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Animal Experimentation Ethics Committees in the United Kingdom

Introduction

In April 1999, the UK Government introduced a requirement for an ethical review process in all establishments using live animal subjects for experimental purposes. The Home Office did not lay down any precise mechanism for this ethical review process other than a requirement that it should be satisfactory to inspectors employed to enforce the Animals (Scientific Procedures) Act 1986 (ASPA) that regulates animal experiments in the UK. The requirement for a local ethical review process is now a standard condition for every designated user and breeding/supplying establishment. This development follows a period when several interested groups and proponents of animal rights have recommended that there be such a review process in the UK.

The RSPCA (UK) looked at how animal experimentation ethics committees (AEECs) should be set up (Jennings, 1994). It stated that the function of the AEECs should be to assist the certificate holders and other named persons in discharging their duties under the ASPA. The AEECs should also promote awareness of animal welfare issues and generate initiatives to apply the concepts of reduction, refinement and replacement to animal experiments. They might also assist in communicating to the public issues concerning animal experiments. The report stated that special consideration should be given to the presence of lay members on AEECs.

Another influential report was produced in 1995 by The Boyd Group which comprises individuals concerned with the ethics of animal research drawn from a wide range of groups including scientists, animal welfare organisation representatives, philosophers and veterinarians (The Boyd Group, 1995). The Report stated that any means of improving the process of ethical review of research involving animals should satisfy three main requirements. First, it should ensure the ethical acceptability of all research projects involving animals. In practice this means ensuring that they are scientifically necessary and of high quality; and that, wherever possible, the use of animals is replaced, refined or reduced. Second, it should improve public confidence in the review process. Third, it should enable those responsible for ensuring the acceptability of work in their institutions to carry out their duties as efficiently and effectively as possible. The Group felt that such committees could enhance the review process by widening consultation and providing a clear institutional focus for the consideration of relevant ethical issues.

The Boyd Group highlighted some potential difficulties with the introduction of such committees. They were concerned that there was a possibility that AEECs might contradict or duplicate the role of the Home Office and lead to a non-uniformity of policy on animal issues across the country. They might increase bureaucracy and cost, cause delays or restrict research, and might compromise the confidentiality of scientific work in progress.

However, the Boyd Group Report also highlighted the potential benefits of establishing AEECs. These included the creation of a forum for the discussion of best practice, the encouragement of best practice within institutions, the widening of consultation on animal research issues and the committees' potential role in helping to create an environment in which broader educational benefits might follow within an institution. It would also provide an avenue of communication with groups outside the institution.

The Report examined the potential membership of

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AEECs and stated that they would need to *encompass as wide a range of views as is compatible with reasoned, expedient discussion and decision-making, to foster an atmosphere of public trust and confidence in the work, to command respect within the institution and to have the support and commitment of the institution's management.* The Report considered whether lay membership would mean research might be delayed. Problems of confidentiality could be overcome by the introduction of ground rules. These rules would have to be negotiated to deal with disruptions or breaches of confidentiality. However, the Report stated that while some individuals or organisations hold extreme convictions so passionately that they are unable to take part in a reasoned, expedient discussion and decision-making, it was important to include lay membership to bring perspectives which can help to raise awareness of the spectrum of opinion on matters discussed by the AEEC.

The Boyd Report also looked at how AEECs could improve openness and stated that *animal welfare and anti-vivisection organisations frequently scan the scientific literature for reports of research which might be of concern; but lack of detail in many published reports of animal experiments is a barrier to accurate criticism. Individual scientists are often wary about responding to requests from such organisations for information about animal procedures, for fear of reprisals. AEECs, in consultation with researchers, could provide a more acceptable channel for the communication of such information. This could help to promote public understanding and avoid misinterpretation of the nature of the work carried out in the institution.*

The Animal Procedures Committee (APC) of the Home Office, a national body that oversees the operation of the ASPA 1986, has also considered the need for AEECs. The APC Report for 1995 stated that a local ethical view process could provide a mechanism to help certificate holders meet their responsibilities and could be the means of encouraging wider local involvement in addressing issues surrounding animal use (Home Office, 1996). At the practical level, such consideration might involve asking whether the proposed animal use was appropriate - and, if so, how the least animal suffering might be caused and welfare maximised. The Committee therefore recommended that the Home Secretary should provide advice to certificate holders and project licence holders on the ethical review process, but neither specify the form that these review processes should take nor add to the regulatory requirements.

The UK system

The 1999 Home Office requirement for a local ethical review process follows, to a certain extent, the suggestions made in these reports. The new requirements are an addition to the existing system of control under the ASPA. There is no prescribed system, but the guidance notes issued by the Home Office state that each institution should set up its own ethical review process within certain parameters and that the Certificate holder should ensure as wide an involvement of establishment staff as possible in a local framework. The Certificate holder should ensure that all use of animals in the establishment, as regulated by the ASPA, is carefully considered and justified. The main aim of the new system is to ensure that proper account is taken of all possibilities for reduction, refinement and replacement and that high standards of accommodation and care are achieved.

The training of members of the review process should include the provision of independent advice and support, the promotion of an ethical analysis of the experimental process, and should increase awareness of animal welfare issues.

It is the certificate holder under the ASPA who will be responsible to the Home Office for the operation of the local ethical review process and for the appointment of people to implement its procedures. The committee should include a named veterinary surgeon, representatives from among named animal care and welfare officers, project licensees and personal licensees. The guidance notes indicate that as many relevant people as possible should be involved in the ethical review process. Where possible, the views of those who do not have responsibilities under the Act should be taken into account. In relation to lay involvement, one or more lay persons, independent of the establishment should also be considered.

Home Office inspectors will have the right to attend any meetings and have access to the records of the ethical review process. All licensees and named animal care and welfare officers must be informed of the ethical review process and should be encouraged to bring matters to its attention. The procedure chosen should allow for input by colleagues and other people from outside the establishment and it should be clear how submissions can be made. The people involved should be regarded as approachable, dealing in confidence with complaints, and processing all suggestions for improvement.

The receipt of a project licence application signed by the certificate holder will be taken by the Home Office to indicate that the application has been through an ethical review process in that establishment. The Home Office will not consider an application for formal authorisation until the prospective project has been considered appropriately within the ethical review process.

How adequate is the UK system?

One of the major criticisms of the way animal experimentation is carried out in the UK is the secrecy surrounding such experiments. The use of AEECs is widely viewed as being an important means of opening up the regulatory process to some form of accountability through scrutiny by outside bodies. In October 1998 the National Anti-Vivisection Society (NAVS) sought judicial review of whether the Home Secretary was acting outside his powers in relation to section 24 of the ASPA 1986 and whether this section gave him authority to declare that all project licence applications were confidential. The judge granted leave to bring an action for judicial review of this use of section 24. The Home Office immediately withdrew its defence, changed its policy and paid the legal costs that NAVS had incurred.

The NAVS wished to use the proposed UK Freedom of Information Act to include animal experimentation and to introduce wider scrutiny of project licence applications. In order to allay the fears of

scientists, NAVS suggested that no names or locations would needed. They were mainly concerned that non-animal alternatives might be suggested and fed into the process of review of proposed experiments (NAVS, 1997).

However, although these are important aims, accountability would be improved considerably if members of animal welfare organisations had a more central role in the ethical review process. Lay members would then be able to directly influence the ethical debate and challenge applications throughout the review process.

There should be a requirement for the appointment of lay members drawn, for example, from animal welfare group nominations. Lay members or animal welfare groups should not only be consulted when the committees see fit to do so. In relation to lay membership, the RSPCA has published a Report (Jennings, 1998) which covers why lay members should be included and how this process can be undertaken on all 3sides.

Another concern is whether the procedures followed by the committees would be adequate and whether their ethical decision-making would be consistent. There are 300-400 establishments that use animals for experimental purposes in the UK, each of which will have its own internal ethical review process. Each institution may make different decisions based upon different ethical criteria. The institutions in the UK will have a membership of thousands that will create problems in relation to the dissemination of information, ensuring consistent practice and training as to the nature of ethical decision-making.

A recent Report by the Laboratory Animal Science Association (Jennings *et al.*, 1998) examines the ethical review process for animal experiments in academia and defines it as a local framework acting as an adjunct to the Home Office Inspectorate to ensure that all animal use in an establishment is carefully considered and justified, and that proper account is taken of all possibilities for reduction, refinement and replacement. Therefore, the review process covers the philosophical and practical issues through the whole process from breeding to the eventual use and disposal of the animals. In relation to lay membership, the Report states that *...many within the scientific and commercial community are extremely concerned about inviting lay people to participate. Their concerns are based mainly on the perceived potential for breaches of personal security, scientific and/or commercial confidentiality, and disruption of the review process. Some establishments already have lay members on their various committees and there is no evidence that this has posed serious problems. Some argue that inclusion of lay members in the ethical review process is not the best way of communicating with the local public and that there are better ways of doing this.*

In relation to the consistency and effectiveness of the ethical review process, the Report is not particularly concerned about variations in the ethical and scientific climate. The role of the Home Office Inspectorate is seen as important in ensuring consistency. However, it is clear that the ethical training given to committee members is also vitally important in relation to ensuring the consistency of decision-making. In relation to training, the Laboratory Animal Science Association has worked on the development of an ethics component of the modular training system for laboratory animal scientists (Jennings and Hawkins , 1998) .

Conclusion

The introduction of AEECs into the UK provides an invaluable opportunity for greater accountability and scrutiny of the use of animals in scientific experimentation. Secrecy is endemic within the current system and the general public remains suspicious and concerned about animal experiments and the scientists who perform them. The stated aim of the process is the reduction, refinement and replacement of animal experiments. If this is to be achieved, alternatives have to be put forward at the earliest possible stage in the development of experiments. It is important that questions should be asked as to the necessity of the experiment as well as the suitability of proposed procedures to achieve the scientific objectives of the experiments. For the ethical review process to have legitimacy, consistency and openness are essential.

The existing inadequacies of the UK system of regulation and its inherent secrecy have led to an undesirable polarisation of the debate on the use of animals in scientific experimentation. The introduction of a compulsory ethical review process in the UK was an ideal opportunity to begin the process of drawing the debate into the open and improving the scrutiny of scientific proposals in terms of animal welfare. Unfortunately, the system chosen to introduce an ethical review process leaves much to be desired. Unless the system is opened up to a greater lay membership and freedom of information, the system is likely to lose the confidence and involvement of the public and animal welfare organisations alike.

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References

Home Office, (1996) Report of the Animal Procedures Committee for 1995. HMSO, London.

Home Office, (1998). Animal (Scientific Procedures) Act 1986: Ethical Review Process. London.

Jennings, M. (1994) *Ethics Committees for laboratory animals - a basis for their composition and functions.* RSPCA, Horsham.

Jennings, M. (Ed.) (1998) RSPCA Report, *Lay members and the ethical review process* .

Jennings, M. and Hawkins, P. (1998) *Developing the ethics component of the UK modular training system for laboratory animal scientists.* A LASA Workshop Report. *Animal Welfare.* **7:** 445-458.

Jennings, M., Moore, G. and Howard, B. (Eds). (1998) *The Ethical Review Process in Academia.* LASA Tamworth, UK.

NAVS, (1997) *Accountability - animal experiments and freedom of information.* NAVS, London.

The Boyd Group (1995) *Ethical Review of Research Involving Animals - A Role for Institutional Ethics Committees.* Edinburgh.

Replacement and reduction of animal usage in teaching physiology and pharmacology at the University of Queensland

Introduction

The replacement and reduction of animal usage in the practical component of the undergraduate teaching and learning programs in the Department of Physiology and Pharmacology at the University of Queensland has been an ongoing process since 1980.

The progress that has been made in reducing animal usage by pharmacy students can be assessed by analysing an example of the animal usage in 1999 compared with that in 1980. Similar statistics could also be presented in relation to the undergraduate practical courses for students in veterinary science, dentistry and the therapies, and our major commitment to students enrolled in a Bachelor of Science degree.

In 1980, the 80 Pharmacy students had a two-semester physiology subject in Level Two and a two-semester pharmacology subject in Level Three. The 26-week practical program involved the use of animal preparations over 22 weeks and experiments in which the students were the human subjects in the remaining four weeks. The animal experiments included 11 weeks each of *in vitro* and *in vivo* experiments which illustrated the actions of a wide range of drug groups in isolated tissues from toads, rabbits, guinea-pigs or rats and whole animal responses in rabbits, mice or anaesthetised cats. The practical program aimed to illustrate the mechanisms of action of drug groups that were the subject of the concurrent lectures. The students also developed significant practical skills in both *in vitro* and *in vivo* animal experiments. However, these skills were of relevance only to the very small number of pharmacy students who pursued a research career in pharmacology or related areas, rather than a career in pharmacy practice. Neither computer-assisted learning (CAL) nor self-directed learning (SDL) modes of teaching were part of the 1980 program.

A major change occurred with the introduction of an integrated physiology and pharmacology program in 1998 for the Level Two students and in 1999 for the Level Three students in the new four-year Bachelor of Pharmacy program. We now attempt to achieve the educational aims of the subjects with a markedly diminished dependence on animal experiments. In the Level Two subject, there is one *in vivo* experiment to illustrate the central nervous system actions of drugs in mice, three *in vitro* experiments on isolated tissues and two experiments in which the students are the subjects. The remainder of the Level Two practical program consists of CAL material, some of which are simulated experiments. In Level Three, the emphasis is on human responses to the drugs, so the program involves no animal experiments and consists of human experiments where the students are the subjects and various modes of CAL material.

The figure illustrates the changes in the practical program for the pharmacy students between 1980 and 1999. There has been a dramatic decrease in the required numbers of each animal species, with an overall decrease of 89% in total animal usage per student.

The major driving force for the change in philosophy towards reduced dependence on animal experiments in physiology and pharmacology teaching programs was animal welfare. The justification must, and should be, much stronger and more clearly articulated to support carrying out an animal experiment in a student practical and obtaining the appropriate ethical approval now than was the case in 1980 when we first began to consider the implementation of alternatives.

Other factors have also been driving forces in this process, including:

- the loss in the late 1980s of the source of cats for *in vivo* experiments. In some experiments, the same aims were achieved in anaesthetised sheep, but their use has been minimised and in some cases replaced by CAL-based simulated experiments;
- a reduced availability of tutors expert in the surgical techniques needed for many of the experiments;
- the establishment of the Departmental CAL teaching laboratories in the mid-1980s and subsequent ongoing expansion and updating of the facilities;
- the development of some excellent CAL material, e.g., by the Pharma-CAL-ogy Consortium (contact: Dr I. E. Hughes, Department of Pharmacology, University of Leeds, UK; administered by the British Pharma-cological Society); Sheffield BioScience Programs (contact: Dr D. G. Dewhurst, Faculty Group of Medicine and Veterinary Medicine, The University of Edinburgh, UK) and the Pharmacy Consortium for Computer Aided Learning (PCCAL). During this process, we have maintained close links, particularly with the British initiatives in the development and implementation of CAL-based alternatives to animal experiments in teaching physiology (at both the secondary and tertiary levels) and pharmacology (Pharma-CAL-ogy Consortium; Dewhurst, 1990; Dewhurst *et al.*, 1988);
- the emergence of relatively easy authoring programs, such as Authorware, facilitating in-house development of CAL material and relatively easy conversion of material written for the Windows platform to the Mac platform and vice versa;
- very large increases in numbers of science students taking physiology and pharmacology over the last decade, necessitating a different approach to the practical-based subjects due to space and tutoring constraints; and
- a change in emphasis of the practical components of Level Two and Three Science subjects from illustrating physiological and pharmacological principles to providing students with an opportunity to develop generic skills in application, experimental design, teamwork and data analysis.

Strategies to replace and reduce animal use in teaching physiology and pharmacology

Recorded experiment
This strategy has been implemented in the Department progressively since 1981. The experiment can be recorded using video which can be integrated into multimedia CAL programs. One experimental animal is required to prepare the video and obtain experimental results for the CAL program, and subsequently no animals are used. Almost complete replacement can be achieved with this approach. It works best when video and CAL are combined, since an interactive CAL component maintains the student's interest and provides the option of doing self-testing questions. Examples of recorded experiments that have been prepared in this Department are a video and CAL illustrating autonomic control of the cardiovascular system in an anaesthetised rabbit and a video of control of salivation in an anaesthetised sheep.

Broadcast experiment
This strategy was first implemented in the Department in 1993 and involves the preparation of one experimental animal, such as an anaesthetised sheep, for recording blood pressure and heart rate with provision for intravenous injection of drugs and other procedures, and display of the results of the experiment on a large number of networked computer work stations. The advantage of this approach is that the students can handle the data from the experiment in real time and can be involved in the actual experiment. This is achieved with markedly reduced animal usage compared with providing each student group with an experimental animal.

Simulated experiment (with or without video support)
Simulated experiments have been a major strategy in replacing the use of animals in pharmacology practicals, particularly since we obtained in 1990 several CAL simulation programs developed by Dr Ian Hughes of the University of Leeds. These programs simulate experiments on the autonomic control of the guinea-pig ileum (replacing some experiments on guinea-pig ileum), the action of drugs at the neuromuscular junction on the cat anterior tibialis muscle (replacing the use of the rat phrenic nerve diaphragm preparation) and the cardiovascular actions of drugs in an anaesthetised animal (replacing many experiments on anaesthetised cats). In addition, other simulation programs have been purchased, such as the Simulated Water Maze CAL, which simulates the actions of drugs on learning and memory in a rat model (Pharma-CAL-ogy Consortium), and some simulation programs have been developed in the Department. The best of these programs includes a realistic level of variability in the results to simulate biological variation in drug responses.

One of the most important features of these programs is that students should be able to make decisions about how to investigate questions raised in the accompanying practical notes. Some programs that are commercially available take the students through a predetermined protocol, and this process, whilst much easier for the programmer, has minimal educational value. It is also valuable to show the students one actual experiment on the simulated preparation (e.g., guinea-pig ileum) or at least a video of the preparation used in the simulation experiment to maintain a link with the reality of the experiment.

Interactive tutorials (with or without video support)
A large range of interactive tutorials (some produced in the Department and others purchased mainly from the Pharma-CAL-ogy Consortium) are used as part of our practical program, but they must be carefully integrated into the teaching and learning program for the particular subject to ensure that students relate appropriately to the material. For example, a tutorial on Drug Development and Clinical Trials is used as the first in a two-week program on the topic. In the second week, the students work in small groups to critically analyse a literature report on a clinical trial and give a short oral presentation on their findings (in some cases as part of assessment).

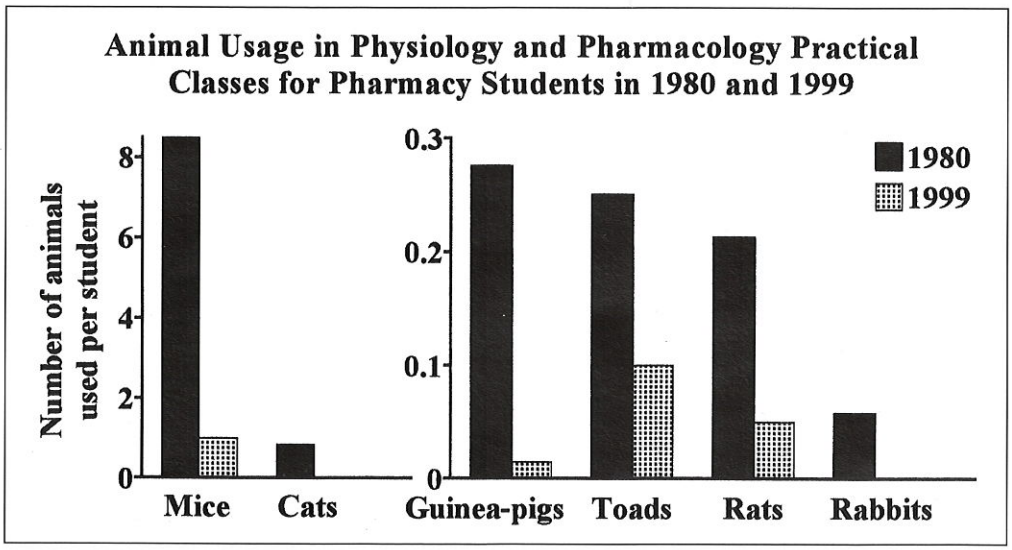
Human experiments
There is now an increased emphasis on experiments on human subjects (volunteer students) rather than animal models to investigate principles that involve the use of non-invasive techniques and the ingestion of safe compounds or drugs. The volunteers undergo an appropriate medical examination prior to participation and medically qualified staff are available during the experiment.

Educational aims in the use of alternatives to animal experiments

a) To provide the practical experience without the students carrying out a hands-on practical

This can be achieved with the broadcast experiment, recorded experiment or simulated experiment. With the simulated experiment, important features to ensure a successful educational outcome are that:

- the tutors must be very well informed about the actual experimental procedure, so that they can pass this on to the students to ensure that the biology is the focus and not the computer;
- the objectives should require the students to design an experiment to investigate a particular question (rather than simply carrying out a sequence of procedures, as might be written in the protocol for an *in vivo* experiment) and ;
- the students must be guided to carry out simulated experiments that could realistically be carried out in the animal preparation, taking into account doses of drugs and prolonged effects of antagonists.



b) To extend concepts explored in a hands-on practical

We frequently use the simulation experiments for this purpose, by carrying out one animal experiment for a particular group of students followed by one or more sessions with the CAL simulation. The important features highlighted above are less likely to be a problem when the students have first carried out at least a simple experiment of the type they are doing with the CAL simulation. This approach provides a good compromise as animal usage is markedly reduced, but the students understand the concepts of the particular experimental set-up much better than when they use only the simulation program. One example is the guinea-pig ileum experiments on basic mechanisms of drug action for the pharmacy students, where all of the concepts explored in five practicals in the 1980 schedule have now been replaced by one hands-on experiment and a further week using the simulation CAL to explore the more advanced aspects.

c) To investigate concepts before a hands-on practical

This is the converse of the situation described above. The aim here is to use the CAL simulation programs to take the students through some relatively difficult concepts so that the use of animals can be optimised when they are in the practical laboratory. An example is the approach we use for the Level Two students in pharmacology who carry out a 9-10 week group project to identify the pharmacological actions of an agonist drug and an antagonist drug, using a range of in vitro tissue preparations. Prior to commencing the experiments, the students use the simulation programs to investigate such concepts as relative potency and efficacy; to consider aspects of good experimental design; and to generate simulated data and carry out the calculations they will need to do with their experimental data. This is invaluable in avoiding inappropriate use of the animal tissues in their subsequent experiments for the project. Our experience concurs with that of Sewell *et al.*, (1996) who reported that student understanding is increased when laboratory practicals are supplemented with simulation CAL programs.

d) To introduce students to the use of statistics for experimental design and data analysis

The use of CAL programs that simulate biological variability allows sufficient data to be generated for statistical analysis to be carried out. Some of the simulation programs, such as the water maze (see above) specifically include statistical design and analysis as a feature of the program, so that the students are able to consider appropriate controls in the design of the experiment, collect the data for a number of simulated rats and then carry out the appropriate analysis of the data.

Advantages, pitfalls and future of alternatives to animal use in teaching physiology and pharmacology

Implementation of the strategies described above has markedly reduced the number of animals needed in the practical components of our teaching and learning programs. However, while the alternatives replace the animals, they do not replace good teaching and good tutors! As with all use of CAL programs, the CAL must be viewed as a resource (and not as a complete teaching entity) and the educational success of the alternative strategy is dependent on the design of the accompanying practical notes, preferably with elements of experimental design built into the tasks set for the students. Tutors involved in the class must be very well informed on the educational aims, the strategies to be used to achieve these aims and the practical experiment that is being simulated by the CAL. It is important to ensure that the students relate to the exercise as a practical experiment and not as a computer exercise, but it is also becoming more difficult to achieve, as more recently graduated tutors have never carried out the hands-on experiment that is being simulated. A comparison from the University of Sheffield of one group of Level Two undergraduate science students which had a traditional laboratory class and another group which had a CAL program and associated resources on intestinal absorption showed that the knowledge gain by the students was the same and that the students had a positive attitude towards the CAL-based material (Dewhurst *et al.*, 1994). However, there is some variation in the student attitude to CAL between different studies (Sewell *et al.*, 1996). Our experience is that similar results are possible, but both the educational outcomes and the students' attitude to the CAL-based material are highly dependent on the provisos above regarding the tasks set for the students and the standard of tutorial advice.

Other advantages of the implementation of alternatives are:

- it is possible to achieve most of the educational aims of the hands-on practical (apart from the development of the actual practical skills);
- practical teaching in physiology and pharmacology can cope with large increases in student numbers;
- students can obtain data from experiments that may be too difficult for them (or in some cases the tutors) to carry out in reality;
- sufficient data can be obtained from simulated experiments for the students to obtain experience in statistical analysis that is often not possible in hands-on practicals;
- students have the opportunity to explore experimental design to an extent that would not be possible, or in some cases ethical, in a hands-on experiment;
- on-going cost compared with laboratory classes is lower, although the cost of the alternative material must be taken into account.

Disadvantages include:

- the potential for students to lose touch with reality (although this can be minimised by appropriate tutoring and the combined use of videos or a demonstration experiment with a CAL program);
- reduced development of practical skills by the students (so that the educational importance of these skills must be assessed for each group of students);
- the necessity to use only CAL or video material that is of high quality and relevant to the particular teaching program (and hence only some commercial material is appropriate);
- the high cost of in-house development of CAL and video material and of keeping both commercial and 'in-house' material updated.

Conclusion

The future should see a continuation of the development of multimedia material to replace animal experiments in the teaching and learning programs in physiology and pharmacology. For Bachelor of Science students, there are unlikely to be further significant decreases in animal usage over those that have been achieved in the last 20 years, since it is university policy to maintain a level of hands-on practical experience at each level of the teaching and learning program for these students.

It may be possible to achieve some further decreases in animal usage for students in the professional degree courses without compromising educational out-

Importation, quarantine and monitoring of laboratory animals, particularly rodents, for issue in Australia

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Introduction

The availability of laboratory animals which are disease and pathogen free and which do not have antibodies which are indicative of past exposure to agents of concern is critical to laboratory services. The course of acquisition from production facilities of known status, shipping under appropriate security and maintenance in housing of appropriate isolation presents its own demands on animals and users.

This paper will not deal with the logistics of handling, housing and airfreight of laboratory animals. Details of requirements are available from the International Air Transport Association (IATA) or from freight forwarding agents.

The number of specific genetic and standardised lines identified for particular tasks means that they are traded around the world in significant numbers. Disease control and welfare issues require particular housing arrangements, attention, and continued monitoring.

The nature of the laboratory animal, methods of housing and care and its relationship with humans create complexity in establishing disease freedom. This usually involves sample testing.

At the national and international levels there are obligations regarding animal health and welfare which affect this matter. Australia's traditional stringent quarantine arrangements which have successfully excluded many livestock diseases are also employed for laboratory animals.

Quarantine

Quarantine in Australia is the responsibility of the Australian Quarantine and Inspection Service (AQIS), an agency of the Australian Department of Agriculture, Fisheries and Forestry.

Quarantine requirements reflect the known disease status and value of such animals, methods of handling and the facilities in which they are held. They are designed to exclude exotic and zoonotic diseases and those troublesome in laboratory colonies. Current requirements centre on hantavirus, lymphocytic choriomeningitis virus, ectromelia virus and rabies but are mindful of other diseases.

Quarantine policy and legislation

Australia's policy has always been conservative but all quarantine restrictions have been scientifically based. Where there has been inadequate scientific information on which to base decisions the precautionary principle has been applied.

The Quarantine Act 1908, one of the early Acts of the new Commonwealth provides the legislative basis and authorises the making of Regulations (which specify how) and Proclamations (which specify what) regarding quarantine activities and commodities that may be imported. This subordinate legislation is made by the Executive Council (Governor-General and Ministers) but is scrutinised by Parliament. The legislation provides certain delegations and authorities to the Director of Quarantine who can authorise "protocols" or "conditions" which provide flexibility and detail necessary to address biological variation.

Australia has obligations arising from its membership of the World Trade Organisation. The Agreement on the Application of Sanitary and Phytosanitary Measures of the WTO mandates the use of risk analysis and, inter alia, consultation and transparency in quarantine decision making because of the potential for unjustified impediments to trade. The Agreement also mandates the International Animal Health Code of the Office International des Epizooties (OIE) - the world organisation for animal health as the standard for quarantine.

The Code provides the general basis for international movement of animals, their genetic material and products derived from them while minimising the spread of disease. The Code also provides the basis of inspection, quarantine and certification.

Australian quarantine policy and procedure were recently reviewed by a Quarantine Review Committee chaired by Professor Malcolm Nairn. The Committee recommended an Import Risk Analysis (IRA) process of routine risk analysis (in house) for common routine cases or where there were precedents and of non-routine risk analysis where there were not. The latter involves the formation of Risk Analysis Panels (RAP) of Experts. The mandated process involves consultation with stakeholders at various parts of the process, including the process itself, composition of the RAP and the draft IRA paper, so that it is truly transparent. The AQIS Bulletin advises interested parties of its intention to undertake an IRA, of the progress made and of the availability of the draft IRA.

Methods of risk analysis are addressed in the OIE Code. Much has been written on risk analysis, essentially a step by step evaluation of the risks of each identified disease from the colony of origin to release in the importing country, is done. This may be quantitative, semi-quantitative or qualitative. The Code addresses:

- country factors e.g., the disease status of the export country/facility;
- commodity factors i.e., the capacity of the animal or

product to carry the disease(s);
- number of import units (to quantify the risk); and
- risk of domestic exposure (in the country/facility of import).

Risk management is the process by which the risks are addressed e.g. by testing or quarantine.

Quarantine requirements

AQIS has developed guidelines for the approval of countries to export animals and their products to Australia. Current conditions for the importation of laboratory rodents were introduced in December, 1998.

The AQIS permit does not absolve the importer from the necessity of obtaining permission to import under the Wildlife Protection Act 1983, should this be appropriate.

The conditions require the donor colony to be free from the following diseases or infectious agents during the 12 months prior to export:

- hantavirus;
- lymphocytic choriomeningitis virus;
- sendai virus;
- ectromelia virus; and
- rabies.

Importers may wish to test for other disease agents to protect their colonies.

The colony containing the animals for export must be housed in accommodation which precludes access by wildlife, including rodents, and be insect vector proof and free of ticks.

The animals to be exported and the donor colony must have remained clinically healthy and free from infectious and contagious diseases in the 30 days prior to export.

Each animal for export must be examined by an official veterinary officer during the 48 hours prior to loading and be fit to travel and free from evidence of infectious and contagious disease and external parasites. Specific Pathogen Free (SPF) animals are exempt from examination, but certification by an official veterinary officer and the veterinarian in charge of the donor colony of their SPF status must be provided.

Transport should be in a container as specified under IATA Live Animal Regulations. On arrival, all litter in the containers must be destroyed.

Imported Animals

The imported rats and mice must be maintained in quarantine premises approved by the Chief Quarantine Officer (Animals). They must be kept in secure containers in a locked building with keys to be held by nominated responsible persons. No transfer of imported rats and mice or offspring is to be made without the permission of the Chief Quarantine Officer (Animals).

A register of all imported rats and mice must be kept by a nominated responsible person. This register shall contain the following information:

- source of animals;
- identity of animals;
- numbers of animals imported, used, born, weaned, transferred, died; and
- cause of death.

All animals on the premises must be immediately identifiable as to their source and quarantine status. Microchips may be used. Advances are being made in national and international standards for microchips so that readers of all brands will be able to read all microchips and registers of microchips will be linked for ready access.

Imported animals may be isolated in microisolators. Non-imported animals may be placed in the quarantine room for use for breeding or as sentinels for immunocompromised imported animals. Animals in contact with imported animals will remain in quarantine until the imported animals are released from quarantine. Husbandry and handling practices, including traffic flows, must be of a standard which ensures the integrity of the quarantine status of the imported animals and thus reduces the likelihood of spread of disease.

If any of the imported or contact animals suffer from or are suspected of illness, or death is suspected to have been caused by hantavirus, lymphocytic choriomeningitis virus or ectromelia virus, AQIS must be notified immediately.

Imported animals must remain in approved quarantine premises during the entire period of their use in research. The imported animals must be kept physically isolated from all other animals in the facility not of the same quarantine status. Any animals (including sentinels) in the quarantine facility that come in contact with imported animals will assume the same quarantine status as the imported animals. Imported animals, must, at the end of their use be disposed of in a manner approved of by AQIS (e.g., autoclaving or incineration).

Release from quarantine

Progeny of imported rats and mice may be released from quarantine to institutions registered by their State or Territory (an institution holding animal ethics clearance) to hold rodents if the above conditions are met.

Except for *Mus musculus, Rattus rattus* and *Rattus norvegicus*, permission must be obtained from Environment Australia to transfer rats and mice and their offspring from quarantine premises to other premises.

Progeny of imported animals are eligible for release only if prescribed tests are performed on a statistically valid sample of all the rats and mice at least eight weeks of age and show freedom from the following disease agents:

- hantaan virus - enzyme linked immunosorbent assay (ELISA)
- lymphocytic choriomeningitis virus- ELISA
- ectromelia virus (mice only) - ELISA

Other test methods may be used with prior approval from AQIS.

Several options for sampling of the imported animals are provided:

- one off sampling of imported animals and their progeny in the quarantine room. Sample size must be sufficient to detect a 5% prevalence of infection at a 99% confidence level and no introductions within 30 days of blood collection;

- sampling the colony of imported animals and progeny in the quarantine room on a quarterly basis over the previous 12 months. Each sampling to detect a 30% prevalence at 99% confidence and no introductions within 120 days of release i.e., 30 days before third sampling;

- progeny maintained as a separate biological unit from the imported animals, each sampling to detect a 30% prevalence at 99% confidence and no introductions within 120 days of release i.e., 30 days before third sampling.

For the second and third options, provided the colony is on a quarterly testing program, progeny can be released after two negative quarterly tests at least 30 days after the last introduction.

If any of the animals test positive, the officer in charge of the colony must notify AQIS. No release will be allowed and AQIS will give instructions as to further investigations required or the disposal of the positive animals and those in contact.

Where immunocompromised mice are imported, sentinels may be used, under the following circumstances:

- sentinels (8 to 12 weeks of age, the same species as those in quarantine) must be placed in contact (in the same boxes) with the imported animals on arrival in quarantine for a minimum of 45 days but not more than 120 days prior to testing for the diseases listed above;

- the number of sentinels to be placed in contact with the colony is calculated from the number of animals in the colony prior to adding the sentinels to give 99% confidence of detecting disease if it is present at 5% prevalence. A few additional animals should be added to the colony.

A report containing the test methods, the name of the testing laboratory, and numbers of animals tested must be provided to AQIS before approval for release will be given. The purchasers of animals may require pre-transfer testing for other disease agents.

Premises

AQIS requires imported biologicals and laboratory animals to be kept in approved laboratories. There are requirements regarding location, equipment, waste control and record keeping which are controlled through quality assurance arrangements which may be based on HACCP principles. This method allows the management to develop quarantine security arrangements which best suit their facilities and operations. It might be said that the process is outcome orientated so that the individual method is less important than the result. This suits the wide nature and purpose of laboratories very well and lightens intervention into regulatory measures while allowing the disease control and welfare needs to be met. Where necessary premises and records are audited.

Disease control

Disease control tends to be based on quarantine and the procurement of healthy stock from accredited or reputable sources. Transport in isolators and quarantine or isolation on arrival may be required. Design of housing or vivaria is important in prevention of cross infection. Bacterial diseases may be treated by chemotherapeutics in feed or water. Mycotic diseases are controlled principally by careful purchase and by control of the animal house environment.

Cleaning and sterilisation of equipment is important as are the sources of bedding and feed.

Biosecurity

Some animals will be SPF and will have to be moved and held in appropriate isolators to prevent introduction of organisms from which they are free. There are important zoonoses which require high levels of security. Biosecurity levels have been described by Murray (1998) and are recorded in the International Animal Health Code of the OIE.

Systems of biosecurity have four levels. The OIE Code specifies:

- Group 1 animal pathogens: enzootic disease organisms. No official control.

- Group 2 animal pathogens: exotic or enzootic organisms. Low risk of spread. Official control. Not vectored, species specific, limited economic significance.

- Group 3 animal pathogens: exotic or enzootic organisms. Moderate risk of spread. Official control. May be vectored, quarantine applied, severe economic significance.

- Group 4 animal pathogens; Exotic or enzootic organisms. High risk of spread. Official control. May be vectored, quarantine applied, movement controls, severe economic significance.

Laboratories handling groups 3 and 4 operate at negative pressure. compared to the environment, have HEPA filtration of exhaust air and treatment of liquid and solid effluent to inactivate organisms. Operatives must shower out. Group 4 also requires full isolation in closed (class 3) biosafety cabinets or the use of full body suits.

Disease concerns

The principal diseases in laboratory mice and rats that are of concern to AQIS include:

Ectromelia (mousepox).
Ectromelia is a highly contagious poxvirus infection of laboratory mice. Infection of naive mice can result in 100% of animals of susceptible strains (eg. BALB/c, C3H) affected. Animals may die in the viraemic stage or develop generalised skin rash. Sub-clinical ectromelia infection may be converted to clinical disease by many common laboratory manipulations.

Lymphocytic choriomeningitis virus (LCM).
LCM is a natural infection of wild and laboratory mice and Syrian hampsters. Humans, monkeys, dogs, rabbits, guinea pigs, rats and chickens are susceptible to infection and it is

because of its zoonotic potential that imported animals have to be free of infection. Clinical disease in mice is highly variable depending on the virus strain, mouse strain and age at infection. In humans infection can cause serious and fatal disease.

Hantaan virus infection.
Hantaan virus is the prototype virus of a group of viruses in the Hantavirus genus. Hantaan virus causes clinically inapparent infection in rats but severe disease (Korean haemorrhagic fever) in humans. Naturally infected laboratory rats have been the source of hantavirus infection in research workers in Japan, Belgium, UK and France.

Other agents that are of less concern to quarantine authorities but should be of concern to importers are:

Murine Parvoviruses (MVM, MPV)
Mouse hepatitis virus
Pneumonia virus of mice
Reovirus type 3
Sendai virus
Theiler's encephalomyelitis virus
Rat parvoviruses (KRV, Toolan's H-1, RPV)
Mouse adenovirus
Rat coronaviruses (RCV, SDAV)
Mouse polyoma virus
Rotavirus (EDIM)
Mouse cytomegalovirus
Mycoplasma pulmonis
CAR bacillus
Clostridium piliformé
Encephalitozoon cuniculi
Citobacter rodentium (freundii BT4280)
Salmonella spp
Dermatophytes (ringworm)
Internal nematodes (eg., pinworm)
Skin mites

Conclusion

The AQIS processes of establishment and regulation of importation requirements are designed to protect the community and the animals concerned. They are scientifically based and must meet national and international obligations. The processes are transparent and stakeholders and interested parties have an opportunity to participate and should do so in order to ensure the best means of achieving disease control objectives are employed. Modern methods of self regulation through quality assurance measures are encouraged.

References and further reading

Aiello, S.E. and Mays, A., (eds.) (1998) *The Merck Veterinary Manual.* 8th Ed, Merck and Co, Whitehouse Station, New Jersey.

AQIS (1991) *The Application of Risk Management in Agricultural Quarantine Import Assessment: a discussion paper.* Australian Government Publishing Service, Canberra.

AQIS (1998) *The AQIS Risk Analysis Process Handbook.* Australian Quarantine and Inspection Service, Canberra.

Cannon, R.M. and Roe, R.T.. (1982) *Livestock Disease Surveys. A Field Manual for Veterinarians.* Bureau of Rural Science, Department of Primary Industry. Australian Government Publishing Service

Garner, M.G. and Nunn M.J. (1995). The Australian national animal health information system. *Epidemio. sante anim.*, **27:** 143-160.

Hueston W.D. (1993). Assessment of national systems for the surveillance and monitoring of animal health. *Rev. Sci. Tech. Off. Int. Epiz.*, **12** (4), 1187-1196.

International Air Transport Association, Live Animals Regulation, 15th Ed July, 1988.

MacDiarmid, S.C. (1991). Risk analysis and the importation of animals. *Surveillance* **18** (5), 8-11.

MacDiarmid, S.C. (1993). Risk analysis and the importation of animals and animal products. *Rev. Sci. Tech. Off. Int. Epiz.* **12**(4): 1093-1107.

Morley, R.S. (1993). A model for the assessment of the animal disease risks associated with the importation of animals and animal products. In risk analysis, animal health and trade *Rev. Sci. Tech. Off. Int. Epiz.* **12** (4): 1055-1092.

Murray, P.K. (1998) An overview of the roles and structure of the international high-security veterinary laboratories for infectious diseases. *Rev. Sci. Tech. Off. Int. Epiz.* **17** (2): 426-443.

Office International des Epizooties (OIE) (1994). *International Animal Health Code,* 1993 and 1994 updates, **(6)** 27-28/19.

Office International des Epizooties (OIE) (1992). *Manual of Standards for Diagnostic Tests and Vaccines,* 3rd Ed. OIE Paris 723 pp.

Nairn, M.E., Allen, P.G., Inglis, A.R. and Tanner, C. (1996) *Australian Quarantine: a shared responsibility.* Department of Primary Industries and Energy, Canberra.

World Trade Organisation (1994) *Agreement on the Application of Sanitary and Phytosanitary Measures,* WTO, Geneva.

Editor's Notes:

Dr Doyle formerly held senior positions with AQIS over some 35 years including that of Australian Deputy Chief Veterinary Officer, and is now National Veterinarian of the Australian Veterinary Association.

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comes. The major challenges are the use of the alternative material in ways that will achieve high level educational outcomes and the continual process of updating the material.

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References

Dewhurst, D. (1990). Computer-based alternatives to using animals in teaching physiology. *Humane Innovations and Alternatives in Animal Experimentation.* **4:** 144-146.

Dewhurst, D. G., Brown, G. J. and Meehan, A. S. (1988). Computer simulations - an alternative to the use of animals in teaching? *Journal of Biological Education.* **22:** 19-22.

Dewhurst, D. G., Hardcastle, J., Hardcastle, P. T. and Stuart, E. (1994). Comparison of a computer simulation program and a traditional laboratory practical class for teaching the principles of intestinal absorption. *American Journal of Physiology.* **267:** S95-S104.

Sewell, R. D. E., Stevens, R. G. and Lewis, D. J. A. (1996). Pharmacology experimental benefits from the use of computer-assisted learning. *American Journal of Pharmaceutical Education.*. **60:** 303-307.

Flooring for housed sheep

CSIRO Animal Health has recently built a new animal experimentation facility at Werribee near Melbourne. As the work requires containment that includes the boiling of effluent, we wanted sheep flooring that:

- could be readily cleaned and disinfected;
- was easily removed if accommodation needs changed;
- would wear sheep's feet evenly and provide good support for the foot;
- would allow for removal of faeces with minimum labour; and
- would use minimum water for washdown.

The perfect materials for sheep flooring are hard to find. Wooden slats are commonly used but the hoof grows long and after wear of the slats the feet are poorly supported and may catch in the gaps. Wooden structures cannot be adequately disinfected. Melwire is another commonly used material but causes wear in the midsection of the hoof with overgrown horn at the toes and heels. Avoiding cold up-draughts is a consideration for the welfare of animals when they are on floors suspended above ground.

Manufacturers' catalogues reveal quite a wide range of materials available in metal flooring, ranging from open steel mesh to a variety of solid sections designed for factory walkways, stairways and similar. Before vacating the CSIRO Maribyrnong Experimental Station in Melbourne, groups of four sheep were maintained on four different steel flooring materials.

The four materials tried were:

- Boral Melwire, (1/4 inch at one inch centres);
- Smorgon's ARC flooring, which is also an open type of wire pattern; and
- two products from BHP.

With the BHP Building Products Interlok Grating Mark 2 that were trialled, one had a smooth surface and the other an "Antiskid" raised pattern impressed upon it to give grip to the foot and to provide sufficient wear to maintain a good foot shape. The sheep's feet were regularly assessed and after ten months, the feet of the sheep on the patterned BHP product had worn best, having had no paring during the period.

The wire patterns produced worn and damaged midsections with overgrowth at the toes and heels.

The BHP Antiskid material is specified as 6520G-225, where the 225 refers to panel width in mms. Stock lengths are 6m but it can be ordered in custom cut lengths. Standard finish is galvabond which we have used but hot dipped galvanised is also available. The metal thickness is 2 mm.

We have put baffles or deflectors under the floors for quick washdown. With a 2.5 cm hose supplying 200 litres per minute, cleaning under the pens takes a minute per pen holding 20 sheep. Washings, including faeces and urine, amount to 8 litres per day per sheep when cleaning is done twice a week.

The supporting structure was made of 90 mm OD, 5 mm wall thickness galvanised steel pipes. Uprights were placed at 3.2 m centres and horizontal supports at approximately 1.3 m centres, bolted together with half inch high tensile bolts (the Figure).

After over 12 months of use at the Werribee facility, the performance of the floor is up to expectation. We have also had 12-month-old calves on these floors with good results. With cattle, faecal matter becomes broken up and dries to form an acceptable surface.

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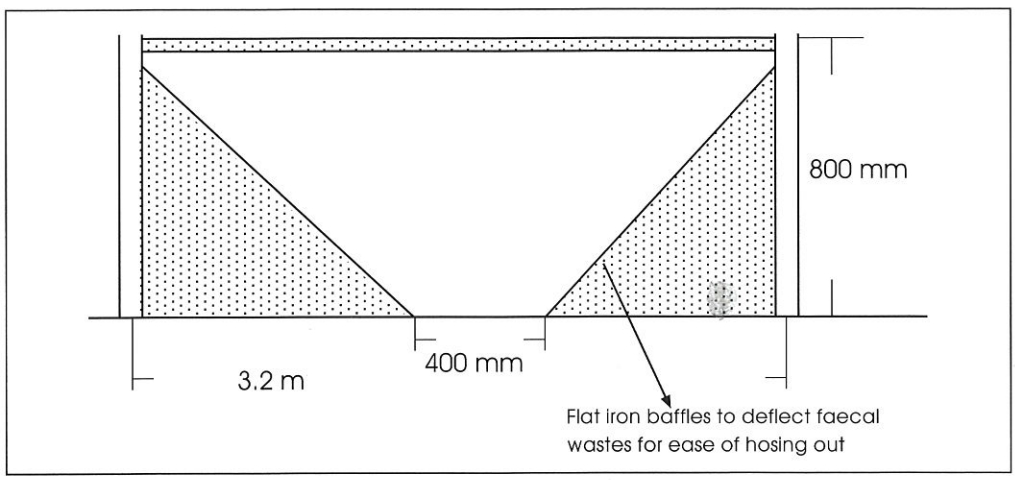

Figure shows underfloor support and baffles in the sheep pen. Vertical and horizontal supports are of 90 mm pipe.

Letters

The 1999 ANZCCART Conference and the University of Ballarat perspective on ethics in wildlife research and teaching

The need for research on animal welfare aspects of wildlife techniques

This conference was timely given the fact that studies in wildlife are the most common research and teaching activities involving the use of animals in Australia (Rose, ANZCCART Conference 1999).

It is, however, disturbing to learn that little research is actually conducted on welfare aspects of wildlife involved in research (Gott, ANZCCART Conference 1999). A simple example will clarify this point. Wood shavings or dry leaves placed inside an Elliott trap are thought to improve insulation. However, I am unaware of any research into energetic losses incurred by small mammals as a result of a trapping program nor the impact the techniques probably have on data reliability such as estimates of home range. Similarly, there seems to be no information on the possible impact researchers might have on habitat where, during long-term studies, repeated trap-rounds on a small mammal trap grid may cause considerable disturbance to the understorey and the creation of new pathways for potential fox and cat incursion. Consideration of the ethical issues may lead to improved techniques, better quality data and consideration of the limitations of the data set. Vaughan Monamy and Miranda Gott considered these issues in their papers, but the impact of the techniques themselves deserve greater attention given the diversity of species of wildlife and range of studies which use wildlife in research.

The teaching perspective

The New South Wales National Parks and Wildlife Service is currently compiling information on ethical issues relating to capture and handling of wildlife. This will be a valuable resource for fieldworkers, but ultimately it is the instructor in the field who exerts the greatest influence over student performance, for example when a student attempts to handle a first rat. In undergraduate teaching much can be gained in a small group situation where, following fieldwork, the opportunity presents itself to self-evaluate individual performance, discuss the technique and how best to obtain the necessary morphometric data. On occasion members of the University AEEC have accompanied field excursions to offer their expertise and observe procedures. This has proven to be very enlightening for lay persons on the committee, providing them with a more thorough understanding of what is involved in wildlife research.

Ethical issues and animal welfare within the Environmental Management degree at the University of Ballarat

In the second year of the degree, fauna and flora studies are presented with an ecological perspective enhanced with GIS computer mapping. During fieldwork the opportunity exists to get hands-on experience of native fauna. Ethical issues are discussed in the context of the aims of the project, the welfare of the animals and habitat management. In the third year, opportunities exist for advanced work in a range of units including Protected Area Management, Survey and Assessment, Aquatic Eco-system Management, Reserve Management, Fauna Management, Vegetation Management and Rangeland Management. In all these areas ethical issues are considered alongside other important fields including legislation and economics. Students undertake a major project in the final year. This provides opportunities for students to take responsibility for their own learning. Projects arise from discussions with staff from the Victorian Department of Natural Resources and the Environment and other state government agencies. Many of these projects include work on fauna and flora and provide opportunities to extend the experiences gained earlier in the course. Our commitment to ecological work extends into honours and the postgraduate area.

A recent survey of students before and after a major fieldwork excursion indicated that for many of the students fieldwork is the essence of the course. Practical work, fieldwork on fauna and flora is it! In addition we have found that a practical orientation satisfies students' desire for relevance in the course and this is paramount in the first year when a student is questioning whether a course is "the right one for me ?" To take advantage of this high level of motivation we have gone to considerable lengths to integrate theory, fieldwork and assessment tasks in all three years of the undergraduate program. Ethical issues are considered as they arise in environmental units but there is also a one semester unit in ethics and philosophy. This allows greater depth of understanding and the opportunity to explore a wider range of issues.

One assigned task in Wildlife Management includes production of a single concept video which focuses on a wildlife technique of the students' choice. A recent student innovation involved use of an infra-red video camera inside an Elliott trap to assess the behavioural response of a small mammal to capture. The footage provided an unequivocal demonstration of behavioural stress imposed by capture.

The 1999 ANZCCART Conference theme - *The Use of Wildlife for Research*

In this brief summary I have attempted to illustrate the general themes of our curriculum at the University of Ballarat and how teaching provides the opportunity to engage our students in consideration of the ethical implications of their work. It is my view that there was insufficient emphasis given to teaching and learning at the recent ANZCCART conference. Perhaps the title of the conference should have been, *The Use of Wildlife for Research and Teaching*.

Given the great diversity of institutes and courses involved in this area, the range of expertise and myriad of species investigated, (and the attitude to animal ethics in the 70s and 80s reported by some of the conference speakers), we would encourage other institutions to publicise their courses. This would lead to a more informed view of coverage and priorities to ethical issues in research and teaching.

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Re: Alternatives to harmful animal use in tertiary education

Students have a right to conscientious objection regarding avoiding harming animals. However, (I guess you knew a however would be coming), consumers also have a right to expect a veterinarian will be educated to a certain standard. Whether this standard can be achieved using the alternative methods Andrew Knight describes (*ANZCCART News*, March 1999) is another matter.

Andrew gives the opinion that "In medical and veterinary courses, alternatives at the preclinical level are mainly focussed upon imparting knowledge". This worries me. Lectures and textbooks at universities are used to impart knowledge (and to provide overviews, links and applications) - they are optional. There is more to just knowledge in science education. It is considered important that students also have an understanding of how that knowledge of science has been obtained. This is important in the critical evaluation of the knowledge. So important that, unlike lectures, practical classes are often compulsory.

I'm not sure how Andrew's alternatives to animals fit into this - have these alternatives ever generated significant new knowledge?

My second reservation is summed up by Bacon's assertion that "If I had my way I should burn all the books of Aristotle, for the study of them can only lead to a loss of time, produce error, and increase ignorance". I might suggest the same fate for electronic simulations of reality. My reason is the same as Bacon's - that the simulations are too good and tempt us to believe they are correct. But biology is inherently variable; and the only way to appreciate that variability, and to be prepared for it (important for a veterinarian), is to experience it first hand. Printed and electronic simulations are not variable - they are exactly the same every time you open the book or click on "run".

The variability of alternatives, the numbers of universities using them, the numbers of students being taught using them, and the legal and financial threats to alleged recalcitrant universities are not reasons for using alternatives. The only valid reason is whether a worthwhile educational objective is being achieved.

I have every sympathy with the aim of reducing the use of animals. However, if the only way to achieve a worthwhile educational objective is to use animals (within the limits of humane treatment, the legislation, and with the approval of the local ethics committee) then so be it.

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Roger Bacon, 13th century "father of modern experimental science" (Quoted by Wells, H.G. (1922). *An Illustrated Short History of the World*, 1987. Webb and Bower, UK.

Use of Koken Rat replica for postraduate training

Appropriate use of replica animals in training courses is one way of implementing 3Rs principles. One replica, the Koken Rat*, has been used successfully and is widely accepted internationally. The Koken Rat is a silicone and vinyl plastic simulation of a 9-week-old male Sprague Dawley rat. This model animal assists people to develop some of the rat-handling skills they require to perform procedures such as oral dosing, tail vein injection or blood collection, and orotracheal intubation.

In a recent Monash University Training Course in Laboratory Animal Care and Use, the Koken Rat was incorporated in one of the practical skills modules (administration of substances/blood collection). This course was attended by postgraduate students and investigators commencing new research studies. All were either working with rats, or intending to do so in the near future. The students chose to attend the course in order to obtain supervised practice of procedures necessary for their research studies, and thereby improve their technical skills.

The Koken Rats were used in the training course to achieve the following aims:

- introduction of students to alternatives to the use of live animals;
- minimisation of animal pain and distress
- reduction of the total number of animals required in teaching

The training module comprised a brief lecture with video demonstration, and a practical component. The video demonstration stepped the students through the techniques they were about to attempt. These techniques were then practised by the students on the Koken Rat and an anaesthetised living rat. Not all of the techniques practised on the living rat could be practised on the Koken model (e.g., intramuscular and subcutaneous injections).

Students used the Koken Rat to practice animal holding, intravenous injections and oral gavage dosing. Feedback was in the form of a written questionnaire and verbal comments expressed throughout the sessions. Staff made written and verbal comments concerning the interaction of the students with both the replica animal, and an anaesthetised living rat.

- The students chose to use the replica rat to practise various common rat holding methods without the concern of either injuring a living animal, or being bitten themselves. Practice of correct handling of living, conscious rats was the subject of a separate practical module.

- Although the living rats were anaesthetised, the students were very concerned to minimise the impact that attempting invasive techniques would have on the rat. Many preferred to gain skill and confidence with the replica before attempting the technique on the living animal. Some students elected not to practise techniques on the anaesthetised rats that they did not need to perform in their subsequent studies.

- Intravenous injection was more easily performed in the replica, and there was the benefit of visual confirmation of success (i.e., the injected fluid leaked out the other end of the tubing)! This was a confidence building experience, which some of the students appreciated. Further practice with anaesthetised living rats was still necessary, due to the tactile and textural differences between plastic and skin, and the greater skill required. In addition, blood sampling from other veins not modelled in the Koken Rat could be performed.

- Oral gavage (introduction of a stainless steel gavage needle into the oesophagus via the mouth for dosing purposes) was more difficult to perform in the replica. This was due to the rigidity of the plastic, the orientation of the head and the absence of swallowing reflexes. However, the plastic window in the replica enabled the gavage procedure to be visually monitored, so that the location within the gut of the gavage needle and the fluid-dose was known.

Given the positive training outcome and the favorable response of the students to the use of alternatives, the teaching staff plan to incorporate other replica animals, such as the Koken Rabbit, into other practical animal handling training modules.

The Monash University Animal Welfare Committee would like to acknowledge the generous assistance of the Australian Humane Research Foundation.

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*Manufacturer: Koken Co. Ltd, 14-3, Mejiro 3-chome, Toshima-ku, Tokyo 171, Japan.

The use of laboratory animals in South Taiwan

The need for good animal care has long been recognised in Taiwan. This is particularly so in recent years, with the growth of research in universities, research institutes and private enterprises. Taking National Cheng Kung Uni-versity (NCKU) as an example, when its Medical College was founded some 15 years ago, its own Laboratory Animal Center (LAC) was simultaneously established as one of the crucial service units. Its animal facility is still considered the leading animal care unit in the south of Taiwan. The primary aim of this LAC has been to provide high quality animals at a reasonable price, mainly for research but also for teaching purposes. Although the primary users come from within the institute, a substantial number (25%) are from outside universities and research institutes in the south. One important function of the LAC has been the provision of free courses in animal use and caring. All animal users are now required to attend such an introductory course before gaining permission to use animal facilities inside the LAC.

Today, LAC supplies common laboratory animals (6 strains of rats, 18 strains of mice and 4 transgenic mice; all specific pathogen-free) to over 30 academic and research institutes to the south as well as other parts of Taiwan. Larger animals are usually not bred in the LAC. In 1998, the number of animals supplied by the LAC was 25,000. The cost of animals has been kept at a reasonable level. For example, the current price of a 3-week old Sprague Dawley rat is about US$3.00. More recently, special mutant strains and specially genetic-engineered models are being produced for molecular biology studies. Special grants for breeding these animals have been awarded by the National Science Council to promote research on their breeding.

Cats, dogs and monkeys are rarely used. In addition to the higher cost to raise or to keep them, there is also the difficulty of finding a quality-supplier in Taiwan. There is a government-run Livestock Research Institute nearby that produces larger animals like pigs for research purposes and supplies users within this area. Taiwan has 14 LACs of a comparable scale supporting research and teaching activities to its universities. In Taiwan, the largest animal breeding unit is located in the north, namely the National Laboratory Animal Breeding and Research Center established in 1988 as a subsidiary unit of the National Science Council. The new Laboratory Animal Center of the National Taiwan University, when completed in the next couple of years, will be even larger.

Quite a number of institutes in Taiwan have already established their own Laboratory Animal Ethics Committees. In 1998, the Legislative Council passed the Animal Protection Act (APA), which was based on similar legislation adopted in USA and Europe. As required by law, every University in Taiwan has to form its own Animal Ethics/Management Committee to put forward sets of ethical guidelines/rules for the researchers working with animals and to perform a supervising job when necessary, to ensure that the experimental procedures comply with law. The APA has laid down a number of guidelines similar to those adopted in North America. A great proportion of biomedical researchers in Taiwan were trained or have worked in North America. In addition, teachers and researchers also helped in training their fellow students and assistants in the handling of laboratory animals. At NCKU, LAC has the primary responsibility for teaching new users, mainly research graduate students, how to handle laboratory animals. Individual laboratories, usually via the principal investigators, may reinforce the training by offering additional supervision. There is also a graduate course offered by the NCKU Medical College, on laboratory animals which includes substantial coverage of animal breeding, use and care. The penalty for users who fail to follow the regulations of animal use and care, is to prohibit them to use the animals. While researchers and the general public are becoming increasingly aware of the issue of animal ethics in this part of the world, animal protectionism has not yet developed in Taiwan to the same extent as it has in North America, Europe or Australia.

While many life science experiments in Taiwan are now done with cell cultures, many still require animals, because there are certain problems in life science which cannot be answered without whole animal preparations. I think it is important that a researcher in this part of the world should be able to convey to the public in a more active manner, what animal research is all about. The method of anesthesia, experimental procedures, rationale of the design, and how it is proposed with reference to good animal ethics should all be stressed. The general public can then obtain a better idea of the real situation rather then be taken by isolated impressions, like snap shots of animal under experimentation in a laboratory setting. Researchers in the universities are in the best position to tell the public more about the research they are doing. For example, it may be beneficial for animal researchers to communicate to the public through television interviews. This is similar to Germany where I learned that university staff appeared frequently on public media to talk about current research issues and explain their research findings. Through this kind of approach, the public may get to know researchers as a profession, and to understand the significance of animal research. A strict watch on proper animal use and care should also be maintained to ensure that animal research is done in accordance with ethical standards accepted at an international level.

References

Annual Report of Laboratory Animal Center, LAC Press, National Cheng Kung University Medical College, 1997.

An Introduction to the Laboratory Animal Centers and Units of the Universities and Research Institutes of Taiwan, Republic of China. Chinese Society of Laboratory Sciences Press, 1997.

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Innovation, ethics and animal welfare: public confidence in science and agriculture

ANZCCART's 1999 New Zealand Conference

ANZCCART New Zealand is holding a joint conference with the New Zealand Animal Welfare Advisory Committee (AWAC) in Wellington on 18 and 19 November 1999. The venue will be Te Papa Tongarewa - the Museum of New Zealand. The conference theme is "Innovation, ethics and animal welfare: public confidence in science and agriculture".

The welfare of animals is inextricably linked to their biological needs, our interpretation of those needs, and our expectations of animals, be they as sources of companionship, food or recreation. Clearly, our knowledge and beliefs affect the way animals are treated, and these will change with future market requirements and consumer preferences. The past century has seen significant changes in the livestock sector, changes which seem set to escalate in the next century given the current developments in science and technology.

This conference plans to address how the application of knowledge has affected the welfare and productivity of farm animals during the past century and how it might affect the livestock industry in the future.

Farming animals in 2020: issues and options is the focus of the first day of the conference. *Science and trust: innovation on the edge*, the focus of the second day, is planned to explain innovative technology, such as cloning and transplantation, in general lay terms and to consider how science and technology create ethical dilemmas, excitement and fear, and place obligations of trust on scientists, the media, and regulatory authorities.

In addressing these issues in a timely and formative manner, the conference will be valuable to any one interested in the place of science and agriculture in the next millennium. It will be of special interest to those involved in the agricultural, scientific, and veterinary professions, and to those interested in livestock production, animal welfare, the developing technologies, and their social regulation.

ANZCCART aims to provide leadership in developing community consensus on ethical, social, and scientific issues relating to the use of animals in research and teaching. AWAC advises the Minister of Agriculture on all matters relating to the welfare of animals in New Zealand, other than experimental animals, and the conference marks its 10th anniversary.

A brochure and registration form was inserted in the March 1999 issue of *ANZCCART News*.

For further information about the conference, contact the Executive Officer,
ANZCCART, PO Box 598, Wellington,
phone: 64-4-472-7421;
email: anzccart@rsnz.govt.nz

Animal research: where does the buck stop?

Ethics, economics, and responsibility

Conference Announcement

The ethical responsibilities of Institutional Animal Care and Use Committees seem clear — to ensure that experimental and husbandry procedures are refined to reduce animal pain and suffering, and that the minimum numbers of animals necessary are used in research. When it comes to ethical responsibility for the humane conduct of animal research, the buck ultimately stops with the IACUC. But ethical considerations can (and increasingly do) collide with reality in situations where IACUCs lack the time, money, or people resources necessary to carry out these responsibilities. Where does the buck stop with respect to providing resources for environmental enrichment, experimental validation of humane endpoints, or retirement programs for animals: with the IACUC, the institution, the investigator, regulators, or other outside agencies? How does the IACUC weigh the cost of refinements against other priorities in animal care and research in general? And what can the IACUC do to increase its effectiveness when ethical responsibilities and the resources to carry them out are not clearly linked?

The Kennedy Institute of Ethics, Georgetown University, Washington, DC, and the Center for Animal Welfare, at the University of California, Davis will hold a conference to discuss ethics, economics, and responsibility in animal research on October 2-5, 1999. The conference organizing committee members are John Gluck, Lynette Hart, Joy Mench, Barbara Orlans, Jerrold Tannenbaum, and Philip Tillman. The conference will be held at the Granlibakken resort conference center in Lake Tahoe, CA. Further details can be obtained by contacting: Sue Pounds Heekin at the
Center for Animal Welfare,
Center for Special Programs,
Meyer Hall,
University of California,
Davis, CA 95616.
Tel: 530-754-8564,
Fax: 530-752-4508,
email:
animalwelfare@ucdavis.edu

ANZCCART STUDENT AWARD AGAIN OFFERED

The Board of ANZCCART New Zealand is offering this award in association with the joint AWAC-ANZCCART 1999 Conference, "Innovation, ethics and animal welfare: public confidence in science and agriculture", for the best abstract of a paper provided by an honours or postgraduate student in New Zealand or Australia. The conference will be held at Te Papa in Wellington on 18 and 19 November, 1999.

Applicants should submit a 300-word abstract on an animal welfare theme relevant to the conference and to the objectives of ANZCCART.

Applicants should be students of any New Zealand or Australian tertiary institution and be 30 years of age or under.

The award is open to all disciplines and is worth $1000 to offset costs of conference attendance, and will be presented during the conference. Conference registration will be free to the winning student. The successful applicant will be required to give a 10-minute paper on his/her winning topic at the conference.

Applications should include full name, postal address, phone and fax numbers, and email address, and should be submitted by 30 September 1999 to:
Executive Officer,
ANZCCART,
PO Box 598,
Wellington, New Zealand
tel: 64-4-472 7421;
fax: 64-4-473 1841;
email
anzccart@rsnz.govt.nz

News

New Chairpersons for New Zealand AWAC and NAEAC

The New Zealand Minister for Food, Fibre, Biosecurity and Border Control, Hon John Luxton, recently announced two new appointments to chair the National Animal Ethics Advisory Committee and the Animal Welfare Advisory Committee. Both appointments are for a three year term.

The National Animal Ethics Advisory Committee's new chairperson will be Mrs Wyn Hoadley. She will assume office on 1 November 1999 on the retirement of the current chairperson, Mr Keith Robinson. Mrs Hoadley is a barrister and a North Shore City Councillor. In keeping with the independent nature of the NAEAC chairperson's role, Mrs Hoadley has no previous association with either the scientific community or the animal welfare/rights movements.

Professor David Mellor will take over the role of Animal Welfare Advisory Committee chairperson, also from 1 November 1999. He replaces retiring chairperson Professor Des Fielden. Professor Mellor is AGMARDT Professor of Animal Welfare Science, Professor of Applied Physiology and Bioethics and Director of the Animal Welfare Science and Bioethics Centre at Massey University, Palmerston North.

New Workshop Reports from ECVAM

The European Centre for the Validation of Alternative Methods (ECVAM) publishes the journal ATLA, which includes reports are also available as a series of offprints. Two recently published workshop reports are:

- Report 33 - Alternatives to the Use of Animals in Higher Education (reprinted with minor amendments from ATLA **27**: 39-52 (1999); and
- Report 35 - The Production of Polyclonal Antibodies in Laboratory Animals (reprinted with minor amendments from ATLA **27**: 79-102 (1999).

Copies are available free of charge, from ECVAM, JRC Environment Institute, 21020 Ispra, Italy. A few copies of Report 35 are available from ANZCCART's Adelaide office.

ANZCCART also has available a number of offprints of Report 25 - *Current Status and Future Developments of Databases on Alternative Methods,* which was published in ATLA **25**, 411-422 (1997) and of Report 23-*Monoclonal Antibody Production* (ATLA **25**, 121-137. 1997)

All of these are free of charge.

FRAME announces winner of 1998 Dorothy Hegarty Award

The British scientific charity, FRAME (Fund for the Replacement of Animals in Medical Experiments) has announced the winners of the 1998 Dorothy Hegarty Award, aimed at promoting the Three Rs, as Emiliana Falcone, Edoardo Vignolo, Livia Di Trani, Simona Puzelli and Maria Tollis (Rome, Italy).

The group won the award for their paper entitled *Comparative Evaluation of In Vitro and In Vivo Assays for the Detection of Avian Infectious Bronchitis Virus as a Contaminant of Live Poultry Vaccines.*

The award is presented annually to the author(s) of the paper published in the previous year's volume of FRAME's scientific journal ATLA (*Alternatives to Laboratory Animals*) which, in the opinion of the Editors and Editorial Board, is likely to make the greatest contribution to the reduction, refinement and replacement of animal experiments.

The Award was set up in 1995 in memory of the late Dorothy Hegarty, FRAME's founder, who worked ceaselessly to improve the welfare of laboratory animals. FRAME believes that the Award is a worthwhile way of recognising good science in support of one or more of the Three Rs.

FRAME was established in 1969 to fund scientific research into non-animal methods of experimenting. FRAME recognises that it is not possible to safely stop animal experiments immediately, if medical and scientific progress is to continue. Therefore, FRAME advocates the Three Rs, i.e. REDUCE the number of animals used in experiments to a bare minimum (by better experimental design), REFINE the procedures used so that animals experience the least discomfort and pain, and eventually REPLACEMENT of the use of animals with non-animal methods (such as computer models and tissue cultures).

Guide for the care and use of agricultural animals in agricultural research and teaching

A revised edition of this 120 page monograph, first published in 1988, has been published by the US Federation of Animal Science Societies (ISBN 01 00 99 321).

Prepared by a number of expert committees, it contains 11 chapters, dealing with institutional policies, general guidelines for animal husbandry, animal health, physical facilities and then with husbandry requirements for beef cattle, dairy cattle, horses, poultry, sheep and goats, swine and veal calves.

Copies of this publication are available for $US10.00 from:
The Federation of Animal Science Societies
111 North Dunlap Avenue
Savoy
IL 61874
USA

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It is a publication for researchers and teachers; members of animal ethics committees; staff of organisations concerned with research, teaching and funding; and parliamentarians and members of the public with interests in the conduct of animal-based research and teaching and the welfare of animals so used.

Contributions to ANZCCART News are welcomed and should be sent to:

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Mrs G. Sutherland, ANZCCART New Zealand
PO Box 598, Wellington, New Zealand

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