sheep were analysed using Kendall’s coefficient of concordance (W), and a mixed model of PC scores (REML) was fitted including observer as a random factor. Observers showed good agreement across all three dimensions (PC1: W=0.77, PC2: W=0.70, PC3: W=0.54), with all values significant at p<0.001. However there was a significant observer effect on mean sheep scores on PC1 (p=0.027) and PC3 (p=0.041). Thus, while observers’ ranking of the 46 sheep on the three QBA dimensions was robust, they differed in their use of visual analogue scales to quantify the sheep’s positions on two of these dimensions. The implications of these findings for QBA training will be discussed.
Healthy and chronically ill dogs show no significant differences in their hair cortisols concentrations, or chronic stress behaviours determined by questionnaire

Sandra L. Nicholson and J. E. Meredith

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As a consequence of their physical and/or psychological impacts, on-going diseases have the potential to elicit chronic stress in dogs. Chronic stress may contribute to disease progression and negatively affect welfare. By investigating whether on-going illnesses cause chronic stress in dogs, this research aimed to determine if stress management should be integrated into veterinary care. Hair samples were collected from 33 dogs to assess cortisol levels (Sick n = 16; 12 non-black and 4 black; healthy n = 17; 12 non-black and 5 black). In addition, a questionnaire was distributed to the owners of these dogs to gather information on pet care, stress behaviours and disease characteristics. The hair cortisol levels of black and non-black dogs did not differ significantly (U = 89, df = 31, p = 0.442). Data were therefore pooled for further analysis. Significant differences were not found in the hair cortisol levels of chronically ill and healthy dogs (t = -0.655, df = 30, p = 0.517) or the number of dogs with stress behaviours in each group (X² = 0.667, df = 1, p = 0.414). Hair cortisol was not significantly associated with disease signs (X² = 0.152, df = 1, p = 0.696) or lifestyle restrictions (X² = 0.788, df = 1, p = 0.375), or related to the number of veterinary visits (rₛ = -0.152, df = 31, p = 0.397). However, it was significantly correlated with the length of time left alone (rₛ = 0.417, df = 31, p = 0.016). In conclusion, the results suggested that on-going diseases do not cause chronic stress in dogs. However, as unrelated stressors may affect the well-being of chronically sick dogs, stress management may still be a beneficial addition to clinical care.
Interactions between management and personality traits in the Labrador Retriever dog

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Canine personality is of keen interest to dog owners and researchers alike. It is suggested that personality is affected by experience, but little systematic study has been done on how factors like level of exercise and housing affect personality traits in dogs. This study used two surveys: a canine personality survey (C-BARQ) which contained 102 questions on all aspects of behaviour and a management questionnaire on physical characteristics, care and management. The two surveys were sent to Labrador Retriever dog owners across the UK. Using PCA and correlations, 12 personality traits were identified from the 2020 respondents to the C-BARQ survey. These responses were matched to the management questionnaire returns to give data on 1978 dogs. Logistic regression was used to investigate the associations between the two sets of data. The working status of the dog had the largest effect. Gundogs had better scores for ‘fetching tendency’ and ‘trainability’ than showdogs or pets (P<0.05). Showdogs had the lowest ‘human and object fear’ and ‘agitated when ignored’ scores (P<0.05). Dogs exercised <1 hour/day had greater ‘barking tendency’, ‘human and object fear’, ‘separation anxiety’ and ‘excitability’ scores than those exercised more extensively (all P<0.05). Dogs exercised up to 2 hrs/day showed more ‘non-owner aggression’ than those exercised for longer (P<0.05). Dogs housed entirely outdoors showed less ‘excitability’ and less ‘human and object fear’ than those housed entirely or partially indoors (P<0.05). Coat colour also had some influences. Chocolate dogs were more ‘agitated when ignored’ and showed more ‘excitability’ than black dogs, and lower ‘trainability’ and ‘noise fear’ than both yellow and black dogs (all P<0.05). The results suggest that working status is associated with a particular ‘lifestyle’ in terms of housing and exercise, and the behavioural ‘requirements’ of that status. Importantly, low levels of exercise were associated with undesirable behavioural traits.
Barriers to horse owners adopting management practices to improve horse welfare

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Horse management is variable and dependent on several factors. It has been shown that the welfare of domesticated horses can be affected by a number of management factors resulting in development of stereotypic behaviours. Horse owners may understand the effects of different management practices on stereotypes. However, the barriers that prevent implementation of that understanding have not yet been studied. The aim of the present study was to investigate the factors influencing horse management practices in order to identify the barriers to adoption of welfare friendly management practices for horses. An online survey questionnaire was administered through the British Horse Society, online equine forums and social networking sites in summer 2013. A total of 406 (93% female) horse owners participated in the study. The questionnaire was based on different cognitive behavioural models and investigated occurrence of management practices, different types of knowledge, management motivations, attitudes towards equine welfare and empathy towards horses (all measured on 6-point likert scales). A regression analysis where welfare-friendly horse management practices functioned as the dependent variable showed that management practices are predicted by motives ($\beta=-0.056, t=-4.05, p<0.001$), objective knowledge of equine welfare ($\beta=-0.161, t=-5.55, p<0.001$), social norms ($\beta=0.129, t=5.48, p<0.001$) and attitude towards equine welfare ($\beta=0.099, t=2.74, p<0.01$). All predictor variables explained 32.7% of the model’s variance. The main motivational factor for management practices was concern about horse health ($M=5.87, SD=0.48$) and welfare ($M=5.77, SD=0.62$). Perceived social norm, including the influence of other people especially for yard stabling owners, clearly plays an important role in the management of horses. The greatest barrier to welfare friendly management practices seems to be the management of the yard and how much control horse owners have over yard management practices.
A behavioural assessment of activity budgets and resting behaviour in captive Asian elephants (*Elephas maximus*) in three UK zoos

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This study investigated the effect of environmental conditions on resting behaviour in captive Asian elephants (*Elephas maximus*); to determine the potential impact of enclosure design, husbandry and management on rest behaviour. This information could be used to suggest housing and husbandry conditions that would encourage captive elephants to engage in increased periods of recumbent rest, on the assumption that this would improve their welfare. Resting behaviour was analysed by observing video footage of 16 elephants (3.13) housed at three zoos within the UK (Zoo A: 14 nights, March to November 2012; Zoo B: 27 nights, June to July 2013; Zoo C: 46 nights, May to July 2013). Elephants spent up to 31% of night-time observations resting. Mean time each elephant spent resting per night ranged from 58 to 461 minutes. Time of night affected type ($\chi^2=211.820$, p<0.001, df=8) and duration (H=252.638, df=8, p<0.001) of rest; standing rest occurred throughout the night whilst lying rest predominantly occurred between 20:00 and 06:00. Mean duration of rest was greatest between 00:00 and 04:00. Lying rest was not observed on concrete or tiled flooring (available to 7/16 elephants). Where available, all elephants lay on sand flooring (13/16 elephants) whilst only two individuals lay on rubber flooring (available to 9/16 elephants). Apart from the sub-adult bull at Zoo B, elephants in each collection were housed together over night. Resting in the presence of at least one conspecific occurred four times more frequently than when conspecifics were absent. This study provides scientific evidence in agreement with current BIAZA guidelines on flooring substrate and group housing. The results highlight the importance of housing compatible individuals together at night and suggest that, in order to increase periods of recumbent rest in captive elephants, hard flooring, e.g. concrete or tiled floors, should be replaced with sand flooring.
The consistently high prevalence of lameness in UK sheep indicates that current management practices are not adequate in its control. An important factor is that sheep are not being treated promptly. One hypothesis is that farmers and veterinarians do not recognise how painful it can be for affected sheep, and are not treating as rapidly as they would if they fully appreciated the suffering it can cause. Movie clips (20 seconds each) of four sheep that had varying levels of lameness were shown to farmers (n=46) and veterinarians (n=56) in order to investigate how they perceived lameness and its associated pain. Each participant completed a short questionnaire for every clip which asked them to rate, using a visual analogue scale (VAS) the level of: i) lameness ii) pain they felt the sheep was experiencing and iii) their own emotional response. Data were found to be non-normally distributed, so non-parametric statistical tests (Mann_Whitney, Spearman Rank-Order Correlation) were run using Minitab 16.1.1. Strong positive correlations were found between all variables for both farmers and veterinarians (Farmers: lameness and pain: r=0.937, p<0.001; lameness and emotion: r=0.837, p<0.001; pain and emotion: r=0.865 p<0.001. Vets: lameness and pain r=0.947, p<0.001; lameness and emotion r=0.873, p<0.001; pain and emotion r=0.906, p<0.001). Farmers and vets did not differ in how they scored the sound/mildly lame sheep (lameness: p=0.85, pain: p=0.89, emotion: p=0.72), however for the moderately/severely lame sheep vets scored significantly higher than farmers for all three variables (lameness: p=0.0095, pain: p=0.003, emotion: p<0.001). These results indicate that participants view lameness as a painful condition. However, vets' scores were significantly higher than farmers for the moderate/severely lame sheep, with higher scores by: 6.6% for lameness, 11% for pain and 17% for emotional response. This may have important implications for decision making surrounding treatment. Farmers’ threshold for treatment may be higher than vets, which could ultimately have consequences for the health and welfare of lame sheep.
Too much or not enough? The ethics of feeding and nutrition in companion and farm animals.

Facilitator: Laura Dixon, SRUC

This workshop will consider ethical issues around the feeding of animals, considering animals that we may over-feed or allow to over-eat (companion animals, some breeding livestock), and those that we may choose to deliberately underfeed as part of management (some breeding livestock). The workshop will consist of two invited presentations, considering under- and over-feeding respectively, followed by debate and discussion of the issues.

Hunger in farm animals

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Most adult captive animals need to have their energy intake rationed to avoid obesity, but this occurs to a greater extent in some farm animals. The generation of animals destined for slaughter (broiler chickens, finisher pigs) have been genetically selected for rapid growth and are generously fed to maximise growth during the juvenile phase before being slaughtered prior to adulthood. The parents of this slaughter generation (broiler breeder chickens, sows) share a good deal of their offspring’s genetic potential for rapid growth, so must be food restricted to avoid obesity and ensure good physical and reproductive health and function. This food restriction results in the welfare problem of hunger, especially evident in behaviour signs such as increased foraging and activity which can become stereotypic. Dawkins (2003) argued that good animal welfare means animals that are healthy and have what they want. In feeding parent animals, it seems we have to make a choice between these as both aren’t currently possible.

One solution might be changes to genetic breeding goals. In poultry, slower-growing or specialised breeds including dwarf breeds can be reared without feed restriction. Selection for juvenile rapid growth separately from adult growth potential might be another solution although the genetic correlation between these traits is large.

Another possible solution is to reduce energy density of the diet (qualitative restriction), for example by adding fibre. EU rules require that sows have access to fibre in their diet or environment (e.g. straw), and broiler breeder diets have been reduced in energy density. But if energy restriction is the same, is welfare improved? Or does ‘metabolic hunger’ remain? There are difficulties in interpreting many existing measures of hunger/satiety. We are developing and investigating new behavioural and physiological measures of hunger to shed new light on this difficult area.
Workshop 1

Obesity in pets

Claire Corridan,

Nathen Valley Veterinary Centre
Workshop 2

**PLANET: Using sensor technology to monitor animal behaviour**

**Facilitator:** DK Arvind, Centre for Speckled Computing, University of Edinburgh

There has been a substantial recent increase in technology, electronics and computing abilities that have led to a greater availability of sensors that are cheap enough to be used both in research on animals, and for on farm monitoring. This timely workshop will consider some of the recent developments and devices that are currently available, and how they might be applied in behavioural research and on farm welfare monitoring. The workshop consists of 5 presentations covering different types of sensors and exploring their potential use in monitoring animal behaviour.

**Tracking and monitoring animals in the wild.**

D K Arvind,  
*University of Edinburgh*

**Wireless sensor platforms for continuous monitoring of animal behaviour.**

Janek Mann,  
*University of Edinburgh*

**Analysis of animal behaviour from high resolution sensor data.**

Emilian Radoi,  
*University of Edinburgh*

**Automated and integrated sensing and monitoring of behaviour and physiology - an effective and holistic assessment of welfare of livestock?**

Malcolm Mitchell,  
*Sruc*

**Automatic recording of ruminant foraging: from research to farm**

Mark Rutter,  
*Harper Adams University*
The possibility that epigenetic abnormalities could be transmitted from cloned subjects to their offspring raises concerns about the welfare of the progeny of cloned farm animals. The aim of the present study was to assess whether there was a difference between progeny of a bull clone and offspring of the corresponding donor bull in a) the level of excitability to routine handling, measured by the behavioural response, and b) the general behaviour expression, as indicators of adaptive ability to farm environment.

Behaviour of progeny of a bull clone was compared to that of offspring from the donor bull. Fifteen Friesian female calves were used. Seven of them were progeny of a bull clone (CLp) and eight were offspring from its donor bull (DONp). During the collection of blood samples for hemocromocytometric analysis, behavioural response of calves to restraint was examined. Calves were individually restrained for blood sampling at 24–48 h, and at 1, 2, 3, 4, 8, 12, 16, 20, 24 weeks of age. Number of struggling movements and vocalizations occurring within the first 1 minute of blood sampling were recorded by direct observation. The calves were also monitored at 2nd, 3rd, 4th, and between 5th and 8th week of age for resting, lying, standing, nutritive and non-nutritive oral, sniffing, self-grooming behaviours and vocalization. Each calf was observed in a morning and an afternoon time band, each lasting three hours. No difference was found between CLp and DONp on the overall mean for struggling and vocalizations at restraint. The study of general behaviour failed to reveal difference between CLp and DONp for the average proportion of any of the considered traits.

Our results suggest that the adaptive ability of progeny of cloned bull to challenges and conditions imposed by a farm environment are comparable to what is normally observed in dairy calves reared under similar conditions.