Report of the 2014 RSPCA/UFAW Rodent Welfare Group meeting

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Introduction

The RSPCA/UFAW Rodent Welfare Group holds a one-day meeting every autumn so that its members can discuss current welfare research, exchange views on rodent welfare issues and share experiences of the implementation of the 3Rs of replacement, reduction and refinement with respect to rodent use. A key aim of the Group is to encourage people to think about the whole lifetime experience of laboratory rodents, ensuring that every potential negative impact on their wellbeing is reviewed and minimised.

Our 21st annual meeting was held on 23rd October, attracting 90 delegates from a wide range of universities and pharmaceutical companies throughout the UK. Presentation topics included animal sentience, reducing suffering during procedures, assessing rodent health and welfare, and how to ensure the right decisions are made when providing 'environmental enrichments' such as running wheels. The day ended with a discussion on the 'culture of care' and how this can be recognised, promoted and maintained within institutions. This report summarises the meeting and ends with a list of action points for readers to raise at their own establishments.

Animal sentience: what do we know and why does it matter?

Helen Proctor, World Animal Protection

Animal sentience can be defined as 'the ability to feel both positive and negative emotions, and to be aware of a variety of states and sensations'.[1] Research into animal sentience is constantly expanding so that we can now infer more than ever about the subjective minds of animals.[2] In recent years research has shown that some animals grieve[3], that decapod crustaceans can feel pain[4], and that mice and rats can be empathetic.[5,6] This fascinating area of science provides us with insights into the emotional lives of animals, with important implications for how we utilise and interact with them.[1]

However, because animal sentience is concerned with the inner mind of our fellow animals, studying sentience may be viewed as controversial due to its apparently subjective nature.[1,7] Critics argue that it is impossible to 'measure' animal emotions objectively or even attribute any meaningful experience to them.[8] But in a recent systematic review of the scientific literature we found that much research using animals does assess, and use, the subjective states of animals objectively and scientifically.[2] Furthermore, it uses these states to evaluate the effectiveness and safety of drugs for human therapy.

Our systematic review included over 2,500 papers published between 1990 and 2012, selected on the basis of their inclusion of keywords specific to animals and animal sentience.[2] We found that knowledge of animal sentience comes largely from laboratory research, given that over 79 % of relevant studies were conducted in the laboratory. The majority of studies (69 %) were conducted for human benefit, e.g. pharmaceutical research and development, rather than for the purpose of gaining insights into animal welfare or behaviour. Almost all studies assumed the existence of sentient traits such as pain, fear and pleasure.

Rodents were the subject of most of the papers in our review, and as a result we can infer a lot about their subjective minds. To give just three examples, studies have shown that rodents are capable of:

- **Regret**, defined as recognising that you made a mistake and that, if you had done something differently, there would have been a better outcome. Researchers studying decision-making in rats found that animals who skipped the chance to have a high-value treat, so they ended up with a lower-value reward, looked back at the location of the high-value treat. On the basis of the animals' behaviour, the implication was that they regretted their decision. Neurological studies showed that the orbitofrontal cortex of the rat brain was active when the animals looked back, which is the same area that is active in the human brain when we are feeling regretful.[9]
- **Empathy**, or the ability to understand and share the feelings of another, has been examined in laboratory rats by placing a free rat into an arena containing a cagemate who is trapped in a restrainer.[5] After several sessions, the free rat will learn to open the restrainer and free the trapped animal, but they do not open restrainers that are empty or contain objects. Given a choice between opening two restrainers containing a cagemate or chocolate respectively, rats preferred to open the restrainer with the cagemate inside first, then open the second restrainer and share the chocolate. This provides strong evidence of empathetically-motivated helping behaviour in the rat*.
- **Laughter**, in the form of ultrasonic vocalisation patterns of around 50 kHz which have been recorded in rats, in response to play with other rats or tickling by humans. These 'chirps' are widely accepted to indicate positive 'affect' (or mood), and are increasingly believed to be analogous to laughter in humans#. [10]

Studies such as these have clear implications for those using or caring for laboratory animals. They may simply confirm what empathetic staff have already observed, or indicate potential issues with respect to data quality (e.g. if social animals, capable of empathy, are housed individually), or help to identify ways of refining housing, husbandry and care. Of course, some of this research presents an ethical dilemma, if regulated procedures are used to generate data that can be used to improve the lives of other animals. Ultimately, encouraging wider recognition that animals are sentient beings and that their feelings matter, both to them and to us, can provide a driver to replace animal use.

If you are interested in learning more about the science of animal sentience, then join the discussion. Visit the Sentience Mosaic (www.sentiencemosaic.org), where you can have your say in virtual debates, read inspiring interviews, and learn about all the great scientific research taking place around the world.

Skin to skin contact: looking at refinements in skin closure techniques
Debbie Bursnall, University of Leicester

* See video at http://www.sciencemag.org/content/334/6061/1427/suppl/DC2
# Article and video at http://www.wired.com/2013/09/tickling-rats-for-science/

Surgical embryo transfer is a very commonly conducted procedure, so ensuring that the most refined techniques are used will have a significant impact on laboratory mouse welfare. Skin closure at the end of the procedure is an important area to consider. Many options are available for closing the skin, all of which aim to produce healing by 'primary intention', which is directly opposing the skin layers to facilitate quick, natural healing. Commonly used skin closure methods have developed from medical and veterinary practice, but there is little published information about the quality of the wound closure in mice. A new study involving the use of CD1 mice for embryo transfer prompted a study to compare different skin closure methods, to see which was best tolerated and provided the most effective healing, as we wanted to ensure that we were observing good practice and minimising suffering. To avoid generating additional animal use, the mice used in the evaluation study were undergoing embryo transfer anyway as part of another project.

The study compared four skin closure methods in surgical embryo transfer mice; tissue adhesive (GLUture®, Abbott Animal Health), absorbable suture (Vicryl™ 6/0, Ethicon), 7mm Autoclips® (Harvard Apparatus) and staples (Proximate® 35, Ethicon). Each of the four methods was used to close a single, lateral dorsal skin incision in 124 CD1 mice at 0.5 dpc, in a randomised study conducted over 15 days.

All mice were anaesthetised with isoflurane (2 to 2.5 %) in oxygen and subcutaneous carprofen was administered (at 10 mg/kg) on induction for pain relief. A local anaesthetic (bupivacaine) was also administered at the incision site after shaving, and then a scalpel was used to make a lateral dorsal skin incision of 5 to 6 mm, followed by a dorsal ventral muscle incision. An infundibulum embryo transfer was performed. The wound was then closed using either (i) a single blanket suture with 6/0 Vicryl™ (35 mice), (ii) a thin line of tissue adhesive (37 mice), (iii) two staples (19 mice) or (iv) a single 7 mm Autoclip® (33 mice). Wound closure took the least time with Autoclips® (25 seconds) and tissue glue took the longest time (140 seconds).

The mice were closely monitored at least daily for 14 days post-operatively, focusing on skin condition and whether the closure device was retained and the wound still sealed. If a mouse had removed the device, they were carefully examined to see whether remedial action was necessary to alleviate pain or the risk of infection. Two skin samples from each closure method were taken post mortem and sent for histology at 4 and 9 weeks post-op, to evaluate skin healing. The results of the study are summarised in Table 1.

TABLE 1 NEAR HERE

Although the advantages and disadvantages for the animals were given top priority when deciding which technique was to be preferred, we also reviewed the financial cost of the different methods. Sutures and glue worked out as £2.70 and £2.33 per animal respectively, while staples and Autoclips® were significantly cheaper but required outlay on equipment – £8.70 for the staples and over £400 in the case of Autoclips®.

We concluded that sutures were the best tolerated and most effective method of skin closure for embryo transfer with our CD1 mice. If the closure using sutures failed it would heal well with no additional intervention, which is another advantage because it means that further, wound repair procedures are not necessary. Sutures are also the most cost-effective method of wound closure.

Sutures will therefore be used for skin closure in CD1 mice undergoing embryo transfer at our facility, and other studies are planned to compare different suture types and patterns. We will also evaluate the optimum technique for skin closure for different strains, to help ensure that each surgical procedure is fully refined from beginning to end.

A comparison of abdominal and scrotal approach methods of vasectomy and the influence of analgesic treatment in laboratory mice

Amy Miller, University of Newcastle

Like embryo transfer, vasectomy is a commonly conducted procedure in the production of genetically altered (GA) animals – which also means that it is very important to ensure that it is fully refined so as to minimise suffering. There has been some debate as to which surgical approach is preferable from an animal welfare aspect.

The BVAAWF/FRAME/RSPCA/UFAW Joint Working Group on Refinement[11] recommends that vasectomy is performed via an incision in the scrotal sac, rather than via laparotomy, arguing that the former could be less painful due to minimal tissue trauma. This recommendation was made on the basis that the abdominal musculature bears the weight of the abdominal contents, and the scrotal approach would avoid trauma to this supporting musculature and requires a smaller opening, reducing the risk of infection. Incising the scrotal sac also allows the vas to be exposed without exteriorising the testis, and only one suture is required for wound closure. People working in the field had also commented that mice appeared less hunched following surgery via the scrotal route.

The recommendation was thus made on the basis of current thinking on good practice, but empirical studies were needed to assess whether the scrotal sac route actually is less painful than laparotomy. We conducted a study to evaluate this for CD1 mice, funded by BBSRC and Pfizer, which has been published in *Laboratory Animals*[12] so a brief summary will be presented here. All of the mice used in the project were required for the University's transgenics production programme.

In an initial pilot study, groups of mice underwent vasectomy via either abdominal or scrotal approach surgery. All animals received carprofen for pain relief, because it is known that abdominal vasectomy affects behaviour in CD1 mice, so a control group without analgesia was not necessary. Mice were filmed for 15 minutes before surgery and at one, 24 and 48 hours post surgery, and data were obtained using automated behaviour recognition software (HomeCageScan, Cleversys Inc). Behaviour changes after surgery were compared between groups at each time point.

Exploratory behaviours such as rearing, walking and sniffing were most greatly reduced one hour after surgery whereas the duration of grooming increased. By 48 hours these changes had largely subsided. Behaviours associated with pain occurred significantly more frequently one hour after abdominal surgery than with the scrotal approach, although there was an increase in belly pressing in animals who had undergone surgery via the scrotal sac. However, these differences were very small, so it was not possible to draw any definitive conclusions with respect to which method was better from an animal welfare aspect.

The subsequent main study evaluated the responses of the mice to different levels of drug treatment, on the basis that more painful procedures would require more aggressive therapy, so this should help to better identify any differences in the effects of the two surgical approaches. Mice received three analgesic treatments; (i) meloxicam, (ii) meloxicam plus paracetamol or (iii) saline subcutaneously. We always consider the justification for withholding pain relief very carefully, and in this case it was judged by our local ethical review process to be necessary in order to achieve meaningful data on the effectiveness of the analgesics.

Unfortunately, the results of the main study showed that neither meloxicam, nor meloxicam plus paracetamol, had any demonstrable beneficial effects for the animals. This means that either the analgesia was ineffective, or the behavioural scoring was not sufficiently sensitive to pick up subtle indicators of the beneficial effects. These results did show us that the control group was necessary,

however, as without the control we may have concluded that both analgesic treatments were equally effective – when in fact both may have been equally ineffective.

Our study, and other recent data on the effects of non-steroidal anti-inflammatory drugs (NSAIDs) in mice, suggest that either considerably larger doses of these or more potent analgesics, more precise monitoring of surgical outcomes, or a combination of both these factors is needed to determine the true extent of pain experienced by mice undergoing vasectomy. Meanwhile, the skill of the surgeon may be more important than the surgical approach, so immediate welfare gains can be made by benchmarking the performance of surgeons and ensuring that they are skilled and competent.

Development and validation of a body condition score for Guinea pigs
Wanda McCormick, Jenna Catlin & Kate Leslie, Moulton College; John Lowe, Dodson & Horrell Ltd

Body condition scores (BCS) have successfully been applied to a wide range of animal species in different contexts as tools for health and welfare assessment. However, to date no BCS system exists for use in Guinea pigs. This project aimed to create and validate a suitable BCS scale which can be used in a range of captive environments for Guinea pigs. This species was chosen because it is estimated that around half a million Guinea pigs are kept as 'pets' in the UK (accounting for 1.1 % of households), but their owners are often inexperienced in assessing and maintaining animal health, so these Guinea pigs often develop obesity and dental problems due to improper feeding. Although the BCS was devised with companion animals in mind, it will also be useful for assessing Guinea pigs in a laboratory setting, whether at a breeder or user establishment.

We used an initial sample of 24 Guinea pigs, group housed in pens at Moulton College, to obtain a range of body measurements alongside the body mass of each animal. Measurements of girth, chest and length were found to be highly significantly correlated to body mass ($p<0.01$), with a multiple linear regression equation of:

Body mass = 530 + 29.3girth – 13.2chest + 36.0length (R-sq (adj) = 22.3%, F=2.15, p=0.165)

These measurements, in conjunction with observational data on the prominence of the animals' ribs, spine and pelvis, were used to create a BCS. To validate the new BCS, body measurements were recorded from over a hundred Guinea pigs housed in a range of settings, including owners' homes, pet stores, nurseries and rescue centres. Each Guinea pig was assessed for BCS independently by both an assistant and a researcher, then these results were compared. There was no significant difference ($p = 0.452$) between the two sets of BCS data, suggesting the scale is reliable for use by both trained and untrained persons. The measurements of body mass in this larger sample were again highly significantly correlated ($p<0.001$) to measurements of length, chest and girth. It is hoped that this new BCS will help keepers of Guinea pigs to assess their animals and manage their health more effectively.

The new Guinea pig BCS has been published on the Pet Food Manufacturers Association website (Figure 1) with guidelines and images to allow for easy use (http://www.pfma.org.uk/guinea-pig-size-o-meter/).

FIGURE 1 NEAR HERE

We are especially keen for those working with guinea pigs in breeder, supplier and user establishments to try the Guinea pig BCS and send us feedback at wanda.mccormick@moulton.ac.uk

Evaluating rodent enrichment: what could possibly go wrong?
Manuel Berdoy, University of Oxford

Quite a bit, it turns out. It is now widely accepted that refining rodent housing is important because it is good for animal welfare and good for science. What is often less clear is what constitutes a refinement, and what form it should take. Evaluation studies play a crucial role in deciding which enrichment is appropriate for a particular species, strain or research programme. But studies of refinement are only useful if they are properly designed and analysed, so that the results are robust and give a realistic indicator of what animals actually prefer and need instead of what we assume they do. And this is where things often go wrong.

I tend to think of a study as essentially a device to communicate with animals, a kind of universal translator, in a sense: in a study, we 'ask' the animals what they actually prefer (rather than what we think they do), and the animals can answer us via the medium of the data that we collect. Thus, the clearer the question we ask, the more likely we will be able to understand the answer. For example evaluation studies, like all studies, should have a clear hypothesis (yet many of them don't). A study should also include a control condition (sadly often not the case), so that data obtained from the animal, e.g. with and without the enrichment, can be properly compared. These are examples of good Experimental Design. The point here is that a bad study is almost worse than no study at all: it takes time, money, potentially causes stress to the animals and the results can be misleading. Although the elements of robust experimental design are not always immediately obvious for each project, the good news is that planning a good study usually involves no more than thinking carefully, and seeking advice, about the elements which would render either our question to the animals unclear or the answer from the animals ambiguous.

So what should we look for? As a taster, delegates were presented with a fictitious study (Figure 2) – can you spot some problems?

FIGURE 2 NEAR HERE

Delegates spotted the following errors in the experimental design – how many did you get? (Note: this is not meant to be an exhaustive list, but an illustration of some typical problems.)

- No clear question or hypothesis. What is the question exactly? How was 'benefit' decided? How was benefit measured? Is it this particular shelter? Or shelters in general?
- There was no control condition; additional data should have been obtained from cages without added shelters.
- Each mouse was chosen by the observer, which would have introduced bias (e.g. they may have selected dominant or submissive animals). The animals should have been chosen randomly (there are plenty of easy ways to do this).
- Animals were only observed during their inactive phase (during the human working day); behaviour at night was not recorded and is likely to have been different.
- No observations were made over the weekend, when animals may have behaved differently because fewer staff were in and noise levels were lower.
- Insufficient number of animals – the sample size was actually just 6, not 180, because they are not "independent".
- No accounting for the effect of the observer – video cameras could have been used instead (and could also have been used to obtain more data).
- No baseline data were taken before the shelters were added.
- Only females were used – although this may not have been an issue if the aim was to evaluate the benefits of a shelter for a project involving only female mice.
- No time apparently allowed for the mice to habituate to the shelter.

- All cages were at the same level and in groups of 3; cages should have been randomly selected to allow for differences in height above the floor and light levels.

Although Norman's study showed that the chosen mice were interacting with the shelter when he made the observations, it is not robust enough to demonstrate a significant benefit or to help make a decision about the best type of shelter to provide for the animals. Evaluation studies like this need to have a hypothesis, asking a clear question that can be tested by the experiment. Incidentally, was Norman's question really about benefits to the animals or about what the animals want? Both questions are good ones but they do not mean the same thing (animals – like humans – don't always want what is good for them). Evaluation studies also need adequate (and independent) sample sizes and valid controls, with potential sources of variation included in the design (none of this was evident here). Sources of bias should also be recognised and addressed. Biases may occur in selection or allocation (e.g. no randomising of animals/cages, self-selection), or in failing to take account of the behaviour of the species (e.g. response to novelty, circadian rhythms) or the influence of the observer (e.g. the subject may be stressed by, or attracted to, the observer). A further source of bias can be failure to implement 'blinding' when obtaining or analysing data. Ideally, the observer should not know which animals have received the treatment and nor should the person analysing the data. This may not always be possible, and would not have been feasible in our hypothetical example, but studies should always be blinded if they can be.

There is currently much emphasis on the importance of good experimental design in the life sciences in general, and studies to evaluate enrichment are no exception. It is always a good idea to obtain advice from someone with expertise in statistics and experimental design when planning your study, and the first port of call for this would usually be the local AWERB, which should have access to a source of statistical advice*. Some useful publications are also listed in the reference section of this paper.[13,14,15,16] Animal technologists have a great deal to offer with respect to evaluating, implementing and reviewing enrichment, and you should be able to access the same level of support as the researchers at your establishment.

The running wheel debate

Charlotte Burn, Royal Veterinary College

Running wheels are often provided as an 'enrichment', but there has been debate regarding their benefits. Here I discuss two questions: 'Are running wheels good for rodent welfare (do they keep rodents healthy and do rodents actually want* them)?', and 'Do they make for better science?'

In rodent cages, opportunities for exercise are extremely limited, so unsurprisingly the provision of a wheel brings about many of the general health and cognitive benefits expected from regular exercise. These benefits include enhanced heart function[18] and cognitive function.[19] Rodents also do seem to 'want' running wheels, indicated by the fact that they are prepared to expend considerable energy, e.g. by pressing a lever many times, to gain access to a wheel.[20] The rewarding effects of wheel-running have been linked to the release of opioids,[21] and rats show 'conditioned place preference' for places that they associate with just having been for a run.[22] However, another behavioural study has shown that rats avoid places that predict wheel access,[23] suggesting that rodents' experiences of wheel running may not be straightforward pleasure.

Despite the potential health benefits of wheel running to most rodents, individuals who wheel run excessively can develop physical deformities, such as arching of the spine (lordosis) or hyperflexion of

* The NC3Rs Experimental Design Assistant will also soon be available; see https://www.nc3rs.org.uk/experimental-design (last viewed 2 January 2015).

* 'Want' as defined by Dawkins (2004).[17]

the tail resembling 'Straub tail' (a response to morphine treatment in rodents). These morphological changes may or may not be associated with pain, and can also affect data quality, e.g. in behavioural tests requiring good motor skills or balance.[24] More research is needed into the effects of wheel design, and length of time spent running, on both welfare and science.[24]

There has also been some debate as to whether wheel-running is a stereotypy. Stereotypic behaviours have been defined as 'repetitive, invariant and apparently functionless or goalless'[25] and wheel-running does fit this description in some – but not all – individual rodents. On the other hand, providing stereotypic rodents with a wheel often reduces stereotypies, but this could mean that either (i) the wheel is an enrichment (improving welfare and satisfying a previously frustrated motivation) or (ii) wheel-running is a redirected stereotypy (leaving welfare largely unchanged). The fact that both stereotypies and wheel-running are reduced by fluoxetine and naloxone[26,27] seems to support (ii), but it is not that conclusive because these substances tend to reduce performance of all rewarding behaviours. Wheel-running occurs in diverse environments and animals use wheels in a variety of ways (e.g. jumping on and off or building nests inside), which is less supportive of the idea that it is a stereotypy. It is perhaps more likely that wheel-running exists in both stereotypic and non-stereotypic forms.[26]

Similarly, extreme use of running wheels has parallels with addiction.[24] For example, some individuals are seemingly unable to regulate their wheel use despite the onset of adverse effects (e.g. becoming physically deformed or emaciated), they spend such a large proportion of their day wheel-running that normal social and/or maintenance behaviours become disproportionately reduced, and they become aggressive if wheel-running is prevented. Again, not all wheel-use follows this pattern.

Turning to the implications of wheel-running for science, if performed to moderate levels, the many benefits of exercise in an otherwise restrictive environment could probably lead to more physiologically 'normal' animals. Also, wheel-running itself can be a useful tool for assessing treatment effects in specific cases, e.g. where treatments are hypothesised to affect activity levels. However, if performed to excess, the behavioural and physical effects of wheel-running could lead to welfare problems as well as abnormal treatment responses that may affect standardisation. Huge strain, sex and individual differences in propensity towards wheel-running exist,[24] so evaluation of the welfare and scientific harms and benefits may require a case-by-case approach.

In conclusion, excessive wheel use can be harmful to health, welfare and science – but moderate use can confer benefits: keeping rodents healthier, allowing them to do something they want to do, and making them more physiologically normal 'models'. In strains known to run to excess, wheels should be avoided and other enrichment provided to encourage exercise. Use of wheels should be monitored, but care is needed if removing wheels from excessive users due to the potential for 'withdrawal' (similar to drug withdrawal) that could cause suffering.[24] Safe wheel design is important, to avoid entrapment and deformity, and other enrichments should always be provided to allow choice and encourage a range of activities.

Building a nationwide NACWO exchange initiative
Jo Cruden & Sam Izzard, GSK Stevenage

Requirements within the revised Animals (Scientific Procedures) Act 1986 (ASPA), such as actively ensuring adequate Continuing Professional Development (CPD) and keeping formal records of this, provide strong encouragement for people in named roles to develop and learn. However, over the past few years we have noticed a gap in the education of Named Animal Care and Welfare Officers (NACWOs), not in terms of training *per se* but with respect to having opportunities to build a strong network and learn about other facilities. The revisions to the ASPA prompted us to explore the

potential for a scheme that would enable and support NACWOs to meet, spend time with each other and share their knowledge and ideas.

We created a proposal for an exchange in which a NACWO will spend the day with another NACWO at a different facility and vice-versa. We envisage three main benefits: insight into day-to-day work in other facilities; opportunities to share ideas and good practices; and the ability to build up a network of contacts. Both the host and visiting establishment will gain Continuing Professional Development (CPD) credits, based on the number of hours spent actively visiting and discussing roles, responsibilities and how things are done at each establishment. A 'tick list' has been developed to help structure and prepare for visits, and a post-exchange report is completed and submitted to the Named Training and Competency Officers (NTCOs) at both facilities. The exchange protocol can also be used for internal exchanges for NACWOs working at different sites within the same establishment, to help promote cross-site communication.

A successful pilot study has been run in collaboration with Imperial College London, which was used to further refine the scheme in the light of feedback from the participants. A second exchange is well underway, with MRC Harwell, and there has been a lot of interest from other groups interested in taking part. The scheme is now being rolled out nationally, in partnership with the IAT, including a secure section of the Institute's website for NACWOs to keep records of visits and ideas to share, inviting participants to present at IAT Council, and highlighting the scheme on the IAT website.

New participants will be led through the process by a guidance document detailing how the scheme works, what is expected of them and what they will gain from the exchange. Ideally, they will link up with someone who has already completed an exchange and contact exchange monitors will be listed within the secure section of the IAT website.

Our vision is a network of NACWOs, communicating and sharing ideas as well and gaining CPD – although there are differences in the way our respective roles are structured, we all have the same goals when it comes to animal care and welfare. If you are interested in taking part, please contact Andy Cunningham (ac572@le.ac.uk), or watch out for the adverts which are coming soon.

A culture of care: a personal experience
David Whittaker, University of Oxford

A 'culture of care' is much easier to say than it is to define, deliver and sustain. This now often (over) quoted sound bite first appeared formally in print in the 2000 edition of the Guidance to the ASPA, and is directly referred to in several places within the 2014 Guidance,[28] as listed in Table 2.

TABLE 2 NEAR HERE

Fulfilling these requirements and recommendations requires careful thought about who and what the culture of care is for, who is responsible for its delivery, what it means in practice (inputs) and whether it can it be 'measured' in terms of outputs or deliverables. The culture should also be sustainable, and sustained, in the long term.

Simply put, the culture of care should demonstrate caring, respectful attitudes and behaviour towards animals and encourage acceptance of responsibility and accountability.[29] This goes beyond just meeting the minimum requirements of the legislation. While each organisation's culture will depend upon the values and attitudes of its staff and the local processes in place that determine how people work and behave, all establishments should have a vision of what their own culture of care means – 'how we do things around here'.

Caring for, and about, animals is of course central to the concept, but it should also encompass caring for the equipment, facilities and each other, including team members, users, customers, clients and other internal and external stakeholders. The specified roles and tasks of the ELH, NACWOs, trainers and AWERBs are set out in Table 2, but everyone has a part to play, including and especially the animal technologist at the cageside. Information has to flow effectively in all directions, within a culture that supports openness between, and learning from, one another, but has zero tolerance for poor practice or noncompliance. Think about what you can see, hear (and smell!) and consider whether it extends to, or goes beyond, compliance, and how it makes you feel. If something does not feel right, you should be able to express your concerns safely and effectively.

It is vitally important for all establishments to have a policy and procedure in place for any member of staff to raise concerns about any aspect of animal care or use. This should include clear communication channels that staff are confident to use without fear of negative consequences, either professionally or socially. The University of Oxford has a dedicated system for raising concerns in place, as do other establishments; see the report of the workshop on *Raising Concerns about Laboratory Animal Welfare* held at the 2014 IAT Congress.[30]

The new LASA/RSPCA Guiding Principles for AWERBs[29] and the revised RSPCA resource book for lay members[31] also discuss practical ways of developing and maintaining a culture of care, and these will both be good sources of ideas and inspiration for you and your establishment.

List of action points based on all of the presentations and discussions

- If embryo transfers are conducted at your establishment, suggest a review of wound closure techniques to see whether the most effective, well-tolerated technique is being used.
- If males are vasectomised, suggest that the protocol is reviewed, using the relevant section of this report and reference 12 as a basis, to see whether further refinements could be implemented and evaluated.
- Think about other commonly-conducted procedures, which are done according to standard protocols, at your establishment. Would any of these benefit from a review? You could suggest this to your AWERB, Named Persons or other relevant local committee.
- If you care for Guinea pigs, try using the 'size-o-meter' and provide some feedback to the contact above.
- When designing studies that aim to evaluate husbandry refinements, including environmental enrichment, obtain advice from someone with expertise in statistics and experimental design to ensure that your data will be significant and robust. Ensure that you have identified and minimised sources of bias, including those due to the behaviour of the species, sex and/or strain.
- If running wheels are routinely provided at your establishment, ask for the AWERB or relevant animal care committee to look at the section of the report outlining the debate. There may be a case for altering the wheel design, setting up a protocol for monitoring levels of use, or using alternative enrichments if running is excessive.
- If you are a NACWO, participate in the exchange scheme – or if you are not, make sure your NACWOs are aware of it.
- Think about your role in your establishment's 'culture of care', whether or not you are a NACWO, trainer or sit on the AWERB. What does it mean to you, and could you become more active in maintaining a positive culture?

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References

All the URLs below were last viewed on 2 January 2015.

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Table 1. Comparison of four different wound closure techniques for embryo transfer in CD1 mice

Method	Advantages	Disadvantages
Sutures	Good skin-to-skin contact Does not need to be removed Excellent wound healing	
Tissue glue	Good skin-to-skin contact – but some mice removed the glue Does not need to be removed Excellent wound healing	Skin needs to be dry Care is needed to control the amount applied Time consuming Can be removed by mouse
Staples	Non-skin penetrating Good wound healing, even if mice remove staples	Difficult to control on application Removed by all mice
Autoclips®	Quick to apply	Needs to be removed with a separate tool Skin penetrating Skin puckers and is red after removal Moderate wound healing, larger scar than other methods

Table 2. References to a 'culture of care' in the 2014 ASPA Guidance document[28]

Section of ASPA Guidance mentioning a 'culture of care'	Requirement/recommendation
Establishment Licence Holder (ELH): Section 3.13.2	• You will need to be proactive and provide effective leadership. You will need good management and communication skills and the commitment to nurture a 'culture of care' in your establishment
NACWO: Sections 8.8.1, 8.8.2	• NACWOs should have appropriate personal authority to promote high standards and will need good communication and diplomacy skills to champion a culture of care amongst both scientific and husbandry staff • The NACWO should ... champion a culture of care at your establishment acting as a role model for all those who care for, and use, animals
Training – Local Module: Section 9.11	• We recommend that each establishment should prepare a local module ... information on the functions and processes of the local AWERB and how the local culture of care is promoted should be included
AWERBS: Section 10.5	• More generally, AWERBs should ... help to promote a 'culture of care' within the establishment and, as appropriate, in the wider community

Figure 1. The Guinea pig Size-O-Meter

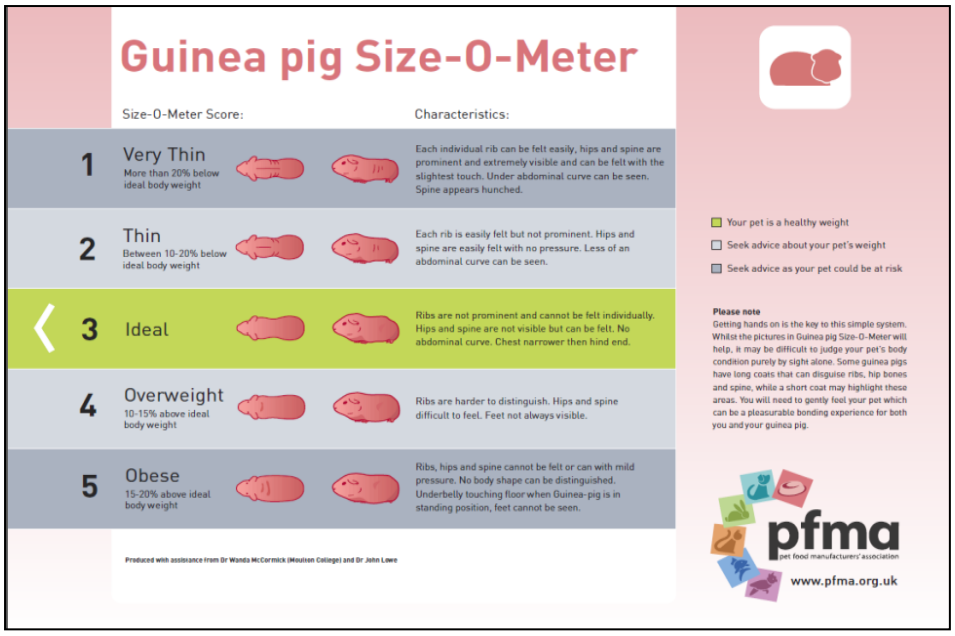

Figure 2. Norman's shelter evaluation study

Norman wanted to know whether mice will benefit from a shelter. He set up his experiment like this:

- A shelter was added to each of six cages containing four female mice
- Three cages were on one rack and three were in another part of the room – all were at eye level so they could easily be observed
- The room was on a 12:12 light cycle, with lights on from 0800 to 2000

Data collection

- The observer chose one mouse to be the focus animal from each cage
- Behaviour was observed at 0900, 1300 and 1700 from Monday to Friday over the next two weeks (i.e. 10 observation-days)
- The sample size for analysis was deemed to be N=180 (6 animals observed 3 times a day for 10 days)

Results

Behaviour	**0900**	**1300**	**1700**	**Totals**	**%**
Moving around cage	1	16	3	20	11
Eating/drinking	10	16	8	34	19
Grooming	0	9	2	11	6
Sleep/rest inside shelter	22	8	18	48	27
Sleep/rest outside shelter	14	4	11	29	15
Awake inside refuge	13	0	15	28	16
Other	0	7	3	10	6
Totals	60	60	60	180	100