

ORAL PAPER ABSTRACTS

Potential indicators for the on-farm assessment of young lamb welfare

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There are currently no welfare assessment methods for neonatal and young lambs that fulfil all the scientific criteria of validity, repeatability and feasibility. The objective of this study was to develop welfare indicators conforming to these criteria. Consultation of the literature and expert opinion identified potential lamb welfare indicators, including demeanour, body condition, lameness and eye condition. To examine inter-observer repeatability a group of observers (n=4), comprising veterinary surgeons (n = 2) and undergraduate veterinary science students (n=2), were trained in indicator assessment. During December 2008 to May 2009 multiple observers (range 2-4) assessed 966 neonatal and young lambs (approximately up to 6 weeks old) in seventeen flocks across North-West England and North Wales. One trained and experienced observer; the 'test standard observer', assessed all sample lambs. A median of 59 lambs (range 30-90) housed indoors in individual pens or groups, or managed outdoors were assessed per farm. Overall repeatability was analysed using Fleiss's kappa and agreement with the test standard observer was assessed using Cohen's kappa. Exploratory data analysis examined distributions of scoring differences. Analysis of all observer assessments provided a Fleiss's kappa of 0.55 for demeanour, percentage agreement 96.6 - 97.2% and Cohen's kappa ranged 0.44 - 0.55. Body condition produced Fleiss's kappa of 0.71, agreement 97.2 - 97.5%, and Cohen's kappa 0.44 - 0.76. Lameness elicited Fleiss's kappa 0.68; agreement 98.5 - 99% and Cohen's kappa from 0.70 - 0.81. Fleiss's kappa 0.72, 95.9 - 97.3% agreement and Cohen's kappa 0.66 - 0.84 were obtained for eye condition. All kappa's were significant at critical probability >0.001. The distribution of differences in scores revealed a very small number of disagreements. Preliminary results using trained observers indicate overall fair to good inter-observer repeatability for these potential lamb welfare indicators. However, these indicators may not all be suitable for the assessment of neonatal and young lambs in all management systems. Close observation is required for the assessment of body and eye condition, which can be difficult to observe in lambs managed in the outdoor environment.

How low can they go? The effects of height restriction on the behaviour of pet rabbits (*Oryctolagus cuniculus*)

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There are a wide variety of commercially available housing options for pet rabbits. However, there is growing concern that most rabbit enclosures restrict or prevent a number of behaviour patterns and thus may compromise rabbit welfare. To investigate this, 19 pet rabbits were housed in floor pens (3.35m²) with low ceilings (0.45m), high ceilings (0.75m) and no ceilings. The daily time budgets of the rabbits were determined by scan sampling behaviour every 30 minutes and all occurrences of hopping, rearing and sitting alert were determined for each 24 hour period. The first 2 hours of behaviour after moving into a new pen dimension were also continuously sampled to investigate any potential rebound effects. Finally, stills of various behaviour patterns in the different pens were extracted and the amount of space needed to perform these behaviours was measured. Mixed model analysis using rabbit as the repeated measure found that rabbits performed more rear alerts and sit alerts in pens with no ceiling or high ceilings compared with the low ceilings (e.g. rear alert: low ceiling = 104.08 ± 47.12, high ceiling = 166.42 ± 52.39, no ceiling = 243.08 ± 88.27, $F_{2, 14} = 26.30$, $P < 0.0001$). Medium sized rabbits exhibited a rebound effect in the amount of hops, rears, rear alerts and sit alerts when moving from a low ceiling pen to a high or no ceiling pen (e.g. rear alert: high to low ceiling pens = 6.71 ± 4.74, high to no ceiling = 6.71 ± 4.74, low to high ceiling = 16.6 ± 6.03, low to no ceiling = 23.57 ± 8.67, $F_{3, 20} = 4.64$, $P = 0.0056$). Sitting and lying behaviours required the most length and width, while vigilance behaviours required the most height (e.g. lying recumbent = 44.9 cm length x 19 cm width x 19.3cm height vs rear alert = 28.7 cm length x 16.8cm width x 52.6 cm height, $P < 0.05$ for all). The space required for Large and Giant sized rabbits to stretch and rear is more than is available in traditional rabbit hutches. Additionally, the ceiling height did influence the space used for different behaviour patterns, most notably, rear and rear alert were restricted by low ceiling pens (e.g. rear alert: low ceiling = 39.81 ± 1.06 cm height, high ceiling = 48.98 ± 1.05 cm height, no ceiling = 47.86 ± 1.04 cm height, $P < 0.05$ for all) Thus it appears that traditional pet rabbit housing would not provide enough space for rabbits to adequately perform a number of behaviour patterns and consequently may jeopardize rabbit welfare.

Pain assessment during calf castration and disbudding.

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In many parts of the world, routine farm operations are carried out with no pain relief. The aim of this study was to evaluate pain in calves, using behavioural and other measures, during castration and disbudding. The efficacy of different combinations of anaesthetic and analgesic was investigated. The welfare of matched sets of calves was compared by measuring: vigorous movement; attention to the injured area; vocalisation; depression and inactivity; changed responsiveness to stimuli; care in movement related to the affected area; gait change; abnormal posture; specific movements such as lifted fore-leg or head-shake; delay in showing normal behaviour; increase in cortisol or other hormones or proteins; subsequent growth rate; and subsequent disease incidence. Ten calves disbudded with caustic paste showed increases ($p < 0.05$ for all results quoted in abstract, Mann-Whitney U or Wilcoxon Tests in this study) in head-shake, ear flick, scratching or rubbing head, quick transition from standing to lying and inert lying after 0.25, 1 and 3 hours and increased plasma cortisol after 1 hour. Both anaesthetic and analgesic were needed to prevent the indicators of pain. After hot-iron disbudding of calves ($n=10$ for each group, Chi-squared test), disturbed behaviours and cortisol both indicated that the analgesic carprofen alone did not prevent pain during the first hour. The use of a regional nerve-block anaesthetic alone did not prevent pain indicators after 1.5 to 2 hours. After castration using a clamp, calves ($n=8-12$) showed the pain-related behaviours: gait change, reduced walking, raising hind leg, and licking scrotal area and also increased cortisol at 6, 24 and 48 hours (ANOVA). The use of epidural anaesthesia with one analgesic flunixin-meglubine reduced the occurrence of pain indicators up to 24 hours and with another analgesic carprofen reduced them up to 48 hours (Mann-Whitney U Test). The measures indicate that an anaesthetic plus a long-lasting analgesic such as carprofen are needed to prevent long-term pain in calves after castration or disbudding.

Investigating differences in fetal lamb behaviour using ultrasonography.

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The function of fetal behaviour may be to establish muscular competence and move the fetus into the characteristic birth posture. The aim of this study was to see if fetal lamb behaviour can be examined using transabdominal ultrasonography and investigate whether nutritional effects and breed differences in neonatal lamb behaviour are also seen in the fetus of 2 British sheep breeds, Suffolk (S) and Scottish Blackface (BF). Control single-bearing ewes (C: n=12, BF=6, S=6) were fed 100% requirements for maintenance and fetal growth throughout pregnancy while restricted ewes (R: n=12, BF=6, S=6) were fed 75% of requirements from days 1 to 90 of pregnancy and 100% thereafter. Ewes were scanned during 3 separate weeks, (approximately gestational days 56, 77 and 98) for an average of 48.7 minutes per week. Fetuses were assigned a behavioural state score every 5 minutes during scanning as follows, 1: Low activity: brief movements, mostly startles; 2: Active: frequent movements, stretches and movement of head and limbs; 3: Very active: Vigorous continual activity including trunk rotations. At d56 BF fetuses tended to be more active than S fetuses (*Fisher's Exact Test*, $p=0.08$) and at d77 BF fetuses were significantly more active than S fetuses, with more fetuses gaining scores of >1 ($p<0.05$). At days 56 and 98 R fetuses were significantly more active than C fetuses with more gaining scores of >1 ($p<0.05$). At d98 S fetuses changed between behavioural states significantly more often than BF fetuses (S median=2, BF median=1, $w = 189.0$, $p<0.05$). From these results it is clear that fetal behaviour can be investigated using ultrasonography and breed and nutritional influences, which affect neonatal lamb behaviour, also impact upon fetal lamb behaviour. Current research is investigating whether fetal behaviour is continuous with neonatal behaviour and assessing the implications for neonatal lamb survival.

Effect of indoor and outdoor farrowing and group composition on the initiation of piglet feeding behaviour immediately post-weaning

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The farrowing environment can have a large effect on the piglet and it has been suggested that outdoor-reared piglets are seen more frequently at the trough post-weaning than indoor-reared piglets. This experiment investigated whether outdoor-reared piglets initiate feeding faster and have improved performance post-weaning. The experiment also investigated whether mixing piglets at weaning from the environments influences feeding behaviour and performance. Forty-two indoor and forty-two outdoor-reared piglets were weaned at $7.3 \text{ kg} \pm 0.22$ and $7.5 \text{ kg} \pm 0.23$ (\pm sem) liveweight and 27.6 ± 0.21 and 28.0 ± 0.18 days of age respectively into 21 flat-deck pens (4 pigs/ pen). Piglets were allocated to one of two group composition treatments: mixed (combination of 2 x indoor with 2 x outdoor piglets) or same (either 4 indoor or 4 outdoor) balancing for liveweight and sex. Feeding behaviour was constantly recorded by Leeds University Feeding Behaviour System (LUFBS) while piglets were offered *ad-libitum* access to feed (16.45 MJ DE, 1.6 g lysine/kg) in four troughs per pen. Piglets were identified by LUFBS by means of transponder ear tags. Piglets were weighed at weaning and 8 days later. Data were analysed as a 2x2 factorial using the GLM procedures of Minitab 12.2 with piglet nested within pen and weaning weight as a covariate. Indoor piglets had a shorter latency to first meal compared to outdoor piglets ($p < 0.05$) although mixed piglets did not initiate feeding faster than either indoor or outdoor piglets. There was no interaction between environment and mixing treatment or any performance benefit between the pre and post-weaning treatments with an average piglet growth of 172 g/day. Surprisingly, indoor piglets ate sooner post-weaning disproving our original hypothesis. In addition, mixing indoor and outdoor piglets did not influence feeding behaviour or performance post-weaning which suggests there was no influence of learning behaviour between piglets.

Interactions between neonatal lamb vigour and faecal soiling at weaning in three breeds of sheep

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Faecal soiling has been shown to be one of the major factors predisposing sheep to cutaneous myiasis (commonly called ‘flystrike’). Soiled wool clusters together into ‘dags’ which is associated with longer wool fleeces. Early life experiences have been shown to affect future growth and immunity, with, for example, ewe nutrition affecting both foetal growth and subsequent lamb vigour after birth. The aim of this study was to investigate whether poor vigour at birth results in higher levels of faecal soiling at weaning. Data from 382 lambs were collected at birth (Neonatal scores: birth assistance score, lamb vigour score, sucking assistance score, along with sex, litter size and birthweight) and at weaning (approx 16 weeks of age; weight and dag score). Neonatal scores were analysed using Kruskal-Wallis non-parametric one-way-ANOVAs while birth weight was analysed using a one-way-ANOVA (Genstat). Dag scores and weaning weights were ranked and then analysed via Restricted Maximum Likelihood (REML) in Genstat, fitting lamb vigour (and for weaning weight, dag score) as a covariate and breed, sex and litter size as fixed effects; ewe was fitted as a random effect. Lambs with better vigour scores had less faecal soiling at weaning (mean rank: 0=124; 1=166.09; 2=169.89; 3=239.93; 4=266.68; $P<0.001$). Single lambs were less daggy than multiple litter lambs (mean dag rank: single=168.93; twin=200.3; triplet=193.14; quadruplet=252.25; $P<0.01$). Lambs with a higher dag score weighed less at weaning (mean weight (kg): 0=31.01; 1=30.16; 2=26.69; 3=28.03; 4=24.95; $P=0.005$). These results show that neonatal lamb vigour might have continuing effects throughout later life. This may be a result of high vigour lambs standing and sucking quicker, ensuing better bonding with the dam and a greater intake of colostrum, resulting in better immunity in later life.

The effect of breed on the development of maternal selectivity in sheep

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The onset of maternal behaviour in sheep is characterised by nurturing the young (licking, bleating, suckling) and the formation of an exclusive maternal attachment to the lamb. In this study we investigated whether known breed differences in the onset of maternal behaviour also affected the development of maternal selectivity in primiparous Blackface (BF) and Suffolk (S) ewes. Selectivity was assessed by sequentially presenting ewes with their own lamb or an alien lamb (of similar age and breed), randomising presentation order within breed. Maternal responses were scored for acceptance (allowing the lamb to suck), ambiguous or rejection; ewes were considered to be selective if they accepted their own lamb and rejected the alien. Maternal selectivity was assessed in 44 ewes (26 BF, 17 S) at 6 h after birth. Of BF ewes, 96.2% accepted their own lambs, compared to 72.2% of S ewes ($\chi^2=5.17$, $P=0.023$), and 61.5% rejected the alien lamb, compared to 22.2% of S ewes ($\chi^2=6.63$, $P=0.01$). Overall, BF ewes were significantly more likely to be selective for their own lambs at 6 h than S ewes (% selective: BF=61.5, S=5.6, $P<0.001$). To assess whether this represented a delay in the development of selectivity, we assessed maternal selectivity in a further 38 ewes (25 BF, 13 S) at 6 and 12 h after birth. As in study 1, at 6 h after birth BF ewes were more likely to be selective than S ewes ($P=0.01$), however this difference had disappeared 12 h after birth, due to an increase in the number of S ewes that were selective (% selective at 12 h: BF=64%, S=58%, NS). The data suggest that S ewes, which show a reduced amount of licking and grooming at birth, also show a delay in the development of selectivity for their own lamb, compared to BF ewes.

Validity of the open field and elevated-plus-maze as tests of fear/anxiety in pigs

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Our aim was to assess the validity of the open field (OF) and elevated-plus-maze (EPM) as tests of fear/anxiety in pigs. One method of investigating test validity is to artificially manipulate the emotional state of experimental subjects with a drug treatment prior to test exposure. Here, Azaperone (1mg/kg), which is marketed in pigs as an anti-stress treatment, was used to investigate anxiety-related pig behaviour in an OF (Saline (S) n=12; Azaperone (A) n=12) or EPM (Saline n=26; Azaperone n=26). Behaviour was observed for 10 minutes in the OF or 5 minutes in the EPM. ANOVA or REML were used for analyses, as appropriate. In both tests, Azaperone-treated pigs showed increased exploration (OF, seconds: S= 178 A= 314 P<0.001; EPM, seconds: S= 25.5 A= 43.5 P=0.031), increased activity (OF, squares entered: A= 113.3; S= 82.3; P<0.001; EPM, location changes: S= 7.9 A= 11.5 P=0.031), and a reduced frequency of vocalisation (OF: S= 57.8, A= 17.8; P<0.001; EPM: S= 70.6 A= 33.7 P=0.01). However, for the EPM, no evidence was found that the classical interpretation of open arm measures relating to anxiety and closed arm measures to activity applies in pigs. In fact, Azaperone-treated pigs entered more frequently (S= 2.5 A= 3.6 P=0.003) and tended to spend longer (seconds, S= 65.2 A= 110.2 P=0.056) in the closed arms than did saline-treated controls. These data tentatively suggest that time in the closed arms in Azaperone-treated pigs relates to reduced anxiety, which raises questions about the correct interpretation of pig EPM behaviour and the appropriateness of the EPM as a test of fear/anxiety in pigs. Overall, these findings suggest the OF may be a less ambiguous test of fear/anxiety in pigs than the EPM. The OF test may therefore provide information about the emotional state of pigs, which could prove valuable within welfare assessments.

POSTER ABSTRACTS

Long-lasting welfare issues following difficult calvings in dairy cattle are highlighted by saleable milk yields.

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Calving difficulty is a welfare problem for dairy cattle and leads to economic losses for producers as a result of subsequent poor health and performance. Studies have generally focussed on yields of animals with full lactations. However, the saleable milk yields (SMY) of the whole herd, regardless of each cow having achieved a full lactation, is more representative of the real losses that producers incur. Additionally, it is unclear how long milk production is altered after a difficult calving. The objective of the study was to investigate how various degrees of calving difficulty would alter the SMY in dairy cattle over different stages of their subsequent lactation. Records on 2430 lactations from 898 animals having calved on the SAC experimental farm between 1990 and 2000 were utilised. These included calving difficulty scores (N: no assistance; FN/FM: farm assistance without/with malpresentation; VN/VM: veterinarian assistance without/with malpresentation; VC: caesarean section) and individual daily SMY. Cumulative saleable milk yield (CSMY) was calculated at 30, 60, 90 and 300 days in milk (DIM) whether or not the animal was culled or died before each of these lactation stages. Lactation CSMY was obtained from the real lactation length achieved by the animal. CSMY were analysed with linear mixed models following a Restricted Maximum Likelihood (REML) procedure. Lower CSMY was found for cows needing farm or veterinarian assistance on the condition calves were not malpresented ($P < 0.05$). Losses occurred at 30 DIM (FN: -5.2%; VN: -8.8%) and persisted until the end of the lactation, where they appeared to be higher (FN: -8.1%; VN: -12.5%). Therefore, calving difficulty triggers long-term income losses for the dairy producer. This can result from both decreased production by the cow and higher milk wastage due to subsequent poorer health, thus highlighting long-lasting welfare issues for the animal.

Social Bonds in Dairy Cattle – Preliminary Observations

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Cattle are gregarious creatures, and when allowed, tend to form large cohesive social groups. The aim of this study was to investigate whether dairy cattle form social preferences when housed in large, dynamic social groups. Observations were carried out on dairy cattle housed in cubicles or out at grass at Moulton College, Northamptonshire. Ten sessions of scan sampling was carried out between June to September 2008 between 0900 and 1800 on each pre-selected individuals, with 15 minutes between each scan to ensure independence. Data was collected on the five nearest neighbours of each focal animal within a 5m radius when housed indoors on cubicles, and 10m radius when animals were out in the field. Cattle were classed as having a preferred partner if they were seen to spend 25% or more of their time near to a particular animal. A chi-squared analysis was used to investigate whether cattle had a preferred partner or not. When analysing all 40 focal animals there was no significant difference ($\chi^2=1.27$, d.f.=1, n=40, $P>0.05$) between the number of cattle that had a preferred partner and those that did not. Further investigation however, showed that there was a significant difference ($\chi^2=8.64$, d.f.=1, n=40, $P<0.005$) between heifers and cows with heifers (17 out of 20) more likely to have one or more preferred partners, than cows (8 out of 20). Repetition of the observations on a new group of heifers and cows was carried out between May to November 2008 on a total of 16 heifers and 25 cows. Although there was no significant difference between cows and heifers ($\chi^2=1.33$, d.f.=1, n=41, $P>0.05$) it is interesting to note that 50% of the heifers compared to only 32% of the cows, had at least one preferred partner. These preliminary results suggest that in some groups, heifers are more likely to have a preferred partner than cows. Further research is required to investigate why this may be and to establish the effects that this may have on the production and health parameters of cattle.

A study of pig behaviour associated with optimistic and pessimistic states as measured through cognitive bias tests using environment to manipulate affective state.

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The assessment of affective state in farm livestock, especially positive states, poses a significant challenge. In human psychology it is accepted that optimism and pessimism (affective/emotional states) can affect judgements (cognitive bias). This study involves groups of pigs in which the first successful cognitive bias study was previously reported, and reports other home pen and test behaviours associated with optimistic and pessimistic judgements. Two groups, each of five gilts, were housed in either enriched or barren environments. The nature of the environment was changed longitudinally according to a balanced cross over design, and individual tests of cognitive bias made before and after each change. The pigs' home pen behaviours were recorded, by scan sampling over 20 minute periods, on three occasions in each housing phase. In addition, individual tests of fearfulness to a novel object and human approach were carried out after adaptation to each change in housing condition. Mann-Whitney tests were used to compare cognitive bias of groups housed concurrently under different conditions, or consecutively in changed conditions, and to compare housing effects on behaviour in the approach tests. Chi-square tests compared the frequency of expression of specific categories of home pen behaviour. When housed in the enriched environment, pigs showed more optimistic cognitive bias ($P < 0.05$) and a higher frequency of playful behaviours in the home pen ($P < 0.001$). When housed in the barren environment, pigs showed more aggressive behaviours in the home pen ($P < 0.001$) and were slower to approach and touch the novel object ($P < 0.05$), suggesting greater fearfulness. It can be concluded that enriched environmental conditions were reflected in both increased expression of behaviours generally associated with positive affective states and a more optimistic cognitive bias.