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Is it finally time to do the maths?

Geoff Dandie, CEO, ANZCCART

Even before the 1989 Australian Senate Select Committee enquiry into Animal Experimentation was set up, the issue of public accountability and the annual publication of national animal use statistics had been widely thought of as being both necessary and desirable. In this context, it is also worth noting that the very first recommendation to come out of the Senate Select Committee Report was:

“The Committee recommends that the Commonwealth, State and Territory Governments publish annually accurate and comprehensive information on the extent and forms of animal experimentation conducted within their respective jurisdictions. In addition, government authorities should provide some analysis of the statistics to make them meaningful to the public, and to reduce the potential for misinterpretation.”

It is now almost 28 years since this committee was set up and some 24 years since its report was published and regrettably, I think Australia as

a nation has failed to satisfactorily address this recommendation.

That is not to say that the recommendation has been unilaterally ignored, because it has not. Each year, licensed institutions around the country collate and submit fairly detailed information about their use of animals for research and teaching purposes in compliance with the stated conditions of their licence. Most (but regrettably no longer all) State and Territory government officers then collate these data and compile the information about animal use within their jurisdiction for the information of their Minister responsible for animal welfare and in some cases, publication on their web site. Other regions hold the data for those who request it, while some no longer have the staff available to collate it at all.

It must also be acknowledged that for a number of years one particular State government department (most commonly the Victorian DPI - Bureau for Animal Welfare) put a lot of time and effort into collating the national statistics, but was rather thwarted by

the different formats, legal and legislative frameworks, methods and timeframes of data collection, etc. This meant that the published data included very little descriptive information which might aid the general public in interpreting what was actually happening to animals and how many were affected. This trend has been further exacerbated in more recent years by different animal lobby groups who have sought out, collated and published only the total numbers of animals used in research and teaching each year. While publication of such raw data will overstate the impact of scientific use on the welfare of animals, we need to gratefully acknowledge the effort these groups put into collecting and collating animal use statistics when no-one else seems willing or able to do so.

As there are currently no official and properly analysed animal use statistics published in Australia, those wishing to portray Australia as a nation that exploits rather than respects animal are able to use such raw figures to their own ends and it is not possible to provide an alternate view that is based on fact. While this is important information to acknowledge, it can also be very deceptive as there is generally a fairly strong inference that all animals have been subjected to quite invasive and potentially debilitating procedures and clearly that is not an accurate representation of the facts. Unlike the majority of countries around the world, in Australia, all vertebrate and some invertebrate animals that are "used" for research and / or teaching purposes and covered by an Animal Ethics Committee (AEC) approval are reported by the various individuals, organisations and institutions that are licensed to use animals. While New Zealand has a similar reporting system to Australia's, the fact that they have a single Government to report to means they have been able to achieve these aims far more simply but also very effectively.

Australia is in the slightly unusual position of being far more inclusive in its reporting of animals used in research and teaching than is generally the case for other parts of the world. So unlike the USA, for example, where the official animal use statistics generally do not include mice, rats, birds, reptiles, amphibians or fish (which among them would account for the great majority of animals used in Australia each year), our statistics do include all vertebrate species used as well as higher order invertebrates such as cephalopods etc. Of course, it must be acknowledged that some Australian states still refuse to include fish in the definition of an animal for the purposes of their Animal Welfare Act.

It is interesting to note that all institutions in receipt of major granting body funds are required to consider

fish as animals and report their use. So even though we must assume that not all fish use is reported, the animal use statistics from these jurisdictions clearly show that a significant proportion of the fish used in research and teaching exercises are actually being reported. This means that those figures are a more accurate reflection of animal use (all species) than we generally acknowledge. Equally, jurisdictions are becoming more conscious of the issue of over-reporting animal use that may result from researchers collaborating by sharing animals between projects. This has meant implementing steps to try and minimize the double or in some cases even triple reporting of animal numbers. So there may always be a need to acknowledge the potential for anomalies in reporting systems to influence the accuracy of the data produced and every effort made to address these variable. However, even within these limits, it would be reasonable to assume that the animal use statistics produced could still be comparable in terms of accuracy with what is produced in other countries and certainly more complete than what is currently being published by many other countries around the world.

So, even if we accept the imperfections in our system and still look at the data pertaining to animal use in more detail, it is clear that animal welfare impact is variable. To consider an animal that is merely observed in its natural habitat in the same way as an animal that has undergone invasive surgery or been treated with cancer-causing chemicals would seem overly simplistic if not inappropriate. So, what would be far more enlightening in terms of any presentation of national animal use statistics, would be the inclusion of more information about the fate or net effect of the research or teaching activity on those animals. For example, which animals were observed in their natural habitat without interference, how many were examined in their natural habitat with minimal interference, what proportion of these animals were part of what is often termed "feed and weigh" experiments (i.e. closely mimic the conditions of normal animal husbandry only), and how many suffered more invasive procedures? It would even be worth further breaking down the animal use that is deemed 'more invasive' into subgroups, so that animals that were painlessly killed for harvesting cells or organs for *in vitro* culture work, might be distinguished from those animals used in memory experiments, basic immunisation studies, dietary studies, carcinogenesis work, or subjected to invasive surgical procedures.

It was therefore very pleasing to read through a recent media release from the Australian Government Department of Agriculture, Fisheries and Forestry that outlined a number of grants which have just been

awarded under the AAWS (Australian Animal Welfare Strategy), one of which went to the ANU and will contribute to a national system to report animal use for research and teaching. The key aim of this project will be to inform work to design and implement a national system to publicly report animal use for research and teaching under the Australian Code of Practice for the Care and Use of Animals for Scientific Purposes, 7th Edition 2004, under existing Australian arrangements. This project looks to be entirely consistent with the stated aims of the 1989 Senate Select Committee Report. So it might have taken a while, but hopefully we might finally be making progress.

Holistic approaches to animals in teaching: who learns from whom?

Teresa Collins

Introduction: attitudes to animals

Controversy about the use of animals for scientific purposes, including for teaching has been at the forefront of the animal welfare debate from the beginning of the modern animal welfare movement in the mid-nineteenth century (Rose and Grant 2008). Perhaps more than any other animal welfare issue, the use of animals in research and teaching is marked by robust public debate and, on occasion, by conflict. We are confronted with a range of competing values and passionately held beliefs which challenge and potentially confound our reaching agreement as to the ethical acceptability of our use of animals, particularly in veterinary education.

Societal interest in animals and how they are treated has increased substantially in recent years (reviewed by Bayvel and Cross 2010). Public attitudes toward animal welfare have changed with growing social affluence and the altered role from custodians to companions for those animals with whom we share our home. Traditionally accepted uses of animals for teaching have been increasingly questioned as to whether the welfare status of the animals involved has been compromised and indeed, if animals are required at all.

We need to know what guarantees good welfare of our subjects (science) and how important the use is, and whether it can be justified (ethics). The growth of animal welfare science has better defined what matters to an animal and provided more depth as to how pain may be experienced by animals. Scientists are more advanced in assessing the degree of any harm done by identifying the various components of welfare (e.g. physiology and

behaviour), but there is a continued need to take a more holistic approach - that is taking a 'whole animal' approach, such as, using more qualitative assessments and seeking the opinions of the wider community.

Animal welfare means different things to different people; but central to the shared concern for animals is that they are sentient beings - that is they have the capacity to suffer pleasure and pain and have interests that matter (Duncan 2006). It is inescapable that questions about our use of animals in science must involve the wider community and reflect their understanding and attitudes. Animal welfare is a complex entity and the use of animals in teaching provides an ideal experience for veterinary and animal science students and staff to engage in a discussion linking philosophical values and evidence-based science that may lead to converging views.

The scope of animal use in education

In most science and veterinary science courses, there is an accepted norm that for students to gain a good understanding of biological science animals may be used and possibly endure unpleasant procedures as they are viewed as a biological model or learning tool. The scope of animal use for teaching is as extensive as the type of species used: it may involve observation and basic care for a classroom pet in primary school, basic dissection in high school biology, anatomical dissection and physiological manipulations for veterinary and medical training, studies of animal behaviour and/or as tools to develop specialist veterinary skills, or invasive procedures for diagnosis and treatment.

A utilitarian approach is generally used when regulators need to assess whether animals should be used for scientific education. This involves a cost-benefit analysis where the 'benefits' measured by student learning outcomes are weighed up against the 'costs' or harms to the animals. As our understanding of the impacts of our handling and use on experimental animals has grown, so has the desire to limit the harms done promoting Russell and Burch's principle of the 3Rs; reduction, refinement and replacement. This ability to weigh up the various options is critical from both a staff and student perspective. Hence, alongside any course that utilises animals for undergraduate teaching, particularly a veterinary curriculum, should include a form of animal welfare and ethics education.

The need for ethical discourse

It has been well accepted that many uses of animals for educational purposes provide a challenging ethical issue. Perspectives on whether such use is justified vary widely and debate will continue with various cultural and historical perspectives. Moore (2001) strongly endorses the use of dissection in science

education claiming it enhances knowledge and deepens our appreciation of nature. It is claimed there is no better way to understand the structure and function of an organism than by directly examining the organism (Moore 2001). Strong support for animal-based teaching methods is evidenced by the long standing use of animals in veterinary schools. The Australian Veterinary Association (AVA) and the Association of American Veterinary Medical Colleges (AAVMC) recognizes the important role that animals play in the education of veterinarians in their initial professional training. The AVA endorses the requirements outlined by the NHMRC *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes* and is committed to the three Rs (AVA 2009). The NHMRC guidelines state that animals are not to be used for teaching purposes unless there are no suitable alternatives and that any specific training involving procedures that may cause adverse impacts on the animals should be justified on a case-by-case basis (Australian Government NHMRC 2004). The AAVMC states that not all educational objectives can be met through client owned animals thus it is necessary that some live animals be obtained by donation or purchase and used for instructional activities that may be terminal in nature (AAVMC 2010).

Historically, animal use that may result in death has been an accepted mode of veterinary education worldwide, provided such use was embedded in an educationally valid curriculum and humane animal care was provided. Many alternatives now exist, and adoption of these alternatives has either fully or partly replaced much of the need for live animals. One driver for change in the way we use animals for teaching is student expectations. Many students enter a veterinary course with fundamental desire to do good things for animals and this personal ethic may be challenged during their studies. Concurrently, students recognise the need for using animals and for competency on animal welfare related issues (Colonius and Swoboda 2010). It is therefore essential that students have some instruction in animal ethics, can comprehend why such animals are used for their learning and develop the skills to debate the acceptability of any use. Veterinary students are being trained as professionals and in addition to gaining animal handling and surgical skills must learn to uphold their ethical principles.

The veterinary profession is privileged to occupy a position of enormous social influence on animal welfare issues and thus it is vital that students understand the various perspectives and attitudes to animals that exist in the community. Equally important is that students develop both a respectful attitude to all animals and the ability to make sound rational decisions about animal use. Thus, students need training in ethical decision

making and practice in engaging in a discursive, rational debate about animals. Encouraging students to reflect on and discuss their personal use of animals during their education is an important first step.

Benefits versus costs:

The main ethical principle which guides most animal use in science is this: *“Using animals for scientific purposes is acceptable only when any harm done to the animals is very greatly outweighed by the benefits of their use”*. (ANZCCART, 2012)

Despite the specific discipline, the justification to include animals for training needs to address how the proposed procedure will enhance student learning. There are three broad categories of learning objectives; cognitive, sensorimotive and affective, and the teaching methods should be chosen on the basis of meeting these aims. Students generally react positively, are motivated and show enhanced learning when animals are used, and a combination of objectives may be addressed with one animal use. For example, both retention of anatomical knowledge and a positive attitude towards the species may be gained by the presence of a live dog in an anatomy class. However, there is a constant need to weigh up the benefits in terms of students' acquisition of skills and knowledge against the harms including stress or loss of animal life, in addition to stress or concern expressed by the students or staff.

For veterinary undergraduates, there remains an accepted need to provide training in clinical competency and veterinary surgery in the latter years of the 5-6 year curriculum. The objective of surgery training is to produce graduates with surgical skills that meet day 1 graduate attributes as dictated by registration authorities. Each Australian state veterinary registration board requires that all veterinary graduates demonstrate competence in all areas of veterinary science. In the past, students performed a range of surgical procedures under supervision on live anaesthetized unwanted dogs from local pounds or shelters, which were euthanased at the end of the class (Read 2012). However, since the 1990s in Australia, the availability of pound dogs has ceased and a combination of factors including rising costs has led to a decrease in the amount of supervision of undergraduate students' surgical training (Read 2012). Increased financial pressure and client expectations have further restricted the opportunities for students to perform surgery such as, wound closures, under supervision whilst on extramural training. Thus, faculty staff have responded to such changes by developing extensive exercises that promote psychomotor and manual skills using inanimate models, cadaver parts

and dog substitutes, for example, (e.g. Dog Abdominal Surrogate for Instructive exercise (DASIE™), and Rescue Critters™). In addition to using these models, staff have fostered closer relationships with shelter organisations to provide student access to shelter animals for desexing. However, given the somewhat variable supply of shelter animals for desexing, some schools have retained a very limited number of non-survival live animal practicals where species other than dogs are anaesthetised to teach critical skills such as tissue handling and haemostasis.

Despite these developments, other perspectives challenge the need for any live animal use for surgical teaching, and state that there is no justification for an animal to be harmed for this purpose. Progressive universities such as the University of Queensland and Murdoch University and others, have adapted to this change in attitude and allow students with a substantial ethical objection to a specific animal use to make a claim for exemption. An ethical objection is defined as 'a deep inward conviction of moral injustice; it can only be held after a period of serious reflection' (University of Queensland 2008). Thus, teachers should be sensitive to these objections and provide an appropriate alternative pathway whereby students can achieve their learning objectives without participating in specific non-survival animal practicals. This view has been sought by some veterinary students with a conscientious objection to the non-survival practicals, and provides real challenges for faculty staff to ensure equivalent surgical competence is gained by all students; those in the traditional classes and those who seek a program with less direct faculty supervision on campus.

Concurrent with the changing attitudes towards animal use and the further expansion of animal welfare science there has been an increasing number of dedicated courses on animal welfare taught to veterinary students. Animal welfare education is not delivered in a standardized manner across schools however it is thought to be best integrated throughout the curriculum in a systematic way (Colonus and Swoboda 2010). Veterinarians occupy a unique role as animal welfare advocates and hence students' training must examine that role. It is stated that veterinary schools should make efforts to elevate animal welfare as a critical theme within the curriculum (Colonus and Swoboda 2010).

It has been suggested that the harmful use of animals in veterinary education may result in the decreased likeliness of students to view animals as sentient, a decreased empathy towards animals, a decreased propensity to administer peri-operative analgesics, and the impedance of normal development of moral

reasoning ability. (Self et al 1991; Paul and Podberseck, 2000; Levine et al 2005). Furthermore, a study of science students indicated that forcing students to use animals in ways they view as harmful or wrong may cause some psychological stress (Capaldo 2004). Such students may lose their interest in science if not given the option to conscientiously object. Knight (2007) suggests that veterinarians trained without harmful animal use will be more sensitive to welfare issues and may develop higher animal welfare standards. However, the impact of animal use on students may be affected by the adequacy of the training, or lack thereof, of ethical reasoning. Importantly, the question that must be answered is if reduced or no stress for students is always beneficial for them in the long term? Veterinarians as professionals are faced with many challenging dilemmas, including life and death decisions where providing the best outcome for patient may directly conflict with the owner's demands. The stressfulness of ethical dilemmas in veterinary practice is significant; 34% of UK veterinarians in practice reported that faced 3-5 dilemmas per week (Batchelor and McKeegan 2012) and that they find these dilemmas stressful. These concerns further support the need for increased training and support for veterinary students in dealing with ethical issues.

Comparing Animal Use with the Alternatives

Many alternatives now exist, including computer simulations, high quality videos, 'ethically-sourced cadavers' such as from animals that were euthanased for medical reasons, preserved specimens, inanimate models and surgical simulators, non-invasive self-experimentation, and supervised clinical experiences. Many veterinary schools have included some of these alternatives as effective teaching tools. For example most veterinary physiology laboratories run interactive computer programs completely replacing the need for any invasive use of animals. Computer simulations are used as replacements for some, but not all, practical classes, or they are being used as supplementary resources, to prepare students in advance of a class using animals. Consequently, objective studies of veterinary students that compare the learning outcomes generated by non-harmful teaching methods with those achieved by traditional animal use are required.

Studies show conflicting results as to whether the use of alternative teaching methods consistently achieve greater learning outcomes than those using animals. Patronek and Rauch (2007) provided the first systematic review; concluding that alternative methods used in biomedical and veterinary science were not significantly different or superior to, the conventional method. This contrasts with other studies reporting the use of well designed alternative programs such as haemostasis models, computer simulations and 'ethically sourced

cadavers' can provide learning outcomes that are equal to or superior, to traditional programs that use animals (Olsen 1996, Griffon 2000, Knight 2007). Use of preserved cadavers prior to a live surgical practical with animals may still be favoured; 95.1% of students in one survey agreed this would provide the ideal training (Silva et al 2007).

A recent survey in Europe on animal use in veterinary education indicated that the major factor that would persuade academic staff to introduce alternatives to animal use were good empirical evidence of educational effectiveness, with colleague's recommendation and objections from students also important (Dewhurst and Hemmi 2011). The same survey reported the most common barrier to the introduction of computer-based alternatives was the difficulty in finding suitable resources.

The future

Societal attitudes will continue to suggest that harming or using animals particularly for terminal use is not justified. Thus veterinary and other science training will need to be continually reviewed and involve changes to accommodate the anticipated rising costs associated with providing animals. Such changes are likely to include the increased use of new models and cadavers to further reduce, refine and replace animals where possible. The underlying message for both students and staff is to be respectful of all animals, minimise their use and engage in ethical thinking to identify any barriers, and work towards a position where the community, faculty and students are in agreement. Veterinarians must be broadly educated in animal welfare science and understand the complex societal issues associated with the field, and be aware of the evolving nature of animal welfare concerns. Addressing the issue of the use of animals in their own education should provide students with important experience in how to manage the ethical dilemmas that are an inevitable consequence of veterinary practice and enable them to be the respected voice for animals.

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This article was the basis of a presentation at the 2012 ANZCCART Conference.

2013 ANZCCART Conference

23 to 25 July

Sydney, Australia

ANZCCART would like to announce that the Call for Abstracts is now open.

Closing date is Monday 3 June 2013

Conference Registration is now open.

Registrations close Friday 28 June 2013

For further information and Registration visit:

<http://www.adelaide.edu.au/ANZCCART/>

Amendment to the Victorian Prevention of Cruelty to Animals Regulations 2008

An amendment to the Prevention of Cruelty to Animals Regulation 2008 (POCTA) was introduced on Tuesday 9 April 2013.

New versions of the POCTA Regulations are available from www.legislation.vic.gov.au under 'Law today'.

ANZCCART New Zealand Board Member receives New Year Honour

ANZCCART New Zealand Board Member Mrs Jeanette Crosado was made a Member of the New Zealand Order of Merit (MNZM) in the 2013 New Zealand New Year Honours for her services to animal welfare.

Jeanette has been involved with the Otago Society for the Prevention of Cruelty to Animals for more than 30 years. When she joined their management committee in 1978 she was its only female member, and served as their President between 1987 and 2010. In 1979 she was also elected to the Royal New Zealand SPCA National Council and served 24 years on this body before standing down in 2012 but has remained as Chairwoman of its Animals in Science Advisory Committee. In 2012 Jeanette was awarded a gold bar to go with the gold medal she received from the RNZSPCA in 2007.

Jeanette has long been involved in the ethical treatment of animals in science as a Member of the National Animal Ethics Advisory Committee (NAEAC) from July 1997 to October 2002 and she has been a Board Member of ANZCCART in New Zealand since 2002. Since 1989 she has also been an animal welfare member of the AgResearch Invermay Animal Ethics Committee.

The 2013 Lush Prize

Nominations are now open for the biggest international annual prize in the non-animal testing sector.

The prize supports animal-free toxicology and is designed to reward groups or individuals working in the field of cruelty-free scientific research.

Nominations close on Monday 15 July 2013

More information on the prize is available at:

<http://www.lushprize.org>

18th European Congress on Alternatives to Animal Testing

15 - 18 September 2013, Linz, Austria

Information on the call for abstracts
and the Congress is available at:

www.eusaat.org

Recent Articles of Interest

Swallows may be evolving to dodge traffic

Road-kill numbers crash as birds shorten their wings to become more agile.

Roadside-nesting cliff swallows have evolved shorter, more manoeuvrable wings, which may have helped them to make hasty retreats from oncoming vehicles, according to a recent study. The study's authors discovered the trend after noticing that the number of vehicle-killed birds had declined over the past three decades. They suggest that the two findings provide evidence of roadway-related adaptation. This trend was supported by the work of an amateur taxidermist, who had gathered and stuffed 104 vehicle-killed adults and 134 adults killed accidentally in nets used for the study and compared the wing measurements of both types of stuffed bird.

http://www.nature.com/news/swallows-may-be-evolving-to-dodge-traffic-1.12614?WT.ec_id=NEWS-20130319

Most popular human cell in science gets sequenced

The HeLa cell genome is riddled with errors, raising questions about its continued use.

The research world's most famous human cell has had its genome decoded, and it's a mess. German researchers recently report the genome sequence of the HeLa cell line, which originates from a deadly cervical tumour taken from a patient named Henrietta Lacks.

Established after Lacks died in 1951, HeLa cells were the first human cells to grow well in the laboratory. The cells have contributed to more than 60,000 research

papers, the development of a polio vaccine in the 1950s and, most recently, an international effort to characterize the genome, known as ENCODE.

Previous work showed that HeLa cells, like many tumours, have bizarre, error-filled genomes, with one or more extra copies of many chromosomes. German geneticists sequenced the popular 'Kyoto' version of the cell line and compared the sequence with that of a reference human genome. They found that HeLa cells contain one extra version of most chromosomes, with up to five copies of some. Many genes were duplicated even more extensively, with four, five or six copies sometimes present, instead of the usual two. Furthermore, large segments of chromosome 11 and several other chromosomes were reshuffled like a deck of cards, drastically altering the arrangement of the genes.

Without the genome sequence of Lacks' healthy cells or that of her original tumour, it is difficult to trace the origin of these alterations, but it is known that other cervical tumours have massive rearrangements on chromosome 11, so the changes in the HeLa cell may have contributed to Lacks' tumour.

http://www.nature.com/news/most-popular-human-cell-in-science-gets-sequenced-1.12609?WT.ec_id=NEWS-20130319

New way to scan moving rats

The University of Sydney's School of Physics and Brain and Mind Research Institute has developed a way of performing PET scans on moving laboratory rats which is more accurate and makes possible new experiments linking brain and behavioural function. Animal imaging techniques such as positron emission tomography (PET) are almost always performed using anaesthesia to keep the animal still because even small movements result in images becoming blurred and prevents useful conclusions about the process being studied.

This circumvents the need to anaesthetise animals, which is a problem for two reasons: anaesthetic drugs can change what's measured in the brain, and having the animal asleep prevents us from being able to image what's happening in the brain while the animal is fully responsive and able to behave normally. The non-invasive new method used involves tracking an animal's head motion at 30 frames a second then correcting for the motion so that the PET scanner is 'unaware' that the animal moved.

<http://sciencealert.com.au/news/20122106-23497.html>

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and members of the public with interests in
the conduct of animal-based research and
teaching and the welfare of animals used.

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