



10th  
Anniversary  
edition



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.



## COMPANION ANIMALS

### Mental health of dogs from puppy farms

Around the world, many dogs (including purebreds) are bred intensively in large-scale commercial factories commonly referred to as 'puppy farms' or 'puppy mills'. There is plenty of anecdotal evidence to suggest that the conditions in many such establishments can be very poor, with breeding dogs being kept in confinement for the entirety of their reproductive life. Such dogs may receive little socialisation in the form of the company of other dogs or positive human contact. They are also typically kept intensively in small spaces, and receive little to no exercise, enrichment or health care. In order to establish the empirical facts about the effects of puppy farms, the authors of this study surveyed the owners of over 1,160 dogs, which were identified as previously having been used as a breeder in a puppy farm. In addition, a group of around 330 non-puppy farm pet dogs was used as a control group, and compared to puppy-farm individuals matched for breed, age, sex and neuter status. The survey tool used in this study was the Canine Behavioural Assessment and Research Questionnaire (C-BARQ; <http://www.cbarq.org>), which poses a series of questions relating to a dog's typical responses – in terms of intensity and frequency – to a variety of everyday situations during the recent past.



lasting psychological problems. However, they also point out that many such dogs can and do overcome their problems with the help of behavioural therapy and patient owners and that there has been a large degree of success in the rehabilitation of these dogs, therefore, such dogs should not be avoided as pets. This study provides the first quantitative evidence that the conditions prevailing in puppy farms are injurious to the mental health and welfare of dogs.

The researchers found that former puppy farm breeding animals showed higher rates of health problems than control dogs (23% versus 16%). With respect to behaviour, puppy farm dogs displayed higher rates of fear, house-soiling and compulsive staring. Puppy farm dogs also displayed lower rates of aggression (toward strangers and other dogs), trainability, chasing small animals, excitability and energy. The authors conclude that factors such as the stressful conditions present in puppy farms, as well as inadequate socialisation during the first few months of life, can result in long-



McMillan, F.D., Duffy D.L and Serpell J.A. (2011) Mental health of dogs formerly used as 'breeding stock' in commercial breeding establishments, *Applied Animal Behaviour Science*, 135: 86-94.

### Aquarium fish aggression and welfare

In the United States alone, around 20 million households are estimated to keep 183 million ornamental fish as pets. Unlike the fish reared in aquacultural facilities, the aquarium trade involves hundreds of species with diverse requirements, and ornamental fish owners may often be unaware of the welfare needs of their pet fish. In this experimental study the behaviour of a common aquarium fish, the Midas cichlid, was

investigated, primarily because this species is said to be highly aggressive in captivity. The study examined the aggressive behaviours of this fish towards others of the same species in captive situations, as well as in the wild.

It was found that when raised in a tank, one individual of the group, usually the largest, would show the most aggressive behaviour towards other group members. The level of aggression was not affected by the size of the group, or by the size of the tank. In general, aggression was higher in tank situations than in the

wild, although this could be reduced by increasing the enrichment provided to the fish in tanks. This included plants, rocks to provide a 3-D tank floor, and caves in which the fish could hide from aggressive individuals. The author concludes that most home aquaria do not provide conditions that allow fish such as the Midas cichlid to experience good welfare, and that fish owners should try to provide complex habitats in their tanks, in order to stimulate more natural behaviour in their fish.

Oldfield, R. (2011) Aggression and welfare in a common aquarium fish, the Midas cichlid, *Journal of Applied Animal Welfare Science*, **14**: 340-360.

## Inflammatory bowel disease in dog breeds

Inflammatory bowel disease (IBD) is a common condition in dogs, but its causes are poorly understood at the moment. In some ways, it is thought to be similar to the human diseases ulcerative colitis and Crohn's disease, as they are all chronic, relapsing conditions, and are thought



to involve an auto-immune response with widespread inflammation of the tissues of the gut. IBD in dogs is thought to have a range of environmental and genetic causes, but the exact manner in which the condition is inherited remains a mystery. Some breeds have been shown to be more susceptible to IBD, but to date few genes have been identified that play a role in the development of IBD.

In this retrospective study, the researchers examined the veterinary records of dogs with IBD treated at the Queen Mother Hospital for Animals in Hertfordshire in order to determine which breeds of dogs in this part of the UK had a greater incidence of IBD. It was found that five breeds – the German shepherd, Weimaraner, Rottweiler, Border collie and Boxer – were significantly more likely to develop the disease. Diagnosis of the disease appeared to take place at a significantly later age in Border collies, which indicates that the progression of IBD might be different in this breed. A previous retrospective study of canine IBD cases in Edinburgh also demonstrated an over-representation of the same five breeds for IBD.

Kathrani, A., Werling, D. & Allenspach K. (2011) Canine breeds at high risk of developing inflammatory bowel disease in the south-eastern UK, *Veterinary Record*, **169**: 635-638.

## FARM ANIMALS

### Pain, its assessment and management

A number of articles on the topical issue of pain have been reviewed for this edition of the Science Update. The broad issues covered in the articles selected for review are summarised below. The sections that follow this summary contain the usual summaries of the selected articles.

**The pain of birth** – Difficult deliveries can cause significant pain to the mother, and also adversely affect the long-term health and vigour of the newborn. In the case of cows, following prolonged labour due to birth complications, a dam may neglect to attend to her calf because of pain, exhaustion or the need for human intervention. This may result in reduced grooming behaviour directed at the calf, and/or a delayed onset of suckling by the calf. The former behaviour is crucial for the formation of a lasting bond between mother and calf, while the latter allows the transfer of essential antibodies (and hence the mother's immunity) to the newborn. Failure by the calf to ingest colostrum can result in ill health and even death. In general, the scientific literature on birth-related pain in cows and sows shows many parallels with studies on humans. In both cases, it has been reported that the pain of delivery is one of the most severe types of pain. Prolonged delivery can be caused by a range of physical, physiological and genetic causes, and this can have both health and production-related outcomes (reduced growth or milk production) in the mother and her offspring. There are drugs available that can help manage the pain of delivery, but it appears that the pain of birth is often not recognised or appreciated by veterinarians or producers.

**The pain of castration** – Castration of male livestock has traditionally been carried out to accomplish three goals – reduce unwanted breeding, reduce aggressive behaviour, and improve meat quality. For all animal species, and across all ages, castration is a highly painful procedure, and there exists a large body of scientific literature on the topic of reducing this pain. Most of these studies, however, focus on the pain caused by surgery, or immediately after surgery, while many of the painkillers that have been tested have short periods of activity. Few studies have investigated the long-term (over a few weeks) perception of pain in castrated animals. The administration of anaesthetics that render animals unconscious during the surgical procedure have been considered, but these have the disadvantage of being costly and time consuming, and of increasing the chances of the animal dying due to being crushed by the mother, or due to its inability to feed or keep warm soon after the procedure. While non-surgical alternatives to castration are now being developed, these procedures also need to be studied more intensively to determine their welfare implications.

*Pain in lambs* – The development of sensitivity to pain is an interesting field of study that has the potential to improve the welfare outcomes of animal husbandry practices. In lambs, for instance, the nervous system is reasonably well developed at birth (compared to human infants), and it could therefore be expected that age will not have an effect on pain sensitivity. However, there is some evidence that older lambs are more pain sensitive than younger lambs. This has implications for issues such as when painful procedures (e.g. tail-docking, castration, ear-tagging and mulesing) are best performed. Mulesing is a cheap, one-off procedure that surgically removes the wrinkly skin around the breech and tail of Merino lambs. Failure to do so may increase the risk of flystrike, where the skin becomes infested with blowfly larvae, causing considerable distress and eventual death to the animal. In spite of the advantages of mulesing, it is currently a major welfare concern in the Australian wool industry, because the procedure is commonly carried out without pain relief, and lambs visibly appear to be in pain for at least 48 hours afterwards, whereas the wound could take up to four weeks to heal. The current alternatives – pain relief; needleless intradermal injection of a chemical formulation; or plastic clips – are being trialled in sheep farms, and have differing levels of effectiveness.

*Pain in poultry* – In modern farming systems, poultry are subjected to a range of procedures that have the potential to cause both acute and chronic pain. There is currently much evidence to show that poultry can perceive pain of different types, and with different causes. It has also been shown that poultry have a greatly developed ability to cope with even high levels of constant pain. This finding, however, should not be taken to mean that pain is irrelevant to poultry. Instead, more research is required for a better understanding of this complex phenomenon, which has the potential to greatly impact poultry welfare.

*Indicators of pain* – Many studies employ bio-indicators, such as blood levels of the stress hormone cortisol, electrodermal activity (the increase in electrical conductivity caused by sweating), and average daily gain (increase in weight as a result of feed intake). For cattle, chute exit velocity (the speed at which a calf will run out of a restraint after a painful procedure) is also sometimes used in conjunction with physiological indicators. However, it should be kept in mind that not all indicators are equally reliable – some drugs may simply slow down the animal by sedating it, thereby decreasing chute exit velocity. Similarly, an animal may sweat more in generally stressful situations, even when it is not in pain. Purely behavioural means of assessing pain also exist, and in some cases the pain-related behaviour is quite obvious – calves undergoing dehorning or cautery disbudding struggle violently, and have to be restrained. Behaviours consistent with acute pain seem to persist for 4-8 hours following such procedures, and there are indications that in the case of more traumatic procedures like dehorning, chronic pain may persist for weeks afterwards. Naturally, the fact that pain-related behaviours stop or reduce following the administration of known painkillers is also a strong indication that the animal was/is experiencing pain. Formalised behavioural means of assessing pain include measures such as the Numerical Rating Scale, which counts the frequencies of behaviours previously established as pain-related behaviour. For calves, such behaviours might include head-shaking, head-rubbing and ear-flicking. In the case of non-routine surgical procedures (which include veterinary interventions such as caesarean sections or biopsies), the animal is usually restrained, which makes the observation of the behavioural signs of pain difficult, if not impossible. Although local painkillers are given to the animal to offset the pain of such surgical procedures, post-operative changes in behaviour may be more significant, in that they indicate that the animal might be suffering from long-term pain.

## Castration and dehorning

The dehorning and castration of calves are usually carried out concurrently, and cause significant pain to the animal. This is a particularly serious welfare issue because the procedures are usually carried out without any anaesthetic. A range of painkillers were investigated in this study, including a mixture of xylazine, ketamine and butorphanol (XKB), sodium salicylate (SAL, an aspirin-like drug) or a combination of both. SAL was administered from 24 hours prior to surgery to 48 hours after surgery, while XKB was administered as an intramuscular injection immediately prior to surgery. The researchers found that SAL-treated calves had higher average daily gain, and lower long-term blood cortisol levels than the other groups. XKB calves, on the other hand, had lower rises in blood cortisol immediately following surgery, reduced chute exit velocity and reduced electrodermal activity. The researchers conclude that while XKB may be useful in reducing short-term postoperative pain, SAL could be beneficial in increasing production in the longer term.

Baldridge, S.L., Coetzee, J.F., Dritz, S.S. *et al.* (2011) Pharmacokinetics and physiologic effects of intramuscularly administered xylazine hydrochloride-ketamine hydrochloride-butorphanol tartrate alone or in combination with orally administered sodium salicylate on biomarkers of pain in Holstein calves following castration and dehorning, *American Journal of Veterinary Research*, 72(10): 1305-1317.



## Difficult calving, maternal pain and calf vigour



Calves that have experienced a difficult delivery are said to be less vigorous. In other words, they spend more time lying on their side, and are slow to stand up and suckle at the dam's udder. Changes in the mother's behaviour following painful labour can exacerbate this situation. In this study, video recordings of the first three hours following 12 natural and 16 assisted (difficult labour) calvings from Holstein cows were compared. The researchers found that calves from assisted births were slow to reach the udder, and that some could not even stand up during the observation period. Cows from both groups performed normal maternal behaviours (licking the calf), but cows that had undergone assisted deliveries spent less time self-grooming. This could indicate a greater degree of pain in these cows, compared to cows that had experienced natural deliveries. The low vigour of calves born with assistance may impact their longer-term health and survival.

Barrier, A.C., Ruelle, E., Haskell, M.J. *et al.* (In press) Effect of a difficult calving on the vigour of the calf, the onset of maternal behaviour, and some behavioural indicators of pain in the dam, *Preventive Veterinary Medicine*.

## Pain relief after chemical disbudding

The disbudding (destruction of the horn buds) of calves can be carried out using a variety of techniques, including scoop disbudding, thermo-cautery with a hot iron, or caustic paste. The caustic paste method involves the application of a thin layer of sodium or calcium hydroxide to the horn buds of calves under the age of six weeks. In this study, the painkiller tramadol was given intravenously or rectally to calves undergoing caustic paste disbudding. The researchers found that injected Tramadol somewhat reduced the pain of disbudding at the late stages of the study (46-60 minutes following the application of the paste), but not immediately after the application of the paste, when the animals were scored as being in pain. Rectal administration of tramadol had no effect. Moreover, control calves that

were not disbudded, but were injected with tramadol, also showed some pain-related behaviour soon after injection. However, the authors point out that, this may be due to Tramadol's side effects or, misrepresentation of observed pain-related behaviours. The study concludes that caustic paste disbudding is a painful procedure that lasts at least an hour from the time the paste is applied.

Braz, M., Carreira, M., Carolino, N. *et al.* (2011) Effect of rectal or intravenous tramadol on the incidence of pain-related behaviour after disbudding calves with caustic paste, *Applied Animal Behaviour Science*, **136**: 20-25.

## Pain caused by mulesing in sheep

This review article summarises the advances made in our understanding of the ways in which to deal with the pain caused by mulesing, and also discusses the future directions the Australian wool industry would need to take, in order to address public concerns regarding Merino sheep welfare. The author argues that a substantive advance has been made in sheep welfare research, in that a post-surgery topical painkiller is currently commercially available to deal with mulesing pain in the short term. However, much work still needs to be done, as many treatments that were once thought to be viable non-surgical alternatives to mulesing have been tested and rejected, due to welfare or economic concerns. A few current alternative techniques look promising, but the author argues that the only sustainable way forward would be to genetically select sheep that have fewer breech skin folds. This will admittedly be a long process, but could be undertaken in conjunction with on-farm strategies to control the sheep blowfly.

Fisher, A. (2011) Addressing pain caused by mulesing, *Applied Animal Behaviour Science*, **135**: 232-240.

## Pain in poultry



This review article summarises our current understanding of the pain experienced by poultry subjected to a variety of husbandry procedures. Recent research has shown that the bird's beak, for example, is a highly sensitive organ, and that beak trimming in young chicks can cause a brief moment of intense pain. However, the nerves regenerate, and the bird is then able to function normally. In older birds, the procedure can cause long-lasting pain from the formation of scar tissue, even after the beak has healed. The removal of feathers

during bouts of feather-pecking can cause pain, as can the shackling of poultry by their feet, prior to being slaughtered. Adverse living conditions can result in painful disorders such as footpad dermatitis, while broiler chickens and laying hens can suffer leg fractures, joint pain and other skeletal disorders.

Gentle, M. (2011) Pain issues in poultry, *Applied Animal Behaviour Science*, **135**: 252-258.

## Pain in lambs

In this experimental study, the researchers looked for the presence of any differences in the pain thresholds of lambs of different ages and sex. Lambs first had the lower part of their hindlimbs shaved, and were then allowed to lie down naturally, with one or both legs extended. Then, a remote thermal laser was aimed at the shaved skin from approximately 1.5 metres away, and kept on until the lamb moved its leg away from the stimulus. The time taken for the lamb to move its leg was recorded. The researchers found that there were no individual age or sex differences in pain thresholds. However, the two variables showed an interaction, with the result that older males had higher pain thresholds than females. The results indicate that pain sensitivity therefore continues to develop in lambs after birth, and that painful procedures should be carried out at a later age in males.



Guesgen, M.J., Beausoleil, N.J., Minot, E.O. *et al.* (2011) The effects of age and sex on pain sensitivity in young lambs, *Applied Animal Behaviour Science*, **135**: 51-56.

## The pain of birth in cows and sows

Birth pain in cows and sows is caused by many of the same factors that also operate in humans during delivery. The initial stage of delivery – involving cervical dilation and the distension of the lower part of the cervix – is often accompanied by visceral pain which may also be felt on the abdominal wall, hips, lower back and thighs. When abdominal contractions start, structures in the pelvis are mechanically distended by the advancing foetus, leading to the sensation of sharp and localised somatic pain. Pain can be exacerbated by a lengthy delivery, sex, size and number of the foetus(es), and also



incorrect orientation of the foetus. Indicators of pain during or following delivery include reduced feed intake and/or milk production, high levels of stress hormones in the blood, behavioural indices such as lying down more, rubbing against the wall, urinating or scraping on the floor, and vocalisations. The authors highlight the need for more research in this field, and suggest that even simple solutions like providing a suitable environment for delivery could have a beneficial impact on the welfare of the mother.

Mainau, E. & Manteca, X. (2011) Pain and discomfort caused by parturition in sows, *Applied Animal Behaviour Science*, **135**: 241-251.

## Alternatives to castration in pigs and other farm animals

In most European countries, castration – a highly painful procedure – is carried out on the majority of male pigs. Notable exceptions are the UK and Ireland, where a tiny proportion of the piglet population is castrated, mostly due to welfare concerns. Castration is said to yield several production benefits, including improvements in meat quality; the meat of intact pigs is said to have an unpleasant flavour, called 'boar taint'. In the UK and Ireland, this problem is solved by slaughtering market pigs at a lower carcass weight. Castration is traditionally carried out surgically, but non-surgical procedures, such as immuno-castration are now being trialled. In this procedure, the pig's immune system is encouraged to produce antibodies against its own reproductive hormones. This stops the development of the testes in a pain free manner, and tends to result in similar behavioural patterns to those seen in castrated pigs.

In general, the younger the age at which castration is carried out on pigs, cattle and sheep, the lower the pain. Pain can be reduced by using analgesics but development and uptake of alternatives to castration would significantly improve animal welfare.

Rault, J., Lay Jr., D.D. & Marchant-Forde, J.N. (2011) Castration induced pain in pigs and other livestock, *Applied Animal Behaviour Science*, **135**: 214-225.



## Nitrous oxide as a painkiller during piglet castration

Nitrous oxide (NO<sup>2</sup>), or laughing gas, is widely used on humans during minor dental procedures, and has the advantage of being easily administered, fast-acting, cheap and without known side-effects. In this experimental study, the researchers tested whether NO<sup>2</sup> could be used to reduce the pain of castration in piglets. It was found that although NO<sup>2</sup> was able to sedate the piglets, and made them easier to handle, they woke up when castration was performed, and produced just as many vocalisations as the piglets that had received no NO<sup>2</sup>. Following castration, NO<sup>2</sup>-treated piglets displayed less huddling behaviour and more tail-wagging than control piglets, indicating that there was some reduction in pain for a few hours following surgery. The authors conclude the NO<sup>2</sup> alone will not lessen the pain of castration in piglets.



Rault, J.-L. & Lay, D.C. (2011) Nitrous oxide by itself is insufficient to relieve pain due to castration in piglets, *Journal of Animal Science*, **89**: 3318-3325.

## The pain of dehorning and disbudding

The horns of cattle are removed in a variety of ways, including cautery disbudding (heating the horn buds with a heated bar), caustic disbudding (using a caustic chemical paste) and dehorning (removal of a horn with a knife or saw). Of these, cautery disbudding appears to

cause the lowest blood cortisol response, which suggests that this method causes the least short-term pain. The reasons for this difference may include the following – cautery is a one-off procedure that causes superficial tissue damage, whereas caustic disbudding requires the chemicals to remain on the horn buds for a period of time, while dehorning may cause deeper wounds. The authors of this review article argue that while there are many painkillers currently available, which can be used in combination to significantly reduce short-term pain, little is known about chronic pain following dehorning, which can persist for up to a few weeks.

Stafford, K.J. & Mellor, D.J. (2011) Addressing the pain associated with disbudding and dehorning in cattle, *Applied Animal Behaviour Science*, **135**: 226-231.

## The pain of non-routine surgical procedures

Veterinarians frequently perform invasive medical procedures on farm animals without the help of a general anaesthetic. Such procedures may be relatively minor, as in the case of a liver biopsy or a laparotomy, or a major operation, such as a caesarean section, or the repair of a displaced omasum. In most cases, a local painkiller is administered to offset the pain of the surgical procedure, but usually no measures are taken to manage the long-term, post-operative pain of farm animals. Such pain is usually indicated by behavioural responses such as reduced food intake, adopting pain-related postures, wound-directed grooming, and changes in lying position. The authors of this review article conclude that the use of pre- and post-operative analgesia can significantly improve the welfare of farm animals, but also add that care must be taken in choosing the right drugs, as some painkillers can lead to complications around calving, for instance. They also disagree with the reasoning that pain speeds up recovery by stopping an animal from using the affected part of its body. Instead, say the authors, surgeons should focus on good suturing techniques and stabilisation of the damaged area, rather than withholding pain medication.

Walker, K.A., Duffield, T.F. & Weary, D.M. (2011) Identifying and preventing pain during and after surgery in farm animals, *Applied Animal Behaviour Science*, **135**: 259-265.

## RESEARCH ANIMALS

### Painkillers given orally in Nutella for laboratory mice

Laboratory mice are routinely subjected to surgical procedures for research purposes, and it is crucial that they be provided with adequate pain relief to counter

any post-operative pain. Traditionally, mice are given repeated injections of painkillers after an operation, but the frequent handling and use of needles can cause high levels of stress to the animals. On the other hand, if the animals are not given regular injections, their blood levels of painkiller may drop, and they may experience pain and reduced welfare.

Previous studies have tested the administration of painkillers to rats in food items. It has been shown that the dosage of painkiller required to have an effect is much higher using this method, compared to injections. In this study, the researchers attempted to feed painkillers mixed in the hazelnut spread Nutella to laboratory mice, to test if such a mixture would be consumed. They found that even high concentrations of the drug Buprenorphine were consumed by two strains of mice, when mixed with Nutella. Female mice were quicker to accept this new food item than males, but both eventually ate the mixture. This resulted in a higher blood concentration of the drug, and for a longer duration (up to 17 hours), than that which had previously been achieved using injections.

Jacobsen, K. *et al.* (2011) Voluntary ingestion of buprenorphine in mice, *Animal Welfare*, 20: 591-596.

## Toys for captive rabbits

Rabbits kept in captivity may develop a stereotypic behaviour known as 'bar-biting', where animals chew on the bars of their cage. Researchers question whether bar-biting is an abnormal behaviour itself or a normal behaviour on an inappropriate substrate as rabbits normally chew regularly to wear down their continuously growing teeth. If rabbits do not have the opportunity to chew on appropriate materials, they will chew on any cage component. However cage bars do not provide suitable abrasion often leading to dental malocclusions and/or abscesses that can impair feeding, grooming and the ingestion of caecotrophs thereby compromising rabbit welfare.

Rabbits were provided with three kinds of toys in this experimental study, to see if rabbits would preferentially chew on them instead of the cage. These included a single cardboard roll, five cardboard rings or a hard



rubber ball with a bell inside it. The researchers found that when a toy was available, the rabbits spent more time chewing on it than on inappropriate objects such as the cage bars. They also spent significantly more time in total chewing when toys were present. Although none of the toys used in the study caused a decrease in the amount of time spent chewing on the cage, there may be one or more toys that do so. None of the rabbits in this study initially showed stereotypic behaviour, making it impossible to assess the effect of toys on pre-existing stereotypic behaviours. The authors conclude that providing toys for captive rabbits to chew on improves their welfare. Note that Hay was not offered to the rabbits to avoid the risk of exposure to pathogens that could compromise their SPF status. In previous studies rabbits preferred hay over other objects and engaged in fewer abnormal behaviours including excessive furllicking, sham-chewing, and bar-biting.

Poggialiomi, S. *et al.* (2011) Environmental enrichment of New Zealand White rabbits living in laboratory cages, *Journal of Veterinary Behavior*, 6: 343-350.

## Shelters for Syrian hamsters



Syrian hamsters are often used in immunological, chronobiological and behavioural research. They are territorial and therefore usually kept in individual cages. In the laboratory, they are nocturnal and commonly build nests out of bedding or nesting

material in which they sleep during the daytime relatively exposed to view and to light. In this experimental study, hamsters were first allowed to choose between a cage that contained a shelter and an empty cage. Next they were allowed to choose between pairs of shelter types (different lengths of pipe, a box, an aluminium cover or deep bedding) placed in two adjacent cages. The light level was also varied, to determine if the hamsters preferred to use shelters in brightly-lit rooms.

In the first experiment, it was found that the hamsters generally preferred the cage that contained a medium length of plastic pipe. The light level appeared to make no difference. In the second experiment, the researchers noted that once again, the hamsters generally preferred to nest in a medium length of pipe that was closed at one end. They were found to nest in this shelter about 50% of the time. The authors recommend that medium length pipes closed at one end make good shelters for Syrian hamsters, but also note that in laboratory situations, such a shelter might completely hide an animal, and prevent its observation.

Veillette, M. & Reeb, S. (2011) Shelter choice by Syrian hamsters (*Mesocricetus auratus*) in the laboratory, *Animal Welfare*, 20: 601-611.



## WILD ANIMALS

### Effect of fertility control on koala behaviour

Koala populations sometimes need to be controlled because of the potential damage large numbers of animals can cause to their immediate environment. Fertility control using reproductive hormone implants are thought to be a humane way of rendering koalas unable to breed – hormones such as levonorgestrel can stop a female koala from breeding for up to six seasons, without affecting normal sexual behaviour or ovarian function. However, there is a potential for such treatments to significantly alter the ranging behaviour of wild animals (this involves the movement of the animal through its territory to search for food or mates), and studies on other species have shown mixed results.

In this experimental study, levonorgestrel implants were placed under the skin of eight female koalas, while another group of koalas were given hormone-free control implants. Upon tracking these free-ranging animals by means of radio collars, the researchers found that during the first breeding season, when most females were carrying young from the previous year, there was very little movement in both groups. In the second and third seasons, all of the treated females were without young, and all moved long distances, up to 11 km, away from their normal range. Even among the fertile (control) females, the only ones that moved



long distances were those that were not carrying young. Thus, the hormone treatment itself was not causing a change in behaviour. The authors suggest that koalas have evolved to live at low population densities, and that long-distance movements, such as those performed by the childless females in this study, may be a strategy to help locate potential mates.

Hynes, E. *et al.* (2011) The effects of gestagen implants on the behaviour of free-ranging female koalas, *Applied Animal Behaviour Science*, **134**: 209-216.

## ARTICLES OF INTEREST

### COMPANION ANIMALS

Sloman, K.A., Baldwin, L., McMahon, S. *et al.* (2011) The effects of mixed-species assemblage on the behaviour and welfare of fish held in home aquaria, *Applied Animal Behaviour Science*, **135**(1-2): 160-168.

### FARM ANIMALS

#### Aquaculture

Aksakal, E., Ekinci, D., Erdogan, O. *et al.* (2011) Increasing stocking density causes inhibition of metabolic-antioxidant enzymes and elevates mRNA levels of heat shock protein 70 in rainbow trout, *Livestock Science*, **141**(1): 69-75.

Dempster, T., Kristiansen, T.S., Korsoen, O.J. *et al.* (2011) Technical note: Modifying Atlantic salmon (*Salmo salar*) jumping behavior to facilitate innovation of parasitic sea lice control techniques, *Journal of Animal Science*, **89**(12): 4281-4285.

van Zwol, J.A., Neff, B.D. & Wilson, C.C. (2012) The influence of non-native salmonids on circulating hormone concentrations in juvenile Atlantic salmon, *Animal Behaviour*, **83**(1): 119-129.

#### Cattle

Alawneh, J.I., Laven, R.A. & Stevenson, M.A. (2011) The effect of lameness on the fertility of dairy cattle in a seasonally breeding pasture-based system, *Journal of Dairy Science*, **94**(11): 5487-5493.

Blackie, N., Amory, J., Bleach, E. *et al.* (2011) The effect of lameness on lying behaviour of zero grazed Holstein dairy cattle, *Applied Animal Behaviour Science*, **134**(3-4): 85-91.

Cooke, R.F., Bohnert, D.W., Meneghetti, M. *et al.* (2011) Effects of temperament on pregnancy rates to fixed-timed AI in Bos indicus beef cows, *Livestock Science*, **142**(1-3): 108-113.

Duve, L.R. & Jensen, M.B. (2011) The level of social contact affects social behaviour in pre-weaned dairy calves, *Applied Animal Behaviour Science*, **135**(1-2): 34-43.

Fishwick, J. (2011) Tackling welfare issues in cattle, *Veterinary Record*, **169**(23): 76.

Heikkilä, A.-M., Nousiainen, J.I. & Pyörälä, S. (2012) Costs of clinical mastitis with special reference to premature culling, *Journal of Dairy Science*, **95**(1): 139-150.

Ivemeyer, S., Knierim, U. & Waiblinger, S. (2011) Effect of human-animal relationship and management on udder health in Swiss dairy herds, *Journal of Dairy Science*, **94**(12): 5890-5902.

Jensen, M.B. (2011) The early behaviour of cow and calf in an individual calving pen, *Applied Animal Behaviour Science*, **134**(3-4): 92-99.

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## UPCOMING EVENTS

### RSPCA Scientific Seminar 2012



Tuesday 28 February 2012, Bradman Theatre, National Convention Centre, Canberra

Visit the [RSPCA Scientific Seminar website](#) for more information, including the program and registration form.

## Public lecture – Animal welfare & ethics: Where does science end and ethics begin? by Peter Sandøe

The keynote speaker at this year's Scientific Seminar is Peter Sandøe, Professor of Bioethics at the University of Copenhagen. To take advantage of his visit, RSPCA Australia, in collaboration with the University of Queensland, Melbourne University and Murdoch University is hosting a series of public lectures in Brisbane, Melbourne and Perth at which Peter Sandøe will further elaborate on the topic of animal welfare and ethics. It promises to be an engaging lecture that will challenge your thinking on ethical issues.

Free public lecture dates & venues:

Wednesday 29 February 2012 6-7pm + refreshments	Thursday 1 March 2012 6-7pm + refreshments	Friday 2 March 2012 12.30-1.30pm
Forgan Smith Building, Rm 1E215 University of Queensland University Drive St Lucia	Lower Lecture Theatre Melbourne School of Land & Env Royal Parade Melbourne	Biological Sciences Lecture Theatre Murdoch University 90 South Street Perth

To register, email [rspca@rspca.org.au](mailto:rspca@rspca.org.au) before 24 February 2012.

Please pass on to those who may be interested. Thank you!



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