



The aim of the animal welfare science update is to keep you informed of developments in animal welfare science relating to the work of the RSPCA. The update provides summaries of the most relevant scientific papers and reports received by the RSPCA Australia office in the past quarter. Email science@rspca.org.au to subscribe.

COMPANION ANIMALS

Containment of domestic cats

Although cats have a natural tendency to roam around, particularly at night, it has been suggested that keeping domestic cats indoors (*i.e.* containment) can have a range of benefits such as the prevention of cat injury, disease and death and the reduction of unwanted cat pregnancies. Other benefits may include reduced potential impacts of owned cats on native wildlife populations and reduced nuisance behaviour in the community.



In this article, the researchers present the results of a survey of over 420 residents of Victoria, Australia, on the topic of domestic cat containment. It was found that out of the 142 cat owners in the sample, the majority (80%) contained their cat at night, but less than half (41%) did so during the day. However, both owners and non-owners stated that containment was important, and that it helped to protect wildlife.

In addition, owners were also concerned about protecting their cats from injury. The authors state that although around 30% of councils in Victoria have 24 hour cat curfews, such regulation is difficult to enforce. To encourage containment in regions with 24 hour cat curfew laws further education programmes for owners regarding the potential for harm to occur to wandering cats during the day may be useful.

Owners also need to be educated about the welfare requirements of contained cats and their basic necessities, as approximately 20% did not provide bedding, food and water to their cats during containment, and 50% did not provide enrichment (such as a scratching post).

The authors concluded that further education programs and research were required.

Toukhsati S.R., Young E., Bennett P.C. and Coleman G.J. (2012) Wandering cats: attitudes and behaviors towards cat containment in Australia. *Anthrozoos*, 25(1): 61-74.

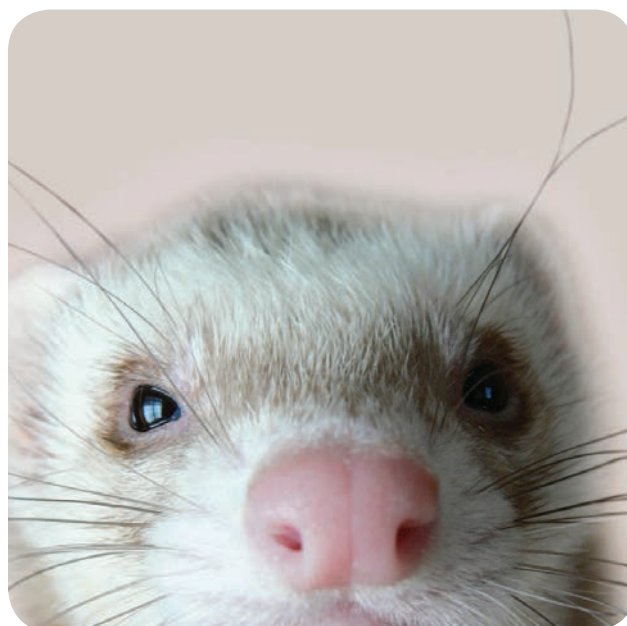
The welfare of pet ferrets

This review article summarises the available information on the health, welfare and behaviour of ferrets.

Ferrets are a popular pet because of their active and social nature. Their most probable ancestors are polecats, which typically have very large home ranges in the wild (12 to 30 hectares), and it is therefore recommended that ferrets be kept in large enclosures or cages with a minimum enclosure size of at least 1.5-2m² for one or two ferrets, and an additional 0.5m² provided for each additional ferret. Most authors however advise larger cage sizes wherever possible.

Ferrets are at risk of overheating and prefer a temperature range of 15-21°C and due to their sensitive respiratory tracts, bedding materials such as straw and sawdust should be avoided.

Ferrets are active animals needing regular opportunities to play, explore, dig and forage.



A well balanced activity program in and outside of the cage, adequate and variable food enrichments and comfortable hiding and resting places (cardboard boxes, tubes) can be helpful in meeting their behavioural needs. The authors warn that being naturally explorative, ferrets are at high risk of foreign object intestinal obstruction (which can be fatal), therefore safety precautions must be taken such as avoiding small objects that may be swallowed (for e.g. soft rubber objects).

Like other *mustelidae*, ferrets are described as solitary carnivores, and can violently reject other newcomers. Social moments in the life of solitary animals include breeding season and rearing of pups by the mother. Some den sharing of adult feral ferret males has also been observed and domesticated ferrets can frequently engage in social play. One study found increased overall health in ferrets that had the company of cage mates, however, the authors emphasise the

importance of careful social matching of ferrets. Another study recommends adopting ferrets in an established pair with the best results with a male-female or male-male pair. Early life experiences (socialisation) are of utmost importance to have a ferret that is well adjusted to being a pet and able to live in the company of other ferrets.

The main health aspects to be aware of include nutrition, intestinal obstruction, hyperoestrogenism, hyperadrenocorticism, insulinoma, respiratory disease, Canine distemper, gastric ulcers and helicobacter infections and the authors recommend a routine annual veterinary examination. The authors conclude that further research on pet ferrets is urgently needed.

Vinke, C.M. and Schoemaker, N.J. (2012) The welfare of ferrets (*Mustela putorius furo* T): A review on the housing and management of pet ferrets. *Applied Animal Behaviour Science*, 139: 155-168.



RSPCA AUSTRALIA SCIENTIFIC SEMINAR 2013

When coping is not enough
promoting positive welfare states in animals

The 2013 Seminar will explore animal welfare assessment in the context of quality of life and positive welfare states and how these approaches may change the direction in which animal welfare science and welfare assessment is headed.

The concept of animal welfare and what it represents has evolved over the last couple of decades, from Don Broom's 'coping' based definition and a focus on biological functioning to, more recently, the promotion of positive affective states and the absence of negative ones. Speakers at the 2013 Seminar will address the practical side of promoting positive welfare states from the perspective of areas relevant to RSPCA's work, i.e. companion animals, working animals, farm animals, zoos, and animals used in research.

We are very pleased to have Professor David Mellor, Co-Director of the Animal Welfare Science and Bioethics Centre at Massey University in New Zealand as our Chair. He and Dr James Yeates, Chief Veterinary Officer at RSPCA UK, will be the keynote speakers.

As is the tradition with this Seminar series, the program aims to cross conventional topic boundaries, challenge current thinking, and stimulate further discussion. RSPCA Australia welcomes the participation of all interested people to help make this a fascinating and thought-provoking day.

For further information and registration, visit www.rspca.org.au

Tuesday 26 February 2013
National Convention Centre, Canberra



FARM ANIMALS

Anaesthesia for pig castration

In some countries, piglets are routinely castrated at a young age to prevent the appearance of boar taint in the meat of older males. This painful procedure is almost always carried out without anaesthetic. A number of local anaesthetics are available for such situations, but the additional handling of the piglets could lead to further stress. An alternative is the use of carbon-di-oxide (CO₂) gas, which is easier to administer, leaves no residues in the meat, and does not require a prescription.

In this experimental study, the researchers trialled the use of the anaesthetic Banamine (injected into the rump), CO₂ gas, or both, on piglets destined for castration. The researchers measured behavioural variables, such as the amount of squealing, and activity levels after the procedure, as well as physiological indicators of stress in the blood. It was found that neither the CO₂ gas nor the anaesthetic had any effect on the stress experienced by the piglets. On the contrary, the piglets treated with CO₂ gas showed signs of increased pain. The administration of an anaesthetic immediately after castration appeared to reduce some pain-related behaviours in the piglets.



Sutherland, M.A., Davis, B.L., Brooks, T.A. *et al.* (2012) The physiological and behavioural response of pigs castrated with and without anaesthesia or analgesia. *Journal of Animal Science*, **90**: 2211-2221.

Smaller rubber rings for lamb castration

The castration of lambs using rubber rings has been shown to be a highly painful procedure, with acute pain lasting for 2-3 hours, and chronic, visceral pain sometimes persisting for a few days. Castration in this way, or by other means, is carried out to prevent unwanted breeding in farm populations. The administration of local anaesthetic at the time of applying the rings is able to block the pain, but this is a time consuming and expensive procedure.

In this experimental study, the researchers trialled a new type of rubber ring, with a smaller, tighter inner diameter, and a shape that in theory would allow higher pressures to be exerted on the nerves inside the scrotum. This was considered desirable because of previous experimental data showing that high enough pressure on the nerves conducting pain impulses can block them, and stop the sensation of pain. It was found that the novel tight rings were able to lead to castration much faster (especially when local anaesthetic was administered at the same time) than the larger, conventional rings. However, lambs fitted with the tight rings still showed the same symptoms of acute pain (such as foot stamping and kicking) when anaesthetic was not provided.

Molony, V., Kent, J.E., Viñuela-Fernández, I. *et al.* (2012) Pain in lambs castrated at 2 days using novel smaller and tighter rubber rings without and with local anaesthetic. *The Veterinary Journal*, **193**: 81-86.



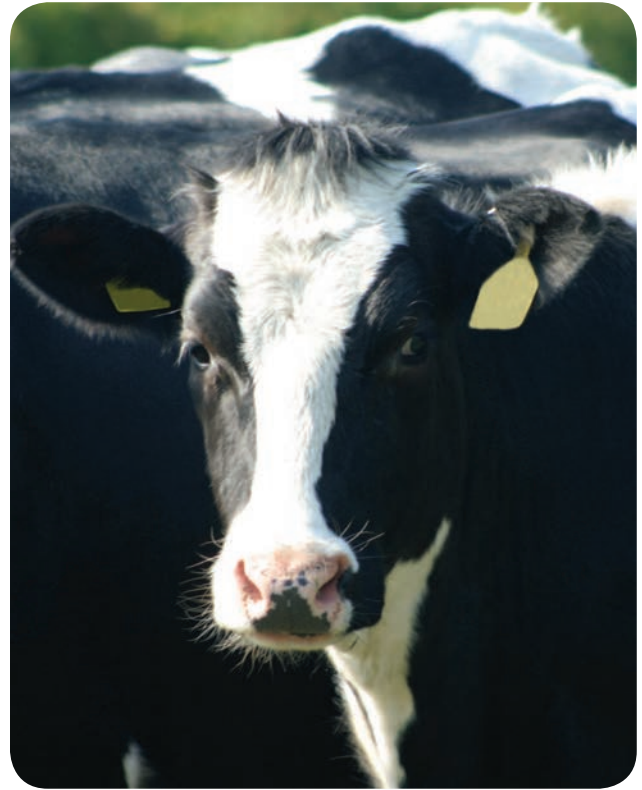
Foot lameness in cattle

Lameness is an important condition in cattle, and is thought to be associated with increased milk yield. The authors of this review article point out that lameness is actually a symptom, and that the underlying causes of lameness are numerous. This includes diseases such as digital dermatitis, sole ulcer and white line disease.

Reviewing the scientific and non-scientific literature published on lameness between 2000 and 2011, the authors show that the vast majority of papers deal with the prevention of lameness, rather than with strategies to treat it. Moreover, many authors merely use the umbrella term 'lameness', and only present a lameness or gait measure, without making reference to the specific underlying disease.

Sometimes, there is a mismatch between the scientific and non-scientific literature concerning the cause and treatments of lameness. For instance, standing on concrete floors is commonly cited as a cause of sole haemorrhage and sole ulcers in the non-scientific literature, but there were only two scientific papers in the past decade that made any mention of this factor.

The authors argue that it is difficult for researchers and lay readers to form an accurate impression of the causes of lameness, and the means necessary to combat it. The authors call for more intervention studies and controlled clinical trials, especially for those causes of lameness which have been overlooked by researchers: sole ulcer and white line disease.



Potterton, S.L., Bell, N.J., Whay, H.R. *et al.* (2012) A descriptive review of the peer and non-peer reviewed literature on the treatment and prevention of foot lameness in cattle published between 2000 and 2011. *The Veterinary Journal*, **193**: 612-616.

Automated measurement of play behaviour in dehorned calves

Calves are routinely subjected to farm management procedures such as weaning and de-horning, which are stressful and/or painful experiences. One way to determine the effects of such procedures on the welfare of calves is to monitor the animals for any changes in positive welfare indicators, such as play behaviour (indicated by running, bucking and kicking). However, such behaviours are fleeting in nature, and it is very time consuming for a human observer to make a careful record of these activities.

The purpose of this experimental study was to trial an automated means of measuring the play behaviour of calves before and after routine husbandry procedures, as a means of gauging the effects of these procedures on the animals' positive emotions. The researchers attached accelerometers to one hind leg of each calf, and observed the animals in a large pen for 15 minutes before and after horn disbudding using caustic paste, or weaning. It was found that the accelerometer readings were good predictors of running behaviour in calves, and the instruments were precise enough to pick up a normal reduction in running behaviour in control calves as they grew older, as well as stress-related reductions in running following de-horning and weaning. Thus, changes in play behaviour can be successfully detected by using accelerometers.

Rushen, J. and de Pasillé, A.M. (2012) Automated measurement of acceleration can detect effects of age, dehorning and weaning on locomotor play of calves. *Applied Animal Behaviour Science*, **139**: 169-174.

Predicting boar taint

In the pork industry, the majority of male pigs are surgically castrated without anaesthesia at a young age, to prevent the occurrence of boar taint. This is a phenomenon where the meat of mature, uncastrated male pigs takes on an unpleasant smell and flavour,



due to the accumulation of chemicals such as androstenone and skatole in the boar's meat and fat. The former is a sex pheromone secreted by the testes, while the latter is a chemical thought to be absorbed from the faeces and urine found in dirty pens. As only a small percentage of male pigs develop boar taint, there is a need to design methods by which high-risk animals can be identified early on.

In this experimental study, the researchers noted three attributes (testes size, skin lesions and dirtiness) of over 100 male pigs, to determine which of these was the best predictor of boar taint. It was found that boars with large testes, particularly at 12 weeks of age, were most likely to develop boar taint.

This represents the first piece of research on developing a predictor of boar taint, and the authors call for further studies to design more accurate and comprehensive methods.

Bekaert, K., Alumé, M., and Millet, S. (2012) Predicting the likelihood of developing boar taint: Early physical indicators in entire male pigs. *Meat Science*, **92**: 382-385.

Immunocastration of pigs and meat quality

Immunocastration is a humane alternative to surgical castration, and only requires the administration of two injections of vaccine, the second being no later than two weeks prior to slaughter. The Gonadotropin Releasing Factor (GnRF) vaccine has been approved in over 50 countries, including Australia, New Zealand and the EU. As immunocastration is a comparatively new technology, its effects on meat quality are still relatively unknown. In this experimental study, the researchers compared the effect of surgical- and immunocastration on meat quality in over 400 [DurocXLandraceXLarge White] pigs.

It was found that immunocastration resulted in leaner pigs with a lower dressing percentage (the ratio of carcass weight to live weight).

The meat of immunocastrated pigs had a higher level of the natural chemical inosine monophosphate, which is supposed to impart flavour to pork, while the fat had higher levels of healthier polyunsaturated fatty acids. Other meat quality and slaughter performance indicators were not affected. The authors conclude that immunocastration is not only more humane, but also results in better quality meat.

Yuan, Y.L., Li, J.L., Zhang, W.H. *et al.* (2012) A comparison of slaughter performance and meat quality of pigs immunised with a gonadotrophin-releasing factor vaccine against boar taint with physically castrated pigs. *Animal Production Science*, **52**: 911-916.

The effect of different beak-trimming techniques

Beak trimming is carried out in young chicks to prevent them from pecking each other's feathers in adulthood. Traditionally, beak trimming is done manually, by placing the chick's beak in a hole in the trimming apparatus, and by slicing off the beak tip with a superheated blade. This technique can cause considerable pain, and

is dependent on the skill and consistency of the human operator. In this paper, the researchers compared the hot blade method with an alternative automated method that is meant to be more humane. Here, the chick is placed in a holder which leaves a precise amount of the beak tip exposed. The tip is exposed to a short burst of

infrared radiation (heat) from a lamp, which causes the tip to erode away over the next few days.

Using different power levels and different lengths of beak tip trimming, the authors determined that it is possible to adjust these variables to produce optimal welfare and economic outcomes in terms of body weight loss, feeding frequency, feed wastage, and reduction in pain-related behaviours. The infrared treatments were just as effective as the hot blade in reducing damage caused to feathers from pecking. In addition to checking the condition of the feathers on living birds, the researchers

also tied experimental feathers to the front of the birds' cages. It was found that hot blade-treated birds, as well as birds treated with high-intensity infrared, caused the most damage to these feathers through pecking (compared to moderate-level infrared birds), possibly due to an inability to carry out more delicate actions with their beaks.

Dennis, R. and Cheng, H. (2012) Effects of different infrared beak treatment protocols on chicken welfare and physiology. *Poultry Science* **91**: 1499-1505.

Broiler bones and growth rate

The selective breeding of broiler chickens, over the last few decades, to grow faster, has led to the appearance of numerous deformities and health conditions in these birds. This effect of fast growth is exacerbated by the fact that broilers have very porous bones, and are unable to support large increases in bodyweight.

In this experimental study, the researchers investigated the physical and chemical properties of two strains of broilers, namely fast growing and slow growing. It was found that in absolute terms, the fast growing birds had thicker and denser leg bones, with a higher concentration of calcium for strength.

However, when these parameters were recalculated relative to the body weight of the birds, it was found that the slow growing birds had higher values of bone density and mineral content.



The authors conclude that while fast growing birds have stronger bones in absolute terms, they are inadequate to support the greatly increased muscle mass of such birds.

Shim, M.Y., Karnuah, A.B., Mitchell, A.D. *et al.* (2012) The effects of growth rate on leg morphology and tibia breaking strength, mineral density, mineral content, and bone ash in broilers. *Poultry Science*, **91**(8): 1790-1795.

Eyestalk removal in farmed prawns

Prawns have a gland in their eyestalks called an x-organ, which produces hormones that regulate the animals' reproductive cycle and metabolism. In aquaculture facilities, it is considered desirable to speed up the process by which female prawns shed their old shells, as this allows them to reproduce more frequently. This is achieved by cutting off the eyestalk of the prawn. However, there is evidence to suggest that eyestalk removal is a painful process for prawns, as they show behavioural responses such as disorientation, tail-flicking (an escape behaviour) and rubbing of the injured part of their body.



In this experimental study, the researchers trialled three different eyestalk-removal procedures, in order to determine their effects on prawn welfare. The eyestalks were either simply cut, cut and then covered to assist blood clotting, or simply tied off with string at the base. These treatments were carried out in two groups, either with or without the anaesthetic xylocaine. It was found that the last treatment (tying with string) caused the most discomfort to the animals, whereas the treatment involving cutting and covering in the presence of xylocaine produced the least behavioural responses. The anaesthetic also did not interfere with the animal's physiology, and is therefore recommended in aquaculture settings.

Dierte-Plata, G., Sainz-Hernandez, J.C., Aguinaga-Cruz, J.A. *et al.* (2012) Eyestalk ablation procedures to minimize pain in the freshwater prawn *Macrobrachium americanum*. *Applied Animal Behaviour Science*, **140**: 172-178.

ANIMALS USED FOR SPORT, ENTERTAINMENT, RECREATION AND WORK

Foraging behaviour in captive wolves

It has been noted that some animals kept in captivity will choose to search for hidden food items in preference to food that is freely available to them. This phenomenon is known as 'contra-freeloading', and there are many competing theories that attempt to explain the causes of this puzzling behaviour. It has been suggested that animals engage in contra-freeloading because the foraging activity itself is rewarding, because it allows them to obtain information about their environment, or because they wish to avoid the novel, unnatural experience of eating food that is freely available.



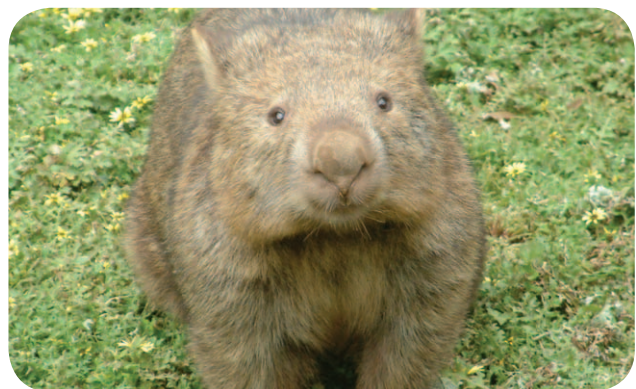
In this experimental study, the authors investigated the food choice behaviour of captive maned wolves (*Chrysocyon brachyurus*), an endangered species from South America. The animals were led into an enclosure divided into two parts, and were freely allowed to move between one side of the enclosure, which contained trays of food, and the other side, which contained a similar amount of food hidden in the vegetation in various locations. It was found that the wolves spent more time in the side of the enclosure with hidden food items, and that half their food intake consisted of these items. The authors conclude that the animals in this study exhibited a clear tendency for contra-freeloading, and suggest that foraging opportunities should be made available for such species kept in captivity.

Vasconcellos, A., Adania, C.H. and Ades, C. (2012) Contrafreeloading in maned wolves: Implications for their management and welfare. *Applied Animal Behaviour Science*, **140**: 85-91.

Wombat space requirements

In the wild, wombats typically have core home ranges of up to four hectares (although the maximum range can be as large as 20 hectares). The minimum required space for captive wombats in Australia is around 50 square metres per pair, but animals kept under such conditions can develop problems such as obesity, aggression, low breeding success and stereotypical behaviour.

In this experimental study, groups of three wombats were housed in enclosures of three different sizes for 22 days: 'small', the minimum required space, 'medium', twice the minimum requirement, and 'large', at three times the minimum requirement. Behavioural observations were made on three days towards the end of each housing period. It was found that wombats in the small enclosure exhibited more aggression in the form of biting. These animals were also seen to dig more frequently at the fence line, suggesting a desire to escape, and self-grooming behaviours, such as scratching, suggesting increased anxiety.



The authors suggest that increasing the enclosure size for captive wombats may be a simple way of enhancing the animals' welfare.

Descovich, K.A., Lisle, A.T., Johnston, S. *et al.* (2012) Space allowance and the behaviour of captive southern hair-nosed wombats (*Lasiorhinus latifrons*). *Applied Animal Behaviour Science*, **140**: 92-98.

HUMANE KILLING

Welfare issues relating to religious slaughter

The Islamic and Jewish faiths require that animals meant for human consumption be slaughtered in a special way. The main requirements are that death be caused by bleeding out through a neck cut, and if stunning is required, that it not result in premature death (as indicated by the heart stopping). In this review of religious animal slaughter, the author describes some welfare concerns that have been raised with regard to certain aspects of this practice.

There are three main areas of concern surrounding the practice of religious slaughter. The first is the potential stress caused to the animal prior to slaughter, due to the nature and design of various mechanical restraints. The second is the issue of pain associated with the neck incision, while the third is the issue of the speed at which consciousness is lost following the neck incision. The second and third concerns are closely linked to the issue of pre-slaughter stunning, and this is particularly relevant because some religious groups oppose stunning on the basis that it is unnecessary (because they believe death ensues quickly after the neck cut) or that it may cause additional stress to the animal. At the moment, stunning is considered acceptable in Muslim countries such as Turkey and Malaysia. The author presents recent evidence in support of the argument that the neck cut is painful, and that consciousness may be lost slowly in a small proportion of animals slaughtered without stunning, due to anatomical and physiological complications.

Anil, H. (2012) Religious slaughter: A current controversial animal welfare issue. *Animal Frontiers*, 2(3): 64-67.

Animal welfare during mass euthanasia

Disease outbreaks among farm animals sometimes have to be countered with the mass killing of affected and unaffected animals, in order to stop the infection from spreading. Sometimes, there is a public health element to such actions, as some animal diseases can be contracted by humans. The scale of the killing required can sometimes be immense: in the 2003 bird flu epidemic in The Netherlands, approximately 30 million birds had to be killed.

In this paper, the author advocates a careful monitoring of animal welfare during mass killing (which usually takes place in farm situations), and suggests that governments develop policies to mandate the appointment of a well-trained, competent official to evaluate each step of the killing process.

The following three phases of mass killing need to be given special attention: (i) animal handling prior to killing, to minimise stress, (ii) the effectiveness of the stunning or killing method used, and (iii) confirmation of death prior to disposal of the carcasses. The author suggests that the official monitoring the process should have the power to intervene, in case any inappropriate practices are noticed, and that lessons learnt from such processes should be incorporated into existing policies, in order to improve them.

Berg, C. (2012) The need for monitoring farm animal welfare during mass killing for disease eradication purposes. *Animal Welfare*, 21: 357-361.



MISCELLANEOUS

Consumer attitudes towards welfare labelling

There are currently a small handful of farm animal welfare labels for the animal product sold in Europe (one of which is RSPCA's Freedom Food for the United Kingdom), and there is a growing consensus among European Union policy makers that a single, standardised animal welfare labelling scheme for the whole of the EU is a desirable objective. The challenge facing such a scheme is that it needs to be flexible enough to be appealing to a range of customers with very different attitudes regarding animal welfare, and varying abilities to pay for a higher welfare, but more expensive, animal product.

In this paper, the researchers investigated the willingness of members of the British public to pay for higher welfare meat. A hypothetical welfare label was devised, which gave an indication of the meat's welfare status through a score ranging from 0 (very bad welfare) to 100 (maximum possible welfare). Around 30 different welfare measures were considered to calculate a welfare score. Participants were then asked how much more they would be likely to pay for different products, with respect to their current meat expenditure. The researchers found that the participants overwhelmingly favoured the introduction of a welfare label, and considered high welfare meat to be superior in terms of taste, nutritional value and safety. They were willing to pay an increasingly larger proportion of their meat expenditure for meat with higher welfare scores. There was a limit to this willingness, however, with scores above 80 unable to encourage the acceptance of higher prices.

Kehlbacher, A., Bennett, R. and Balcombe, K. (2012) Measuring the consumer benefits of improving farm animal welfare to inform welfare labelling. *Food Policy*, 37: 627-633.

Pain in crustaceans

Vast numbers of decapod crustaceans (such as crabs, lobsters and prawns) are used in human food and many are subject to extreme treatment which may cause pain. This study examines four objective criteria that may be used to indicate that crustaceans can experience the unpleasant feeling of pain (rather than just simple reflex nociception). These criteria include: avoidance learning, physiological responses, protective motor reactions and motivational trade-offs. An example of the first criterion is experimental evidence that crabs avoid shelters where they have been administered an electric shock.

Crustaceans also show marked physiological stress responses to tissue damage. Crustaceans have a stress hormone, the Crustacean Hyperglycaemic Hormone (CHH) that functions in a similar way to corticosteroids in vertebrates in that glycogen is converted to glucose and also causes elevated lactate. Forceable removal of a claw from edible crabs (a practice used in some fisheries) induces a rapid rise in glucose and lactate. Other studies show crustaceans displaying protective reactions such as marked increases in grooming and rubbing of body areas that have been subjected to electric shocks or acetic acid. Prolonged grooming and rubbing indicates an awareness of the specific site of the noxious stimulus and is not easily explained as a reflex.

The author points out that such experimental results indicate pain perception in crustaceans and that the responses cannot be explained by nociception alone.

The author also points out, that while the evidence for pain perception is as strong for decapods as it is for fish, the idea that fish experience pain has broader acceptance than the idea of decapod pain.



Elwood, R.W. (2012). Evidence for pain in decapod crustaceans. *Animal Welfare*, 21(S2): 23-27.

Assessing pain in rabbits

Ear tattooing is a routine identification procedure performed on laboratory, commercial and companion rabbits. Although this procedure is considered painful, it is usually performed without the provision of analgesia which compromises animal welfare. Current means of assessing pain in rabbits are poor and more reliable methods are required.

The objectives of this study were to assess the physiological and behavioural effects of ear tattooing on rabbits, evaluate the analgesic efficacy of topical local anaesthetic cream application prior to tattooing, and to develop a scale to assess pain in rabbits based on changes in facial expression. Eight New Zealand White rabbits each underwent four different treatments of actual or sham ear tattooing, with and without prior application of a topical local anaesthetic (lidocaine/prilocaine). Changes in immediate behaviour, heart rate, arterial blood pressure, serum corticosterone concentrations, facial expression and home pen behaviours were assessed. Changes in facial expression were examined to develop the Rabbit Grimace Scale in order to assess acute pain. The Rabbit Grimace Scale is composed of 5 facial action units: orbital tightening, cheek fattening, nose shape, whisker position and ear position.

Tattooing without EMLA cream resulted in significantly greater struggling behaviour and vocalisation, greater facial expression scores of pain, higher peak heart rate and higher systolic and mean arterial blood pressure compared to all other treatments.

Physiological and behavioural changes following tattooing with EMLA cream were similar to those in animals receiving sham tattoos with or without EMLA cream.

Serum corticosterone responses did not differ between sham and tattoo treatments. The authors conclude that ear tattooing without analgesia causes pain and distress in rabbits, and that prior application of local anaesthetic cream (EMLA) is a safe, accessible and effective method of analgesia that prevents almost all pain associated with the procedure. The authors also conclude that the Rabbit Grimace Scale developed, appears to be a reliable way to assess acute pain in rabbits and may be helpful to assess acute pain in rabbits when evaluating other procedures.



Keating, S.C.J, Thomas, A.A., Flecknell, P.A. and Leach, M.C. (2012) Evaluation of EMLA cream for preventing pain during tattooing of rabbits: Changes in physiological, behavioural and facial expression responses. *PLoS ONE* 7(9): e44437. doi:10.1371/journal.pone.0044437.



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ARTICLES OF INTEREST

COMPANION ANIMALS

White, S. (2012) Companion Animals, Natural Disasters and the Law: An Australian Perspective, *Animals*, 2(3): 380–394.

FARM ANIMALS

Aquaculture

Zimmermann, E.W., Purchase, C.F. & Fleming, I.A. (2012) Reducing the incidence of net cage biting and the expression of escape-related behaviors in Atlantic cod (*Gadus morhua*) with feeding and cage enrichment, *Applied Animal Behaviour Science*, 141(1–2): 71–78.

Cattle

Alawneh, J.I., Laven, R.A. & Stevenson, M.A. (2012) Interval between detection of lameness by locomotion scoring and treatment for lameness: A survival analysis, *The Veterinary Journal*, 193(3): 622–625.

Bak Jensen, M. (2012) Behaviour around the time of calving in dairy cows, *Applied Animal Behaviour Science*, 139(3–4): 195–202.

Barrier, A.C., Haskell, M.J., Macrae, A.I. *et al.* (2012) Parturition progress and behaviours in dairy cows with calving difficulty, *Applied Animal Behaviour Science*, 139(3–4): 209–217.

Dias Coimbra, P.A., Pinheiro Machado Filho, L.Z. & Hötzel, M.J. (2012) Effects of social dominance, water trough location and shade availability on drinking behaviour of cows on pasture, *Applied Animal Behaviour Science*, 139(3–4): 175–182.

Huxley, J.N. (2012) Lameness in cattle: An ongoing concern, *The Veterinary Journal*, 193(3): 610–611.

Korthals, M. (2012) Emotions, truths and meanings regarding cattle: Should we eat meat? *Journal of Agricultural and Environmental Ethics*, 25(4): 625–629.

Laven, R. (2012) Bovine lameness: Still more to learn, *The Veterinary Journal*, 193(3): 607–609.

Whay, H.R., Barker, Z.E., Leach, K.A. *et al.* (2012) Promoting farmer engagement and activity in the control of dairy cattle lameness, *The Veterinary Journal*, 193(3): 617–621.

Pigs

Bierhals, T., Magnabosco, D., Ribeiro, R.R. *et al.* (2012) Influence of pig weight classification at cross-fostering on the performance of the primiparous sow and the adopted litter, *Livestock Science*, 146(2–3): 115–122.

Bloemhof, S., Kause, A., Knol, E.F. *et al.* (2012) Heat stress effects on farrowing rate in sows: Genetic parameter estimation using within-line and crossbred models, *Journal of Animal Science*, 90(7): 2109–2119.

Elmore, M.R.P., Garner, J.P., Johnson, A.K. *et al.* (2012) Differing results for motivation tests and measures of resource use: The value of environmental enrichment to gestating sows housed in stalls, *Applied Animal Behaviour Science*, 141(1–2): 9–19.

Fels, M., Hoy, S. & Hartung, J. (2012) Influence of origin litter on social rank, agonistic behaviour and growth performance of piglets after weaning, *Applied Animal Behaviour Science*, 139(3–4): 225–232.

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