

# Vacation Scholars Meeting Abstracts

*Wednesday 10<sup>th</sup> December 2008*

*Beswick Building Rm 017,  
Department of Biological Sciences,  
University of Chester, Chester CH1 4BJ*

*Science in the Service of Animal Welfare*

**UFAW**

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## UFAW Vacation Scholars meeting

<b>Date:</b>	<b>10<sup>th</sup> December 2008</b>
<b>Venue:</b>	<b>Beswick Building Rm 017, Department of Biological Science, University of Chester, Chester CH1 4BJ</b>
<b>Start:</b>	<b>10.00 am</b>
<b>Finish:</b>	<b>4.50 pm</b>

### Programme:

**10.00 Registration**      **Light refreshments** available to speakers/visitors

#### 1st Session:

**10.30 Dr Emma Creighton** Welcome to Chester on behalf of the Department of Biological Science

**10.50 Jennifer Jamieson**, University of Edinburgh, 'The impact of early life stress on responses to castration and tail-docking in young lambs'

**11.05 Mona Wendelin**, Estonian University of Life Sciences, 'The pain markers in horses recovering from laminitis'

**11.20 Georgina Limon Vega**, RVC, 'Evaluation of the welfare of llamas and sheep before and during slaughtering in a slaughterhouse in the community of Puxara, Bolivia.'

**11.35 Michael Petri**, Anglia Ruskin University, 'What is enriching about enrichment? Investigating properties of materials used in enrichment for pigs'

**11.50 Lorna Wilson**, University of Oxford, 'Statistical examination of latency to choose as a measure of laying hen welfare'

**12.05 Rowena Packer**, University of Bristol, 'Quantifying the benefits of ranging behaviour in individual laying hens'

**12.20 Lunch**

#### 2<sup>nd</sup> Session:

**1.40 Dr Johanneke van der Harst**, University of Utrecht, 'Pleasure and reward as the common currency of welfare: anticipatory behaviour and drug-discrimination as tools to assess welfare and elucidate subjective feelings in animals'

**2.10 Laura Pratola**, University of Glasgow, 'Detection of hearing impairment and assessment of cochlear status in the dog using transient evoked and distortion product otoacoustic emissions'

**2.25 Victoria Ratcliffe**, University of Nottingham, 'Mother-offspring vocal recognition in cattle'

**2.40 Janina Mukanowa**, Royal Holloway and Bedford New College, 'A pilot study to investigate the possibility of using the social amoeba *Dictyostelium discoideum* to identify emetic liability of new chemical entities'

**3.00 Coffee/Tea**

#### 3<sup>rd</sup> Session:

**3.40 Anjanette Harris**, University of Edinburgh, 'Environmental enrichment indirectly enhances cognitive performance in rats by reducing stress during testing'

**4.10 Ashleigh Brown**, University of Edinburgh, 'The effect of environmental enrichment in the form of a foodball foraging device on the expression of stereotypic behaviour in captive sloth bears (*Melursus ursinus*)'

**4.25 Jessica Hardiman**, University of Lincoln, 'Space requirements need to perform a specific behaviour in the domestic rabbit (*Oryctolagus cuniculus*)'

**4.50 End**

# **THE IMPACT OF EARLY LIFE STRESS ON RESPONSES TO CASTRATION AND TAIL-DOCKING IN YOUNG LAMBS**

**Jennifer Jamieson**  
University of Bristol

This study formed a sub-project of an existing multi-institutional 5 year research programme of work funded by the BBSRC (Advancing Animal Welfare Science: welfare assessment and early life programming). The objective of the sub-project was to evaluate the cumulative effects of early post-natal pain and non-pain stressors on immediate alterations in pain sensitivity of lambs using two analgesiometry techniques (mechanical pressure thresholds and touch-sensitivity).

Lambs were assigned treatment groups comprising of controls and different combinations of pain and non-pain procedures: pain groups were castrated and/or tail-docked (rubber ring, no analgesia); non-pain stressors were either an immune stressor (injection of lipopolysaccharide), or psychological stressor (transport/isolation). There was some evidence for a change in mechanical pressure thresholds in response to the pain and stress stimuli in the male lambs, with stressed lambs having lowered pain thresholds and castrated lambs having increased thresholds compared to controls. However no cumulative effects of early post-natal stress on subsequent pain thresholds were demonstrated. The female lambs showed an increase in touch-sensitivity threshold (using Von frey filaments) following injection with LPS, but no changes in mechanical thresholds.

The lack of evidence for a differential or cumulative effect of pain or non-pain stressors on immediate alterations in pain sensitivity of lambs may be a result of limitations of the study or a consequence of buffering effects from external factors, such as maternal care. Temporal factors may also have influenced the results and testing at subsequent later time points may yield different conclusions, with effects taking longer to become apparent.

# **THE PAIN MARKERS IN HORSES RECOVERING FROM LAMINITIS**

**Mona Wendelin**

Institute of Veterinary Medicine and Animal Sciences, Estonian University of Life Sciences

The assessment of pain experienced by horses is complex, often inaccurate, and varies widely among practitioners. During laminitis it is supposed that horses suffer severely from pain. It would be ideal if there were an accurate, reliable and sensitive method of assessing this pain as the condition progresses, and as treatment is applied, to improve the condition of the horse. This work considers various parameters and their suitability as markers to assess the pain experienced by horses undergoing treatment for laminitis. 14 horses were assessed during their treatment period. Heart rate, respiration rate and hoof temperature were all significantly correlated with the Obel grading score for lameness. Other parameters, including body temperature, digital pulse and behavioural attitude were not. The horses improved their lameness grade over the period of the trial. It is concluded that the use of the simple practical measures described may be usefully applied by owners and practitioners as markers to estimate the pain suffered by horses under their care.

# **EVALUATION OF THE WELFARE OF LLAMAS AND SHEEP BEFORE AND DURING SLAUGHTERING IN A SLAUGHTERHOUSE IN THE COMMUNITY OF PUXARA, BOLIVIA**

**Georgina Limon Vega**  
Royal Veterinary College

This report presents an evaluation of the welfare of llamas and sheep before and during slaughtering in the community of Puxara, Bolivia. The llama slaughterhouse was assessed during 4 visits. Slaughter by puntilla followed by neck sticking was examined in 20 llamas. Welfare indicators including attempt to stand, presence of normal rhythmic breathing, vocalization, presence of positive palpebral reflexes and eye rotation were recorded after stunning. Information with regard to the backyard slaughtering of sheep in the community was obtained by means of interviews. The observations revealed that waiting pens in the abattoir provide a good protection against adverse conditions and allow animals to lie down stand up and move around without restrictions. The data collection showed that all 20 llamas had breathing movement at the flank following puntilla and before sticking, and 95% had positive palpebral reflex at the same time. Interviews to local people revealed that sheep are not stunned before slaughtering. These findings showed that it is difficult in practice to penetrate the spinal cord with a single puntilla stab. Also, the importance of animal welfare needs to be explained to local people and authorities and, taking into account local needs and limitations, training need to be provided to slaughter men and local people in order to improve their skills when slaughtering.

## **WHAT IS ENRICHING ABOUT ENRICHMENT? INVESTIGATING PROPERTIES OF MATERIALS USED IN ENRICHMENT FOR PIGS.**

**Michael Petri**

Anglia Ruskin University

Eight groups of intensively housed pigs were provided with five different point-source enrichment items which, uniquely in the published literature, differed by only a single characteristic (one being the 'ancestral' type from which single changes were made to produce four other types of enrichment). Behaviour patterns exhibited towards the enrichment items were analysed using cladistic methods (a relatively novel procedure in the animal welfare literature) and more conventional non-parametric methods.

Cladistic analysis showed that one enrichment item, differing from the ancestral item through the addition of a 50cm length of jute rope, was distinct from the others in the suite of behaviours it elicited which were rare or non-existent towards the other enrichment items.

The behaviours particularly or solely directed towards the rope enrichment toy included behaviours reminiscent to bar biting behaviour, a key animal welfare and production problem in large pig units.

# **STATISTICAL EXAMINATION OF LATENCY TO CHOOSE AS A MEASURE OF LAYING HEN WELFARE**

**Lorna Wilson**  
University of Oxford

Many new physiological and behavioural indicators are being considered as potential welfare measures. Animal welfare science has also seen the development of sophisticated data capture techniques. Unfortunately the resulting large datasets have not made animal welfare assessment any easier, meaning statistics must play a crucial part in avoiding information overload. This project used state-of-the art multilevel statistical modeling to analyse an existing dataset of laying hens' environmental choices. The latency to choose between three different environments in sets of pair-wise comparisons was considered. Latency to choose was shown to vary greatly between individual hens and, by examining how latency related to a wealth of other information available, some of this variance was explained. It was shown that the pair of environments between which the hen must choose and the environment in which she had been housed most recently both affected her latency to choose. After accounting for this effect, and for the stage of the experiment in which the test was carried out, other behavioural, physical and physiological indicators were considered. It was found that hens with bad posture had longer latencies than those with good posture. Those hens that did not interact with a novel object in separate tests were significantly slower in the preference test. Chickens that spent more time stretching their wings and wagging their tails in the home pens had shorter latencies. This project provides some evidence that chickens displaying 'comfort' behaviours have shorter latencies to choose whilst those showing behaviours possibly associated with nervousness have longer latencies. This suggests that latency to choose could itself have some role as a welfare indicator. Its use in on-farm assesment would not be practical, but as part of future experimental studies it could prove a valuable measure.

# **QUANTIFYING THE BENEFITS OF RANGING BEHAVIOUR IN INDIVIDUAL LAYING HENS**

**Rowena Packer**

University of Bristol

The welfare of laying hens and the conditions under which they are housed is a major animal welfare issue for the consumer, the egg production industry, legislators and animal welfare organizations. The willingness of some consumers to pay a premium price for eggs from non-cage systems, has led to an estimated 9 million hens being kept in the UK in free-range systems. With the ban on non-enriched battery cages in 2012 under EC directive 99/74/EG; barn and free-range systems are likely to become increasingly prominent forms of egg production in the UK. However, studies of free-range flocks show that generally over 80% of so-called free-range hens never leave the hen house, including in this study where the mean percentage of the flock ranging was just 21.56%. These birds are therefore not gaining the benefits of free-range systems. This study aimed to quantify the benefits of ranging behaviour by investigating differences between ranging and non-ranging hens, and also implications for the welfare of the whole flock. The results showed physical and behavioural differences between hens that do and do not range. Higher levels of several behaviours were seen on the range, with some exclusive to it, indicating range use may reduce frustration by facilitating these. Physical differences were seen between the posture, alertness and comb characteristics (size, floppiness and colour) of ranging and non-ranging hens. Flocks with a higher percentage of hens ranging were also seen to settle faster in the evenings, which may reduce the risk of injury from flapping and crashing into furniture when the house is at maximum stocking density. Indirect benefits of ranging may be conferred to non-ranging hens due to lower stocking densities in the house, which could increase mobility and activity. This could promote bone strength and subsequently delay or prevent the onset of osteoporosis.

**PLEASURE AND REWARD AS THE COMMON CURRENCY OF WELFARE:  
ANTICIPATORY BEHAVIOUR AND DRUG-DISCRIMINATION AS TOOLS TO  
ASSESS WELFARE AND ELUCIDATE SUBJECTIVE FEELINGS IN ANIMALS**

**Johanneke van der Harst**  
Utrecht University

This project is divided in two parts: the first, and largest, part concerns the validation of a tool to assess animal welfare which is based on the concept that welfare is determined by the balance between positive and negative experiences. In other words, rewards can be regarded as a common currency of welfare: as long as there is enough money (positive experiences / rewards) to pay the bills (negative experiences), welfare is guaranteed. This concept implies that an interaction exists between stress systems and reward systems in the brain and, as a consequence, that negative experiences induce an increased sensitivity (need) for positive experiences (i.e. rewards) as a compensatory mechanism. Therefore, reward-sensitivity is proposed as a welfare-indicator, since the need for rewards may be indicative for the previous (stressful) experiences of the animal, and thus, for the state of welfare. Several experiments were conducted to establish the relationship between reward-sensitivity, reflected by anticipatory behaviour in expectation of a reward, and the history of animals. This was accomplished by the analysis of anticipatory behaviour in rats with differential previous experiences, induced by different housing conditions. Also strain and gender were included as factors to verify that the outcome can be generalised and is not specific for the animal model that is chosen.

The second part of the project was dedicated to the elucidation of subjective experiences in animals. This was approached by an experimental paradigm that is a combination of standard protocols for place-preference and drug-discrimination studies. These paradigms are both based on the importance of rewards as a tool to 'ask' an animal 'questions' and deduced the 'answer' from its behavioural response. In the eighties, drug-discrimination studies showed that rats can learn to associate their own internal state with a certain choice they have to make, or a certain behaviour they have to perform to receive a food-reward: rats pressed the left or right lever in a Skinner-box to indicate which drug (resulting in a positive, neutral or negative internal state) they had received. The fact that rats can do so, indicates that they are able to recognize their own internal state. In this project, this paradigm is combined with a place-preference setup (the animals had to choose between two different *places* (left or right) to go to) to be able to use it under different conditions and eventually with different animal species. The future goal of this setup is to be able 'ask' an animal how it 'feels' or how it perceives certain events by observing its choice/behaviour after a certain event (such as laboratory procedures (eg. (repeated) handling or injections) or standard husbandry-procedures (eg. re-location, transport)).

The current presentation provides an overview of the results of the above-described project.

**DETECTION OF HEARING IMPAIRMENT AND ASSESSMENT OF COCHLEAR STATUS  
IN THE DOG USING TRANSIENT EVOKED AND DISTORTION PRODUCT  
OTOACOUSTIC EMISSIONS**

**Laura Pratola**

University of Glasgow

Peripheral deafness in dogs can be subdivided into three categories. Namely either inherited or acquired; congenital or late onset; and sensorineural or conductive. Peripheral deafness stems from cochlear malfunction, and until recently there has not been a specific test modality in dogs. Brainstem Auditory Evoked Response (BAER) testing measures cochlear as well as brainstem response to a sound stimulus via needle electrodes placed subcutaneously. The cochlea emits specific sounds named otoacoustic emissions (OAE's) which have been measured in human medicine with an ear probe and computer system, this is a measure of peripheral hearing and cochlear function. There are two types of OAE's produced by the cochlea, there is a transient evoked distortion product (TE-OAE), which is a measure of cochlear sound produced in response to a single frequency click stimulus and a distortion product OAE (DP-OAE) which can be measured in response to a two tone stimulus a set frequency apart. In this study, 10 dogs were hearing tested with DP-OAE and TE-OAE, and then compared to the gold standard BAER test results under general anesthetic. As well, a further 20 normal hearing dogs were tested with TE-OAE and DP-OAE, under general anesthetic. The results illustrated that both TE-OAE's and DP-OAE's can be measured in dogs. Also, deaf dogs as determined by the BAER test were also proven to be deaf with an OAE test. As well, all dogs that were proven to be of normal hearing by the BAER test were also proven to be normal hearing with the OAE test. And testing the further 20 dogs with an OAE allowed a standard trace for cochlear hearing to be determined. Therefore, it was shown in this study that OAE can be a reliable non-invasive modality for testing deafness in dogs.

**MOTHER-OFFSPRING VOCAL RECOGNITION IN CATTLE  
(*BOS TAURUS*).**

**Victoria Ratcliffe**  
University of Nottingham

There is little information available on mother-offspring vocal communication in cattle, or the structure of their calls. These are very important for an understanding of their behaviours and indeed have important implications for their welfare. Therefore we studied vocal communication and behaviour of cows (*Bos taurus*) and their offspring. The activity budget of adults and juveniles was measured, along with the social and nursing behaviour in adult females. Recordings of vocalisations were also carried out. The beef herd of mixed breeds consisted of 33 adult cows, 1 bull and 28 calves (15 males, 13 females). A total of 682 cow calls and 862 calf calls were recorded. The highest numbers of calls were produced when the cattle moved between fields. A total of 118 calls were analysed, giving average fundamental frequencies of 224.56Hz and 242.73Hz for cows and calves, respectively. The results of our study are now being used for a longer research project. This will allow us to examine individuality in the calls of both cows and calves, and also determine how recognition is achieved.

# **A PILOT STUDY TO INVESTIGATE THE POSSIBILITY OF USING THE SOCIAL AMOEBA DICTYOSTELIUM DISCOIDEUM TO IDENTIFY EMETIC LIABILITY OF NEW CHEMICAL ENTITIES**

**Janina Mukanowa**

Royal Holloway University of London

Dictyostelium discoideum is a widely accepted model organism for biomedical research in cell and developmental biology. The use of this organism has helped to elucidate the mechanism of action of several drugs, including bipolar disorder drugs lithium and valproic acid. This study aimed to investigate whether the amoeba can be used in emetic research. Chemotaxing *D. discoideum* cells were subjected to a range of compounds with known emetic effects and the cell behaviour was video recorded and then analysed using image analysis software. Four chemicals tested had a significant effect on *D. discoideum* behaviour: copper sulphate, copper chloride, denatonium benzoate and phenylthiourea. These results indicate that *D. discoideum* is sensitive to these drugs and can be used as a new experimental animal model for the study of these and other structurally related chemicals.

# **ENVIRONMENTAL ENRICHMENT INDIRECTLY ENHANCES COGNITIVE PERFORMANCE IN RATS BY REDUCING STRESS DURING TESTING**

**Anjanette Harris**

University of Edinburgh

Rats housed with 'environmental enrichment' do better in tests of spatial cognition than do rats housed in barren cages. The leading hypothesis is that exposure to 'social and inanimate complexity' leads to better cognitive processing abilities, which directly enhances performance in a spatial task. However, enrichment is associated with reduced stress responses in novel or acutely stressful situations (cognitive tasks are typically both). Therefore, a plausible alternate hypothesis is that experience of enrichment indirectly enhances performance by reducing a rat's stress response during cognitive testing. We found that, irrespective of sex, enriched rats outperformed barren-housed rats in the Morris Water Maze. However, after accounting for the effects of thigmotaxis (a behavioural stress measure), there was no significant difference in performance between enriched and barren housed rats. Enriched rats were simply less thigmotactic and this indirectly improved their performance. This was true for both males and females. We conclude that enrichment reduces stress outside the home cage, in a testing situation, and subsequently, the cognitive benefits of enrichment occur because enriched animals are less stressed.

# **THE EFFECT OF ENVIRONMENTAL ENRICHMENT IN THE FORM OF A FOOTBALL FORAGING DEVICE ON EXPRESSION OF STEREOTYPY IN CAPTIVE SLOTH BEARS (*MELURSUS URSINUS*)**

**Ashleigh Brown**

Royal (Dick) School of Veterinary Studies, University of Edinburgh

Captive Ursidae species demonstrate a high prevalence of stereotypies, and one potential causative factor may be prohibition of highly motivated elements of the natural behavioural repertoire, such as foraging, due to the constraints of captivity. The objectives of this research were to assess the suitability of a football foraging device as a form of environmental enrichment for captive sloth bears (*Melursus ursinus*), and determine the effect of the device on expression of stereotypy and the general behavioural time budget. The device utilized was the Likit™ Snak-a-ball™ which dispensed small quantities of foodstuff from an internal chamber in response to manipulation by the subjects. Twelve captive sloth bears were sequentially exposed to the following four experimental phases: Phase 1 = Baseline: no enrichment; Phase 2 = Enrichment: football containing foodstuff (500 g dry chickpeas); Phase 3 = Extinction A: football without foodstuff; Phase 4 = Extinction B: foodstuff (500 g dry chickpeas) without football.

The results shows a significant difference between the phases for recorded observations of stereotypy, with lowest stereotypy occurring during Phase 2 and highest during Phase 1. Significant differences between the phases were also detected for interaction with the enrichment substrate, which was highest during Phase 2; inactivity, which was lowest during Phase 2; and non-aggressive social interaction, which was also lowest during Phase 2. This foraging device appears to be an appropriate form of enrichment for captive sloth bears, as it stimulated device-directed foraging-type behaviours and reduced expression of stereotypy and inactivity.

## **SPACE REQUIREMENTS NEED TO PERFORM A SPECIFIC BEHAVIOUR IN THE DOMESTIC RABBIT (*ORYCTOLAGUS CUNICULUS*)**

**Jessica Hardiman**  
University of Lincoln

The rabbit is the third most popular mammalian pet in the UK, yet little research has focused upon the companion rabbits requirements. Some behaviour that rabbits display require unlimited space for expression and many hutches that are available on the market do not appear to have the space required for these activities. Twelve rabbits of different ages, gender and size were placed into three pen dimensions representing the space provided by the average hutch as found by Mullan and Main, 2006 (0.6728 m<sup>2</sup>), recommendations by the RSPCA, 2007 (1.62 m<sup>2</sup>) and double these recommendations (3.3 m<sup>2</sup>).

Time budgets, vertical and horizontal measurements included active (locomotor, maintenance and environmental interactions), inactive (lying and sitting) and consumption behaviour were analysed using a General Linear ANOVA model. Time budget and space occupied in performance of activities were affected by the pen dimension. The area that a traditional hutch provides reduces activity ( $F_{11,1} P<0.018$ ) and increases inactivity ( $F_{11,1} P<0.000$ ) and the space occupied when adopting lying, sitting and rearing postures.

Lying behaviour and stretching were particularly affected by pen dimension, both by frequency and the space occupied, with the largest areas being occupied in the large pen. The vertical measurement of rearing behaviour ranging exceeded the heights of traditional hutches (60 cm), laboratory and farm cages (45 cm) suggesting that these may not be adequate. The results also suggest that the pen dimension of the small pen or a traditional hutch are likely to inhibit expression of some normal activities, so traditional hutch dimensions may not be suitable to house rabbits.