Future solutions to animal behaviour and welfare problems

ISAE REGIONAL MEETING

ABSTRACT BOOKLET

31st October 2013

Mc Meekan Centre

AgResearch, Hamilton, New Zealand

10 Bisley Road, Ruakura, Hamilton
Thank you!

Many thanks to Mhairi Sutherland, Mairi Stewart and Fiona Graham from AgResearch for volunteering to host this meeting and their help organising the day.

Thanks to Amanda Doughty, Cheryl O’Conner, Jean-Loup Rault, Kate Littin, Mairi Stewart, Mark Farnworth, Mhairi Sutherland and Raf Friere for their efforts reviewing abstracts.

Thanks to Caroline Lee, Mairi Stewart and Mhairi Sutherland for chairing sessions during the meeting.

Finally, thanks to the presenters for submissions.
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in dogs and humans.

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Mirjam Guesgen – Social context and previous experience influence the behavioural expression of pain in lambs

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**14:15**  
Else Verbeek – Adrenocorticotropic hormone injection generates an optimistic judgement bias in sheep

**14:30**  
Sally Haynes – Positive human contact and fear responses of shelter dogs to humans

**14:45**  
Clare Brown – How delayed reinforcement affects learning in dogs

**15:00**  
Karen Mancera – Effects of mining noise amplitude on the behaviour and welfare of wild mice (*Mus musculus*)

**15:15**  
Mark Farnworth – Keep it or kill it? How the behaviour of domestic cats (*Felis catus*) impacts upon perceptions of their value and management methods

**15:30**  
Anoma Arachchige – Factors influencing cow competition for mixed rations fed on a feed-pad between bouts of grazing

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DRINKS  
Ruatora campus social club
Much of our understanding of the neural basis of learning and memory is based on studies conducted with rats and monkeys, and very little is based on studies conducted with pigeons. This is somewhat surprising given that much of what we know about animal learning and memory comes from studies using pigeons. The reluctance to use pigeons in neural studies of learning and memory probably stems from the fact that a) the avian brain is seen as radically different from the mammalian brain and as such can contribute little to its understanding, and b) that the behaviour of pigeons is not viewed as sophisticated as that of mammals, and certainly primates. Studies over the past few decades detailing the remarkable cognitive abilities of pigeons, as well as a newly revised nomenclature for the avian brain, is starting to change these views. In this talk I will review our behavioural studies on pigeons’ cognitive abilities and our neural studies on the functions of their ‘prefrontal cortex’ and show that they provide information not only on the workings of the avian brain, but also shed light on the operation of the mammalian brain.

Mike received his undergraduate degree in Molecular Biology and Psychology from the University of Colorado and his PhD from Rutgers University with a research emphasis on comparative animal cognition and neuroscience. Following his PhD, he was awarded an NIH Postdoctoral Fellowship to study the neural mechanisms of visual processing and memory in monkeys at Princeton University. He joined the University of Otago in 1992. He conducts lesion work examining the role of the hippocampus in learning and memory, single-unit electrophysiology work examining the neural basis of learning, memory, gambling, and reward mechanisms, as well as studies of animal cognition, all in the avian brain.
Play behaviour as an indicator of animal welfare in dairy calves

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Play behaviour in young animals has been suggested as an indicator of “good welfare” and positive emotions. Animals play more if all basic biological needs are met and it has been shown that play behaviour is often reduced when animals are exposed to negative situations, such as feed shortage, disease, pain or thermal stress. In this review we will discuss the use of play behaviour to assess the effect of painful husbandry procedures (disbudding) and management practices (rearing substrate and space allowance) on the welfare of dairy calves. The most important findings showed that disbudding reduced play behaviour in calves and this response was reversed by giving calves pain relief (local anaesthetic + non-steroidal anti-inflammatory drug) prior to disbudding. Calves reared on river stones played less than calves reared on sawdust in the home pen, but conversely played more in an arena test than calves reared on sawdust. In addition, calves reared at a space allowance of 1.0 m²/calf were less active in the home pen than calves reared at larger space allowances (1.5 and 2.0 m²/calf), but played more in arena test than calves reared at larger space allowances. These latter findings indicate that rearing calves on river stones or at small space allowances suppress locomotor behaviour in the home pen and that a rebound effect can be observed when calves are moved to a novel environment that facilitates play. These results provide evidence that the performance of play behaviour can be used to assess animal welfare in dairy calves; for example reduced play may indicate unfavourable conditions, but increased play in an arena test may indicate increased motivation to play due to suppression of play behaviour in the home pen.

Gemma Worth is a research technician at AgResearch. Gemma is completing a MSc at the University of Waikato, on the preference and welfare of dairy calves reared on alternative bedding substrates under Professor Mary Foster.
Recent changes in climatic conditions and a growth in national demand for a consistent year round supply of Australian lamb have led to producers considering finishing lambs in feedlots. While most lambs acclimatise to this environment, an estimated 5-20% do not adapt. Differences in temperament may help explain the individual differences in the lamb’s ability to adapt to a feedlot environment. This study examined relationships between temperament, feeding behaviour and stress in lambs held in feedlots. There were 480 lambs (180 focal lambs) studied within four adjacent 40-lamb feedlot pens in 3 time replicates over 16 months. This study focused on the behaviour and physiology of lambs in the first 2 weeks in the feedlot. Prior to entering the feedlot, lambs were subjected to a temperament test (Isolation Box Test). Weekly weights, displacements at the feeder in week 1 (where a lamb exits the feeder within 5 s of another lamb entering the feeder), and neutrophil:lymphocyte ratios (N:L) in week 2 were recorded. A parsimonious general linear model was developed, using F tests, to relate √N:L to all other measurements. Relationships were found between √N:L, entry weight, jumps during the temperament test and times displaced at the feeder. After adjusting for the other variables within the model, N:L was higher if the lamb’s activity in the temperament test was high (P= 0.021), and also if the lamb was more frequently displaced from the feeder (P=0.0045). Higher N:L was also associated with lower entry weights (P=0.023). Stressors can be deleterious to immune function and thus N:L could be used as an indicator of stress and therefore adaptation to the feedlot. These results suggest that the ability of a lamb to successfully adapt to a feedlot (based on N:L) is associated with individual properties of weight, temperament and competition at the feeder.
The domestic ferret (*Mustela putorius furo*) is becoming an increasingly popular companion animal in Australia and overseas yet very little is currently known about the effects of different management factors (such as housing and provision of enrichment) on domestic ferret behaviour and welfare. Hence, the aims of this study were to investigate the housing and management factors of keeping ferrets which are associated with positive and undesirable behaviours. An online survey was constructed which focused on different management factors utilised by ferret owners and required owners to score (on a scale of 0-4) the frequency of behaviours observed. Positive behaviours measured included two types of play behaviour (dooking and weasel war dance) whilst undesirable behaviours surveyed included two types of biting behaviour (bite-drag and bite-hurt), compulsive scratching, and repetitive behaviour. Ferret owners were also able to report what management aspects they believed particular ferret behaviours were associated with. There were 466 ferret owners who participated in this survey study. Male ferrets showed more play behaviour (weasel war dance) than females ($P = 0.04$) and de-sexing reduced the incidence of repetitive behaviour ($P = 0.01$). The number of enrichment items was shown to increase the incidence of dooking ($P = 0.01$) and weasel war dance ($P < 0.01$). There was also a significant interaction between number of hours ferrets spent confined and number of enrichment items ($P = 0.03$) on the incidence of bite-hurt (an undesirable behaviour) suggesting that higher levels of enrichment in conjunction with less hours spent confined results in less bite-hurt behaviour. Surprisingly, size of enclosure had no significant effect on any behaviour ($P > 0.1$). We conclude that within the ferret population surveyed, owners reported that welfare is generally good. However, factors such as the level of enrichment provided, amount of time ferrets are confined and de-sexing should be carefully considered when implementing management plans for domestic ferrets in order to promote good welfare.

Sarah is completing a PhD at the Charles Sturt University, on the behaviour and welfare of the domestic ferret (*Mustela putorius furo*) under Dr Rafael Freire and Dr Skye Wassens. Her Hons degree from CSU focussed on the effects of management factors used by ferret owners, on the behaviour and welfare of the domestic ferret.
Can models be ecologically significant in canine training?

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Models are commonly used when training and assessing animals, for example in canine temperament testing, in predator awareness training and for prey aversion training; yet there has been no systematic evaluation about their effectiveness. The New Zealand Department of Conservation runs a kiwi aversion canine training programme which uses models rather than using live kiwi. This research investigates whether models mimic the real thing using the same standardised canine aversion training protocol and then presenting the dogs with a live bird. Chickens were used rather than kiwi due to their widespread availability. Eight-four dogs were trained to avoid a chicken model and then presented with a live chicken one month later at a novel location with novel dog handlers. There were five chicken models used and seven treatment groups: (1) dead chicken; (2) stuffed chicken; (3) chicken faecal material; (4) chicken nesting material; (5) wooden cut-out chicken; (6) all chicken models together; (7) a live chicken. The dogs were randomly allocated to the treatment groups. These models were selected for investigation because they are the training stimuli used by the kiwi aversion training programme, but with kiwi equivalents (Groups 1-6 only). Behaviours towards the live chicken were quantified, as was the time and distance taken to detect the chicken when it was presented. The model used for training significantly affected the behavioural responses of the dogs to the chicken ($H(6)=20.868$, $p=.001$). The use of the live chicken in the initial training ($n=10$) consistently resulted in the highest levels of aversion being displayed when presented with a novel live chicken, one month later, in a novel site and with novel handlers (90%). Use of the live chicken also resulted in the shortest time to detection of the chicken and from the furthest distance. Dogs initially trained using all the models (1-5) together resulted in the next highest level of aversion observed when presented with a live chicken (67%; $n=12$), followed by the dead chicken model (62%; $n=13$). The remaining four models resulted in lower levels of aversion behaviours being displayed when presented with a live chicken (‘chicken faecal material’ was 33%, $n=13$; ‘stuffed chicken’ was 25%, $n=12$; ‘cut-out bird’ was 25%, $n=12$; and ‘nesting material’ resulted in 25%, $n=12$). The results suggest that most of the test dogs did not generalise from the chicken model to the live chicken. It is recommended that the use of models in animal training is questionable, and needs further study.

Arnja is a Senior Lecturer in Animal Welfare and the Animal Welfare Investigations Curriculum Leader. Arnja is completing her PhD at the School of Psychology at the University of Auckland on the use of electric collars in dogs. She has an MSc in Conservation Ecology from Massey University & an MSc in Applied Animal Behaviour and Welfare Science from the University of Edinburgh.
The development of practical measures to benchmark pig welfare in the Australian Pork Industry

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The Australian Pork Industry Quality Assurance Program allows producers to be annually audited against a set of standards and performance indicators, but does not provide the opportunity to monitor the welfare status of pigs over time and/or benchmark the welfare status of animals between farms. This project aimed to identify and examine the suitability of a range of valid, reliable, and feasible animal-based welfare indices for inclusion in a practical on-farm pig welfare benchmarking tool to be applied by Australian producers for self-auditing purposes. An extensive review of the relevant literature identified key animal-based welfare indices. The practicality of these indices for on-farm assessment was examined at a range of production systems representative of the Australian Pork Industry. The validated animal-based welfare indices recommended for inclusion in an on-farm pig welfare benchmarking tool are body condition score (sows and growing/finishing pigs), body lesion score (sows and growing/finishing pigs), vulva lesion score (sows), tail lesion score (growing/finishing pigs), bursitis (sows and growing/finishing pigs), lameness score (sows and growing/finishing pigs), coughing (sows and growing/finishing pigs), sneezing (sows and growing/finishing pigs), stereotypic behaviour (sows), and morbidity (sows and growing/finishing pigs). Methodology modifications necessary for on-farm assessment in Australian conditions are recommended for a more simplified scoring of body condition, body lesions, and lameness. The validity and reliability of the recommended welfare indices and on-farm methodology modifications now need to be evaluated, in order to fully develop an effective on-farm pig welfare benchmarking tool suitable for the Australian Pork Industry. An on-farm pig welfare benchmarking tool, which provides a simple, validated set of pig welfare indicators, would enable producers and the industry to monitor pig welfare over time, to demonstrate improvement in animal welfare outcomes over time, to identify areas of improvement for pig welfare, and to compare pig welfare across units in multisite enterprises.

Dr. Lauren Hemsworth is a post-doctorate fellow at the AWSC at The University of Melbourne, studying animal behaviour and welfare, with an emphasis on the validation of behavioural and welfare indicators.
How companion animal behaviour is impacted upon by living with domestic violence

Catherine Tiplady\(^1\)*, Deborah Walsh\(^2\) and Clive Phillips\(^1\)

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Domestic violence is an international problem which can affect both heterosexual and same sex couples from all socioeconomic groups. Companion animals are often the additional victims in violent households and can suffer physical and emotional trauma as a result. To investigate how animal behaviour can be impacted upon by domestic violence, women (n=13) who had survived a violent relationship whilst living with animals (range n=36, 22 dogs, 10 cats, 4 birds) were invited to be interviewed over the telephone about incidents of animal abuse or neglect, changes in their animal’s behaviour and involvement with veterinarians. Eligible women self-selected after being informed about the study by staff at a 24 hour domestic violence crisis and accommodation service in Queensland, Australia (DVConnect). Responses were analysed for themes and results presented as a qualitative study. Although animal abuse, neglect and behavioural changes were described by women, many clearly stated that they did not see veterinarians as a professional group they would feel comfortable talking to. Commonly reported behavioural changes in dogs and cats included fearfulness (particularly of the male partner, men in general, strangers), aggression (particularly towards the male partner) and seeking closer proximity to the woman. Follow up interviews with five of these women were conducted six months after they and their animals had safely relocated. Most of these women (n=4) reported that the animal behaviours noted had largely been resolved and would only reoccur when in the presence of stressors, such as males and raised voices. In one case, the dog’s aggression persisted and after behavioural rehabilitation the owner elected to rehome the dog. Understanding the issues faced by people and animals during and after a violent relationship is vital in order for veterinarians to be able to provide informed and compassionate support to owners and their animals.

\textit{Catherine is completing her PhD at the University of Queensland, on the topic of companion animal welfare in domestic violence situations and how veterinarians can assist in these cases.}
The effects of socio-behavioural contexts on oxytocin in the cerebrospinal fluid of pigs

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Social behaviour is a major determinant of welfare for social animals. Yet, it remains challenging to assess: social interactions can be subtle (e.g. eye gaze) and are intrinsically subjective experiences. Oxytocin (OT), a mammalian hormone, has been shown to be implicated in various social behaviours such as pair-bonding, attachment and social recognition. However, the relationship between social behaviour and OT in the brain remains poorly understood due to technical difficulties. This preliminary study investigated the effects of various behavioural contexts on OT concentrations in the cerebrospinal fluid (CSF) of pigs. Four pigs underwent surgery under anaesthesia to implant a catheter in the lower lumbar region. This spinal catheter allowed for repeated collection of CSF samples, a valid method to assess neuropeptides at brain level. After a 2 day recovery period, the pigs were subjected to different behavioural tests every other day: circadian rhythm (sampling CSF every 3 h for 24 h), social union-separation-reunion test with 2 conspecifics, familiar human positive contact, unfamiliar human negative contact, and intranasal administration of 24 IU of OT. Behavioural activity, social behaviour and CSF OT concentrations were analysed for each test. Samples were obtained from only 2 pigs because of catheter failure. The circadian rhythm showed a slight increase of CSF OT throughout the day. Oxytocin seemed to increase during social union and reunion but showed a complex pattern during separation. Oxytocin also seemed to fluctuate over time as a result of positive, but not negative, human contacts. Intranasal OT administration resulted in a 2 to 60 fold increase in CSF OT 60 to 120 min later. This project showed that spinal catheters are a feasible approach to assess OT at brain level in pigs through a minimally-invasive procedure, although the procedure needs improvement. Further replication on a larger sample size should allow to validate the relationship between OT and specific behavioural contexts.

Jean-Loup Rault is a Research Fellow at the Animal Welfare Science Centre, specialising in pig and poultry welfare. His main research interest focuses on the potential for social behaviour to enhance the stress-coping abilities of social animals, with an emphasis on social support and the hormone oxytocin.
Considering the effects of restriction for one commodity on behaviour for another with hens

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In preference or demand studies access to food, water and other commodities is frequently restricted (in order to motivate stable responding for a related reinforcer). Two studies have been carried out, in the first study the amount of water 11 hens consumed daily was measured for 55 days, body weight was held stable at 85% ± 5% of free feeding body weight during this period. After this period the time of access allowed to water was gradually restricted over a period of 32 days from ad libitum access to two hours access with six of the hens. The other five hens remained with ad libitum access. The results showed that the amount of water consumed decreased as time to access was reduced but dehydration checks carried out twice daily indicated no health concerns throughout this period. In the second study three hens (who were naïve to behavioural experiments) were shaped via the method of successive approximations and three via Autoshaping to respond for food reinforcers on a touch screen. Video footage captured each session, and analysis of the form of the peck into individual components (head fixation to beak contact to no movement) showed that the time duration of each component remained stable across hens and across pecks. The aim of these two studies was to develop a method of restricting water access with hens in order to motivate responding for water reinforcers and to assess the form of the food motivated peck in hens. Implications of this research are that methodology has been developed which can allow further investigation into whether restricting access to one commodity has behavioural effects on access to another commodity.

Surrey Jackson is completing a PhD at the University of Waikato with Associate Prof. Bizo, Prof. Foster and Dr McEwan. Her thesis is investigating the effect of the motivating operation on the form of behaviour relevant to obtaining a related commodity with hens. Surrey’s MAppPsy (Behaviour Analysis) from the University of Waikato investigated whether feeding hens laying hens a consistent diet of one type of food effected demand for a different type of food.
The welfare of sheep: vision of the future

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The welfare of the individual animal in large extensively farmed flocks is influenced by many factors including the financial value of the animal itself, and the shepherd:animal ratio. The latter determines the time available for a farmer to deal with an individual animal. The age, education and skill of sheep farmers are also important factors as are the prices for lamb, mutton and wool. The welfare problems of sheep can be categorised as flock problems (nutrition, parasites, environment, pain due to husbandry procedures) or individual (prolapsed vagina, dystocia, individual injury or sickness). Flock problems may be managed with foresight and planning. These include pasture management, forage storage, preventative health programmes and farm design all of which can be used to reduce many of the common welfare problems of sheep. The employment by sheep farmers of specialist sheep veterinarians and sheep production consultants, and teams of specialist technicians to undertake routine farm activities may improve welfare as may the use of good modern equipment for restraint. Managing the welfare problems of individual sheep depends on the value of the animals, the cost of dealing with the problem, the ease of capture and restraint, and willingness or not to kill affected animals. The low value of individual animals may make the treatment of individual animals uneconomic and the bother of capture too cumbersome. The discussion about shifting the focus of animal welfare from reducing suffering to encouraging positive emotional states does not generally take account of the difficulty of eliminating the former. These issues will be discussed with some thoughts as to how sheep welfare will be improved in the future.

Kevin Stafford is Professor of Veterinary Ethology at the Institute of Veterinary Animal and Biomedical Sciences, Massey University, Palmerston North, New Zealand. He has carried out and supervised research in veterinary science, livestock health, welfare of ruminants, pain in animals, lamb survival, ruminant physiology, nutrition and behaviour, wild horse biology and control, wallaby behaviour digestion and control, companion animal behaviour and human-animal relations. Kevin in involved in teaching animal welfare and applied ethology to veterinary, agriculture and science undergraduates and post-graduates.
The physiological response to a human infant crying is similar in dogs and humans.

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Humans respond to infant crying with an increase in cortisol level and heightened alertness, a response interpreted as empathy. In this study, we examined whether dogs, which have a long history of affiliations with humans, show a similar response. We compared dogs’ and humans’ responses to three auditory stimuli: infant crying, infant babbling, and a computer generated “white noise”. Seventy five dogs and 74 young adult humans were randomly assigned to one of the three auditory stimuli for 13 minutes at 82db loudness. Salivary cortisol samples were collected before and 18 minutes after the auditory stimulus. We also recorded dogs’ behaviour while the sound was playing, and the humans rated auditory stimuli aversiveness. Dog owners were present throughout the experiment although they were sensorily isolated. Both humans’ and dogs’ cortisol levels increased significantly after listening to crying (both ps < .05). There were no significant changes in cortisol levels for babbling or white noise in either species. Dogs showed both alertness and submissiveness to crying (both ps < .05). We did not find similar behavioural pattern with babbling or white noise. Humans rated crying and white noise as more aversive compared to babbling, p < .01. The cortisol changes and behavioural patterns suggest that dogs experience a form of empathy – emotional contagion – in response to human infant crying.

Min is completing a PhD at the University of Otago, Dunedin, New Zealand. She is investigating whether domestic dogs could recognise human emotions e.g. anger, sad, happy, under the supervision of Professor Ted Ruffman.
Social context and previous experience influence the behavioural expression of pain in lambs

Mirjam J. Guesgen, Ngaio J. Beausoleil*, Edward O. Minot, Mairi Stewart, Kevin J. Stafford

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There is evidence that the presence of a conspecific can alter the emotional experience of pain in humans and other animals. This ‘social buffering’ may be mediated by factors such as relatedness and familiarity. Sheep make a good study species for social buffering of pain as they form social groups and routinely undergo painful husbandry procedures. This study investigates whether and how the social context affects the behavioural response of lambs to docking. Specifically, whether the presence of a lamb who is familiar, related or neither as well as previous experience; and sex of both the pained lamb and its test-mate affects pain expression. We hypothesized that lambs would show a reduced behavioural response to docking indicative of social buffering when with a familiar, related partner. Fifty one lambs were reared to allow testing in one of three social conditions: Familiar Related, Familiar Unrelated or Unfamiliar Unrelated. Each lamb was exposed to the test environment twice, once as the actor (i.e. tail-docked) and once as the observer (not tail-docked) so that half were docked in their first exposure and half in their second exposure. The pain-related and visual behaviour of the actor lamb was recorded for 30 minutes before and 30 minutes after tail-docking. As expected, all docked lambs showed an increase in the frequency of active behaviours traditionally associated with docking pain, as well as an increase in the time spent in abnormal postures and decrease in time spent in normal postures. However, Familiar Related lambs showed a smaller increase in kicking and rolling than other groups (Kick: F = 3.75, P = 0.03; Roll: F = 4.78, P = 0.01). Previous experience of the test environment also affected pain behaviour, with lambs who had experienced the test environment before showing overall less activity (round effects, all P < 0.05) and a smaller increase in active behaviours after docking than those docked on their first exposure (period*round interactive effects, all P < 0.05). This is the first study to demonstrate that lamb pain-related behaviour is influenced by social context and previous experience.

Mirjam Guesgen is completing a PhD at Massey University, Palmerston North on the effect of social environment on pain behavioural expression and empathy in lambs. She is under the lead supervision of Ngaio Beausoleil. In the future, she wishes to work in the field of science communication.
Adrenocorticotropic hormone injection generates an optimistic judgement bias in sheep

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1 CSIRO, Animal Food and Health Sciences, 2 AgroParisTech
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Judgement bias measures whether animals have an increased expectation of positive events (optimistic) or negative events (pessimistic) when exposed to ambiguous stimuli, and provides an indication of the affective state of the animal. However, previous research has shown that acute stressors such as shearing and restraint generated optimistic judgement biases in sheep, which is counter-intuitive. One explanation is that these optimistic biases are induced by the release from the stressful situation rather than by the acute stressor per se. In order to mimic one of the pathways involved in acute stress, this study aimed to administer a synthetic adrenocorticotropic hormone (Synacthen Depot) and to assess judgement bias. For the judgement bias test, ewes were trained in an arena to approach a positive location cue associated with food in one corner and not approach a negative location cue associated with a dog in the opposite corner. Three non-trained, non-reinforced ambiguous location cues were situated between the positive and negative locations. Twenty-eight sheep were subjected to either a Synacthen injection (0.5 mg) or water injection 1 h prior to testing. Judgement bias was assessed by measuring whether animals approached the locations (go/no-go response). Plasma cortisol concentrations were measured at baseline, 30, 60 and 90 min after Synacthen administration. We found a treatment x location interaction for judgement bias (P<0.025), with more Synacthen treated animals approaching the ambiguous location closest to the dog (64%) compared to the control (14%). The area under the curve of the plasma cortisol response was significantly higher in Synacthen treated animals (120±4 ng.ml/min) compared to the controls (19±4 ng.ml/min, P<0.001). These results support previous findings that acute stress results in an optimistic judgement bias in sheep, suggesting that this bias is not a result of the release from a stressful situation.

Else Verbeek is a postdoctoral fellow at CSIRO in Armidale, Australia. She is interested in investigating the impact of stress on affective states and animal welfare, and in particular whether being subjected to chronic stress affects the ability to cope with additional acute stressors. She completed her PhD at the University of Waikato (Hamilton, New Zealand) and AgResearch in 2011. During her PhD, she investigated the impacts of undernutrition on the behaviour, stress responsiveness and welfare of pregnant ewes.
Positive human contact and fear responses of shelter dogs to humans

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Human contact affects the behavioural fear responses of shelter dogs to humans. The present experiment examined the effects of the duration and nature of the handler contact (positive contact: crouch, talk, extend hand and pat; neutral contact: stand, silent and arms crossed) on the fear responses of shelter dogs to humans. Sixty-four dogs entering a USA county shelter were randomly allocated to one of five treatments imposed daily during their first four days in the shelter: no human contact (NoContactDogs), 5s neutral human contact (5sNeutDogs), 5s positive human contact (5sPosDogs), 30s neutral human contact (30sNeutDogs) or 30s positive human contact (30sPosDogs). One handler cleaned each pen in a standard manner once daily (0900-1200h), imposed the treatments and left the pen. All other contact with the dogs was minimised. The ‘fearful behaviours’ (FearBeh) of crouch, head oriented away, tail low/tucked and tail still were recorded using one-zero sampling within 5s of food delivery on Days 1-4 (0630h) and during a standard human approach test (HAT) on Day 4 (0830-0900h), with the same handler crouching for 1 minute at 1m and 0m from the pen door. ANOVA for repeated measures showed a significant effect of treatment ($F_{(4,51)}=3.147$, $P=0.022$) and day in shelter ($F_{(1,51)}=17.267$, $P<0.001$) on the frequency of FearBeh at feeding, with no interaction between treatment and day ($F_{(4,51)}=2.089$, $P=0.096$). Post-hoc comparisons using the Fisher LSD test revealed that 30sPosDogs displayed significantly fewer FearBeh at feeding ($Mean\pm SE, 0.50\pm 0.18$) than NoContactDogs ($1.35\pm 0.17$) and 5sNeutDogs ($1.11\pm 0.21$) but were not different from 5sPosDogs ($1.00\pm 0.17$) or 30sNeutDogs ($0.81\pm 0.21$). There were also significant treatment effects on FearBeh in the HAT when the handler was 1m ($F_{(4,55)}=3.051$, $P=0.024$) and 0m ($F_{(4,55)}=2.807$, $P=0.034$) from the pen door. The results suggest that both duration and particularly nature of handler contact may reduce fearful behaviours in shelter dogs, which has implications for shelter dog behaviour and welfare.

Sally is completing a PhD at the University of Melbourne on the relationship between human attitudes and human behaviour and dog behaviour and dog welfare in animal shelters, under the supervision of Professor Paul Hemsworth and Professor Grahame Coleman.
How delayed reinforcement affects learning in dogs

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The aim of this study was to examine the effects of delaying positive reinforcement when training pet dogs to perform a novel behaviour. Research on other species (e.g. rats and pigeons) has shown that although delayed reinforcement can result in trained behaviour, delays can compromise speed of task acquisition and rate of responding. The effects of delaying reinforcement on learning has not been studied with dogs, although field observations of owners training their dogs show that delays range from 0 – 6.2 s. Thus, this experiment attempted to measure the impact of such delays. In this study pre-training was conducted in an experimental pen to condition the dogs to the sound of a beep (conditioned reinforcement) preceding delivery of food treats (unconditioned reinforcement) from a feeding device; this took approximately eight minutes. After a 10 minute break, the experiment began during which single dogs were led into the pen and allowed to explore. Inside the pen were two cube-shaped containers, the open top surfaces of which were criss-crossed with infrared beams connected to a computer that controlled when food was delivered from the feeding device. The target behaviour was a dog putting their head inside one of the two containers, breaking the infra-red beams. When these beams were broken, positive reinforcement (beep and then food) was delivered at a pre-set delay: either 0 s or 1 s (each dog worked on the same delay for the entire session). Sessions finished after 30 minutes or when 200 reinforcers were delivered. The behaviour was considered learned when performed 10 times in a row, with \( \leq 5 \) s between responses. Twenty dogs were in each of the 0 s and 1 s delay groups and the groups’ success rates were significantly different: 60% of the dogs learned the behaviour at a 0 s delay, while 25% learned with a 1 s delay \( (\chi^2(1) = 5.013, p = 0.025) \). The 15 dogs who did not learn the task at a 1 s delay were switched onto 0 s delay, and then six learned the task. These results indicate that delaying positive reinforcement impacts on learning a novel task for most dogs, and that timing of reinforcement is an important variable in successful dog training.

Clare Browne is completing a PhD at the University of Waikato with Drs. Starkey and McEwan and Prof. Foster. Her thesis is investigating dog-human interactions and how they affect dog training, focusing on how delayed positive reinforcement can impact on the efficacy of dog training. Clare’s MSc from Massey University with Prof. Stafford examined the use of detection dogs to find New Zealand reptiles for conservation work.
Effects of mining noise amplitude on the behaviour and welfare of wild mice (*Mus musculus*)

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Anthropogenic activities are the most important cause of noise for wildlife, including transport noise (e.g. traffic and aircraft) and noise from industries (e.g. logging, construction, oil drilling). In Australia, mining is a major industry and often takes place in remote regions of the country with susceptible wildlife populations. It produces significant noise, but the only regulations that address the amplitude are when it constitutes a work hazard for humans. There is no information regarding the possible damage for wildlife. We exposed surplus wild mice from the UQ wild mice colony to a simulated mining noise sequence containing machinery used in open cast mining, including drills, shovels and a sequence of blasting. These animals were considered a good indicator species for this study because they retain genetic and behavioural variability due their wild generational background even when bred in captivity. Two levels of amplitude were set to exemplify energy inputs representing the following distances from the mining site: 0-500 meters (70-75 dB [A]), which constituted the High Noise treatment (HN) and 500-1000 meters (60-65 dB [A]), which constituted the Low Noise Treatment (LWN). Also a Control treatment (C) where animals were exposed to only background laboratory noise was included. All three groups were composed of 8 replicates, each consisting of 4 males individually caged and 8 females caged in 4 pairs). After 1 week of habituation to the experimental rooms and handling, the 36 animals were exposed to their corresponding auditory stimuli for 3 weeks. During this period, the behaviour of the mice was recorded continuously using surveillance cameras attached to video recorders. Faecal samples were collected daily for corticosterone analysis. All animals were caged with 2 plastic tubes (black and white, used to hide) and shredded paper (used to build the nest) as environmental enrichment. In order to assess any effects of the activation of the hypothalamus-pituitary-adrenal axis in the organs, animals were euthanized at the end of the experiment by cervical dislocation, after which they were weighed and the following body parts removed, weighed and preserved in formaldehyde for histological examination: brain, pituitary gland, spleen, adrenal glands, thymus, kidney, liver, popliteal lymph nodes and reproductive organs. Ten days were chosen for behaviour recording, based on a logarithmic scale. Within those days, one half of the data was selected for behavioural analysis. We observed the first 5 minutes of every 24 hour period (2 hours of observations per repetition) and recorded the frequency and duration of the following behaviours: hiding in the tubes, hiding with the head out, active inside the nest, inactive inside the nest, nest building, drinking, feeding, grooming, stereotypic circling left or right (mouse climbing to the lid of their cages and describing circles for prolonged periods of time), digging and chewing the metal bars of the lid. We used a General Linear Model (GLM) to analyse the data, applying mathematical transformations when needed (log₁₀ and square root). Significance was taken when P < 0.05. Our preliminary results show an increase in the % of time spent circling in the HN treatment when compared with C (HN = 5.5 % of time; C = 0.002 % of time; P=0.002). Exposed mice spent more time circling to the left than those in
the C treatment. (HN = 0.05 % of time; C = 0.034 % of time; P = 0.02), which relates to some studies in several animal models that have indicated that circling behaviour occurs opposite to the hemisphere exhibiting the higher dopaminergic activity excitatory to the cortex and also related to an abnormal motor activity mediated by dopamine. The animals in C treatment spent more time nest building, a normal behaviour for these mice, compared with animals in HN (C = 2.04 % of the time; HN = 0.63 % of the time; P = 0.041) In male mice exposed to the HN treatment the spleen was lighter compared with controls, suggesting a possible effect of noise on the immune system (HN = 0.017 g; C = 0.023 g; P = 0.042). It is concluded that mining noise potentially adversely affects the welfare of wild mice over at least an amplitude level similar to the one experienced at 500 m, but conformation is required by validation in the field.

Karen is completing a PhD in Veterinary Science (focusing on behaviour and welfare) at UQ, investigating the effects of anthropogenic noise on wildlife welfare and behaviour using the wild mouse as an animal model, under Professor Clive Phillips. Her MSc from the National Autonomous University of Mexico (UNAM) was on the effect of tree coverage on some welfare indicators of tropical cattle.
Keep it or kill it? How the behaviour of domestic cats (*Felis catus*) impacts upon perceptions of their value and management methods

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The domestic cat is the most commonly owned companion animal both in New Zealand and globally. Recent dialogues around the impact and value of cats have once again brought them into the spotlight and this presentation seeks to discuss these New Zealand based dialogues using a behavioural framework. Generally cats are thought to live in three broad categories: ‘Feral’, ‘Stray’ and ‘Companion’ and how a cat is attributed to these categories will depend upon its behaviour in and around human habitation. Other behavioural qualities such as predatory behaviours, which are not considered human-centred, are shared across all cats and have the potential to substantially impact upon cat treatment and welfare. Behavioural temperaments are constructed over the lifetime of an animal and, consequently, how a cat behaves and how it is labelled will be directly related to the degree of care historically provided to it. Cats in New Zealand have no enforceable ownership requirements that function to reduce their likelihood of becoming lost or abandoned. As a result they are far more likely to be abandoned that dogs. In part this may be because they are seen as being behaviourally independent and as having a need to roam. As a result of historic loss or abandonment ‘feral’ cats become behaviourally and reproductively autonomous. They are, therefore, freely and necessarily controlled through lethal means. ‘Stray’ cats are also euthanized frequently in order to manage the population, especially if they are behaviourally unable to be adopted.

This presentation seeks to draw together prior research and prospective research ideas to generate a discussion around public perceptions of what a ‘cat’ is, both as a construct of their behaviour and as constructs of the New Zealand society in which they reside. A better understanding of cat behaviour could lead to improved management, reduced abandonment and therefore a decline in our need to kill cats.

*Mark is currently completing his PhD at Massey University focussing on cat behaviour and assessment of pain. In his role as a senior lecturer at Unitec Institute of Technology he has been researching the status of cats in New Zealand since he ‘stepped of the boat’. In 2013, and in recognition of his expertise in cat behaviour and welfare, he was invited to join (and joined) the editorial board of Applied Animal Behaviour Science.*
Factors influencing cow competition for mixed rations fed on a feed-pad between bouts of grazing

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The objective of this experiment was to evaluate how space allowance and provision of feed barriers interact to affect feeding and social behaviour of dairy cows fed a partial mixed ration (PMR) on a feed-pad. The experimental design was factorial with 3 feeding space allowances (0.6, 0.75, 1.0 m per cow) with or without head barriers between cows at the feed trough. Holstein-Friesian cows in mid lactation were allocated into 12 groups of 12 cows, with 2 groups randomly assigned to each of 6 treatments, crossed over weekly over 3 weeks. The social hierarchy within each group had been determined before the experiment commenced. During each week of experimental period, cows were given 4 days of adjustment followed by 3 days of data collection for feeding and social behaviours using video recordings and changes in heart rate (HR) and heart rate variability (HRV) using heart rate monitors. Data were analysed using REML mixed effect models. When space allowance increased, feeding time (P<0.001) and mean feeding bout length (P<0.05) increased and feeding bout frequency (P<0.001) decreased, particularly in submissive cows. The number of aggressive behaviours (P<0.05) and displacements (P<0.001) decreased when space allowance increased. In addition, HR was reduced (P<0.001), particularly in submissive cows. Use of feeding barriers increased feeding time (P<0.05) and decreased feeding bout frequency (P<0.05), especially in submissive cows and reduced the number of displacements (P<0.05). It is concluded that increasing the feeding space to the higher values used in this study would improve both feeding and social behaviours of PMR fed dairy cows on the feed-pad and would reduce stress caused by competition. Use of feed barriers could further reduce competition at the feed trough. Submissive cows, which are the most affected at higher levels of competition, would benefit most from these strategies on the feed-pad.

Anoma Hetti Arachchige is completing her PhD at the University of Melbourne, in conjunction with the Department of Environment and Primary Industries, under the supervision of Ellen Jongman, Andrew Fisher and Bill Wales. Her PhD involves defining dairy cow behaviour and welfare in feeding systems based on total mixed ration fed in conjunction with grazed pasture.
The effect of feeder space and space allowance on feeding behaviour and growth of lambs in feedlots

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An estimated 5-20% of all sheep that enter a feedlot do not adapt to the feed and the environment. The literature suggests that the percentage of sheep that feed regularly may be reduced at higher stocking densities. In addition, competition for feeding space can lead to an increased incidence of non-feeders. The Australian Model Code of Practice for the Welfare of Sheep recommends a minimum of 2cm/lamb of trough space if being fed *ad libitum.*

This study examined the effects of feeder space and space allowance in a feedlot on weekly feed intake (pen average), body weight and feeding behaviour (as observed by video and analysed during a peak feeding period from 2-8pm). A total of 640 merino lambs in four time replicates over 16 months (160 lambs per replicate) were studied in four 40-lamb intensive finishing systems (feedlots) for a 6-week period. A factorial design examined the two factors pen floor space (2 and 5 m²/lamb) and trough length (4 and 10 cm/lamb) and were analysed as randomized block analyses of variance. No effects of increasing space allowance from 2 to 5m²/lamb were found. A trough length of 4 cm compared to 10 cm significantly reduced the average feed intake/pen during each week of the 6-week period. However, weight gain only differed during week 1 (0.2 vs 1.1kg, P=0.03), with an average feed intake of 5.5 vs 6.8 kg (P<0.05). The difference in weight after week 1 was maintained throughout the 6-week period (final weight 35.4 vs 36.8kg, P=0.02), indicating that there was no compensatory growth. Lambs with the greater feed trough space spent more time feeding. However, this study clearly indicates that the recommended minimum of 2cm/lamb of trough space is insufficient as even 4cm/lamb trough space resulted in reduced feed intake, growth rate and feeding behaviour.

Ellen Jongman is employed as a research scientist by the Animal Welfare Science Centre. Interests include the effect of housing and management on stress and welfare in a diverse range of species.