ANZCCART NEWS

Australian and New Zealand Council for the Care of Animals in Research and Teaching

Review of the Australian Code of Practice for the Care and Use of Animals for Scientific Purposes

The *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes* (the Code) undergoes regular review to take in to account advances in the biological sciences and changes in community attitudes. The National Health and Medical Research Council (NHMRC) coordinates this process through the Code Liaison Group (CLG) which includes representatives of the Code sponsors (NHMRC, CSIRO, the Agriculture and Resource Management Council and the Australian Research Council), as well as representatives of State and Territory governments, the RSPCA, Australian and New Zealand Federation of Animal Societies, and the community. In April 1995, members of the CLG met and recommended a limited revision of the Code.

It was agreed that the revision should focus on Section 2 (Responsibilities of institutions and their animal experimentation ethics committees), Section 5 (Responsibilities of teachers), and add to the Code separate sections addressing the use of livestock and the use of wildlife in research and teaching. The review also included clarifying the scope of the Code and updating the bibliography.

All representatives present on the CLG undertook to publicise the review amongst their client groups and in July 1995, an advertisement was placed in the *Weekend Australian* inviting public submissions by mid September. A total of 64 written submissions was received. The Code was annotated to include the substance of all submissions at the relevant section. This procedure was followed to facilitate consideration of all the recommendations made in the submissions. The writing groups developed draft comments which were discussed and amended at meetings of the CLG. The draft revised Code was then sent to all respondents and re-advertised, seeking further public comment.

A further 71 submissions were considered after the second phase of public consultation, which ended in September 1996. While not all suggestions were taken up by the CLG, every suggestion was given due consideration.

So what is new in the Code?

Wildlife

A noticeable addition to the Code is the new Section 5 on Wildlife Studies. Section 5 was included because of the special considerations involved when wildlife studies are undertaken. They are often conducted in the field where the close monitoring by ethics committees or State authorities is impractical. Many of the studies are observational, some opportunistic, while others involve capture and release, causing significant disruption to the animals. The major issues then revolve around the impact of the researcher's activities on both target and non-target species and also on the ecology of the area in which the study occurs. Consideration is given to the methods of trapping wildlife, identification of animals and transport and release. All of these procedures, if not carried out correctly, can lead to death of the animals.

There are several necessary areas of wildlife research where the impact of the investigations on the animal is severe. One example is the study of feral animals in which the objective of the research may be to control or kill the animal. Another is the study of predator-prey relationships or competitive relationships with a species which have the potential for animals to suffer injury. The revised Code now addresses these issues and urges careful scrutiny of the justification for the research and of the consideration given to animal welfare concerns.

Livestock

Section 6 is another addition to the Code and addresses particular issues encountered when farm livestock are used for research or teaching purposes. The CLG was particularly concerned that the introduction of this section safeguarded the welfare of livestock, but in a way that did not interfere with valuable educational work of departmental officers in the field demonstrating best practice techniques. In order to satisfy both objectives, the following three situations were identified:

- a full ethics application where the animal is subjected to other than routine husbandry practices;
- an application requiring adherence to published standard operating procedures by staff possessing the appropriate training and skills; or
- circumstances and procedures where no approval is necessary, for example, stock on their home property subjected to routine husbandry procedures.

The last of these may involve a spontaneous on-farm demonstration by a field officer of an approved technique. For such circumstances, to require individual ethics approval would be unreasonable and unproductive.

Education

Section 7 addresses the use of animals in teaching. The previous edition of the Code was very brief on education and the review highlighted the need to

Elsewhere in this issue ...

This issue contains the facts sheet on the dog. The insert is also available as an offprint.

incorporate teaching throughout the Code. This has been achieved by defining "scientific purposes" to include teaching activities. In addition, the new Section 7 puts in place procedures to ensure the welfare of animals used in schools. It carefully spells out the responsibilities of those involved in the use of animals in schools, the limits which are appropriate for animal use in the school environment and the need to consider seriously the use of alternatives to animals.

Replacement, reduction and refinement

Quite a number of the written submissions received by the CLG pointed out that the principles of replacement, reduction and refinement put forward by Russell and Burch in 1959 could be given greater prominence in the *Code of Practice*. This was achieved by reorganisation of Section 1 of the Code, which deals with the General Principles for the Care and Use of Animals for Scientific Purposes, so that the contents of the section fell more readily under these three headings.

The animal ethics committee (AEC)

The second section of the Code deals with the responsibilities of the institution and the AEC. There are very significant changes to this section which have an impact on the composition of the institutional AEC. The most obvious addition is the inclusion of footnotes which help clarify the intent of the Code, particularly in relation to the composition of the committee. The centre point of our *Code of Practice* is the AEC, which reviews applications to use animals for scientific purposes, makes contact with researchers and teachers and inspects facilities and laboratories to ensure adherence to the *Code of Practice* and adherence to any conditions that the AEC itself has set down regarding the protocol. The ethics committee is not the forum for the continuing ethical debate over whether or not society should allow animals to be used for scientific purposes. The Code sets down the conditions under which the use of animals for scientific purposes is acceptable. It is essential that the relationship between the AEC and those it serves is one of mutual trust and respect. Over cynicism by some ethics committee members towards researchers and resentment of the intrusion of the ethics committee into the laboratory by some researchers are counterproductive. Considerable thought and effort has gone into the revision of Section 2 of the Code and it is hoped that the changes will improve the effectiveness of the AEC. Care must be taken in selecting members of an ethics committee to ensure that all members are effective and industrious.

The AEC has four categories of membership; veterinarians, scientists, animal welfarists and independents. It is the intention of the Code that Category A members of the committee be veterinarians except on the very rare occasion where a person of comparable or greater expertise may be appointed. This takes into account the special circumstances where a person with a qualification in wildlife biology and experience with the species being studied may be the most appropriate Category a member.

The Category B member of the committee is the scientist or teacher and this is probably the least contentious of the four categories. It is necessary that the Category B member be a current researcher or teacher with the appropriate academic credentials (higher degree(s)) and appropriate experience and expertise.

The Category C member is the animal welfare member of the committee. The revised Code now states that this person, *should, where possible, be selected on the basis of active membership of, and nomination by, an animal welfare organisation*. This wording has changed to ensure that the Category C member is a genuine animal welfarist who has the support of their own animal welfare organisation. This person brings to the committee current community concerns regarding animal welfare, which should be his / her primary focus during AEC deliberations. The Category C member is not on the AEC to represent his / her own organisation since many of these organisations are anti-vivisectionist. His / her role is to ensure that acceptable standards of welfare apply to those animals used in research and teaching. If the reason for the Category C member accepting the invitation to serve on an AEC is simply to oppose the use of animals, this will lead to frustration for the individual, the AEC and the institution.

Inclusion of animal welfarists on ethics committees throughout Australia should give the animal welfare movement an appreciation of how and why animals are used in research and teaching institutions, and it should give researchers and teachers a greater awareness of the genuine concerns that exist in our community over animal welfare issues.

The footnotes point out that veterinarians are not appropriate Category C members of an AEC unless they have specific experience working for an animal organisation or have served on a body developing animal welfare issues.

The long footnote to Category D membership (independent person) reflects the fact that institutions have difficulty appointing truly independent members to their ethics committees. The person should not be a former scientist or teacher who has used animals, and should not be an employee of the institution. The independent member *should* be appointed from outside the institution, although it is recognised that in universities academic staff from non-scientific departments may be truly independent of the medical or biological departments undertaking animal-based research. Where a university wishes to appoint a Category D member from within the institution they need to state why this is necessary. Institutions need to turn their attention more to drawing their Category D members from among the distinguished members of the community, for example, business people, lawyers, accountants, teachers or retirees.

Two additional points which received a lot of comment in written submissions were the independence or otherwise of the Chair of the AEC and the balance of membership on the committee. The Chair should hold a senior position within the institution. While this is not set in stone — "should" rather than "must" is the wording — it was felt that such a person would be better placed to ensure that recommendations made by the AEC are implemented by the institution. This is particularly important at present when institutions are restructuring to reduce costs, and reducing staff numbers in some faculties such as medicine where student numbers are to be reduced. This is a difficult climate in which to obtain funds to improve animal facilities and therefore any request requires careful preparation and forceful presentation by a senior member of the institution.

The balance of veterinarians and scientists versus welfare and independent members of the AEC has always been an area of concern. Critics of the ethics committee system claim that anything less than fifty-fifty balance

will allow the "scientists" on the committee to pass all applications. If our ethics committees were to operate on the basis of them (veterinarians plus scientists) against us (welfare plus independent), then we should immediately abandon this approach. In reality, where legitimate concern is expressed about a protocol it should not receive approval until that concern has been resolved. If rejection of applications consistently comes from the same individual on the committee, and objective assessment of the reasons for rejection reveals that the individual is out of step with the opinions of all others, then the committee will not be able to operate on the basis of unanimous decisions.

It would be either a foolish committee or a dysfunctional committee that would give approval to projects where two or more members expressed serious reservations. It should not be necessary for the welfare and lay members to represent 50 per cent of the committee for the welfare and lay input to have influence in the decision-making process. On the other hand, a broad representation of scientific expertise is necessary to fully comprehend the likely significance of a range of research protocols that may come before the committee. The scientists should be in the best position to predict events that may have an impact on the welfare of the animals involved.

Taking all these factors into account, the balance set down in the revised Code is that at least one third of the committee should be welfare and independent members.

The revised edition of the Code is currently being sent to the sponsors and to State and Territory governments for their endorsement. It is hoped that copies of the Code will be available in July or August 1997. I would urge all researchers, teachers and member of ethics committees to read through the revised *Code of Practice* so they will be fully apprised of the changes and will be in a position to implement them.

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The value of animal ethics committees

Our society accepts that, with appropriate controls, animals may be used for approved purposes which include scientific and medical research as well as education, for food and in some sports. The controls on the use of animals in research and teaching vary from State to State, but the *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes* (1990) is accepted nationwide. A fundamental principle of the Code is that *experiments using animals may be performed only after a decision has been made that they are justified, weighing the scientific or educational value of the experiment against the potential effects on the welfare of the animals.*

The task of determining whether experiments or teaching exercises using animals may or may not be performed falls to Animal Ethics Committees (AECs). Their most important function is to evaluate the outcome of the procedures, either in terms of advancement of knowledge or in educational value, and the impact on the animals, in terms of pain and suffering, confinement and other stresses or death. The committee then needs to decide whether the outcomes justify the impact on animals. The membership of AECs is designed to ensure that approval for animal experiments is given by a group of people with an appropriate collective wisdom. This includes understanding of the science of the proposed experiment, veterinary knowledge of the animals involved, animal welfare considerations and input from the public.

A subsidiary responsibility of the committee is to ensure that the balance of the outcomes compared to the impact is as favourable as possible. Thus, the AEC also considers ways to maximise the outcomes and minimise the impact.

The circulation of applications before formal meetings of the AEC allows all members to read the aims and potential significance of the proposed work and to form an initial opinion about the balance between impact on the animals versus scientific or educational merit. Members in Categories A (veterinarians) and B (scientists) often find this relatively easier, since they may be more familiar with the scientific background and procedures to be used. Although it is the responsibility of the applicants to describe the aims and significance of the project in a way that allows all members of the AEC to assess the merits of the proposal, this is not always achieved and it is possible, even likely, that some committee members will not have reached a preliminary decision about some of the applications when they arrive at the meeting. Thus, in the real world, it is often necessary for A or B members to provide explanations of some of the technical aspects of the application at the formal meeting. At this time there may or may not be a need for detailed discussion of the merits of the application. Having considered it in their own time, and having had specific queries answered, it is often possible, in a short time, for members to make a final judgement. If there is disagreement, open debate of the issues should allow all members to express their opinions.

It is not uncommon, at the first submission of the application, for the committee to return it to the applicant for a request for further information. In many cases the applicants are asked for a more detailed justification of the use of animals. At this stage, it may be that the 'subsidiary task' referred to above becomes most important. That is, changes in the procedures (usually refinements, to reduce impact) suggested by members of the committee, or requested from the applicant, may significantly alter the balance between merit and impact. Even in the absence of any disagreement about the value of the project as a whole, the committee will spend time considering ways of refining the procedures.

With the additional information available to members at the next meeting or with conditions imposed by the AEC, the application may be more acceptable to those who had been unwilling to approve it in its original form. Most committees will continue discussions until a consensus is reached, but there may be situations when consensus cannot be achieved. In these cases, voting will be necessary and approval will only be granted if a majority is in favour. While the size of the majority required for approval may vary, according to institutional policy, the Chairman is unlikely to allow the application to proceed if as many as two or three members of the committee strongly oppose it.

In considering the value of AECs and their impact on the use of animals in research and teaching, it is important to remember that it was never intended that their purpose was to stop the use of animals in research and teaching. They were established to ensure that the potential benefits of experimental proce-

dures justified the use of animals and that the impact on the animals was minimised. Bearing this in mind, some comments on the value of AECs follow.

Most AECs consider applications in which animals will be subjected to surgical procedures. While in the past the use of analgesics may have been haphazard, for many years AECs have required investigators to administer appropriate analgesia. Members of the committee are especially aware of these issues and keep up to date with the latest developments. This allows for rapid dissemination of information to those who conduct the experiments and ensures best practice.

Committees are also particularly sensitive to the impact of experiments traditionally associated with pain and distress for animals. These include experiments in which pain mechanisms or methods of alleviating pain (necessitating the imposition of pain) are studied, tumour induction, the use of Freund's adjuvant for antibody production and others. In these cases, AECs work with investigators to ensure that adequate monitoring is available and that all steps are taken to minimise pain and distress. Furthermore, AECs may prompt formal studies to determine the minimal level of impact required to elicit the required response. For instance, in experiments to investigate demyelination processes, experimental allergic neuritis was induced in rats by injection of a homogenate of myelin, Freund's incomplete adjuvant and *Mycobacterium bovis* into both hind footpads of rats (Harvey and Pollard, 1992). At the suggestion of the overseeing AEC, the investigators found that it was possible to achieve a significant neuritis when the dose of *Mycobacterium bovis* was reduced by half and the injection confined to one footpad (Spies *et al.,* 1995). These refinements reduced the impact on the animals and subsequent publication of the data has enabled the refinements to be widely adopted.

Inspection of animal house and laboratory facilities by AECs has been an important factor in improving the general standards of animal care and housing. Institutions are aware of their legal responsibilities in this regard and the insistence by the AEC that renovations or improvements are required have been effective in the allocation of resources for these works to be funded. AECs will continue to have an impact on animal welfare as they work with institutional administrators to ensure allocation of adequate resources to maintain standards of animal housing and care.

Replacement, that is the use of non-animal alternative methods, is encouraged by AECs. Before the use of animals is approved, investigators are required to indicate why such methods are not suitable for their particular application. However, the AEC is not bound to accept the applicant's justification, if members are aware of possible alternatives. One research institution in Victoria has made a conscientious effort to encourage the use of bio-reactors (e.g., Cell-Max, Mini PERM) in experiments to raise monoclonal antibodies. At present, available systems are imperfect and some hybridoma lines are particularly refractory to growth in the bio-reactors but, as the technology improves, the use of animals for antibody production will be very significantly reduced. Even at this time, any applicant at the Victorian institution mentioned above who asks for mice for such purposes is asked to re-consider the proposal and to indicate whether an alternative method is available for the production of the particular antibody to be used in their experiments.

The situation in which the use of alternatives arises most frequently is where animals are used for teaching purposes. Here, because the outcome of the "experiment" is known, it is often relatively easy to substitute the exercise with a video or computer-based simulation. Recent advances in technology have facilitated the production of very effective teaching packages. Since AECs routinely ask whether such alternatives can be used, there has been a consistent reduction in the numbers of animals used for teaching over the past twenty years (Einstein, 1996). In order for a teaching protocol to be approved now, the applicant needs to make a special case, on the basis of the educational objectives and how animals are necessary to fulfil these.

It is difficult to select a criterion on which an objective assessment of the value of AECs could be based. There has been no attempt to quantify the changes that have occurred in laboratory animal practice, including the routine use of pre- and post-operative analgesia, improved standards of housing and attention to environmental enrichment. Nevertheless, for those scientists, technicians and veterinarians who work with laboratory animals, the changes have been very obvious. From a negative point of view, it has been suggested that the committees are ineffective because few, if any, applications are rejected. While the statistics may indicate that this is the situation the numbers hide some very important points. First, the primary purpose of the committee is to review each application on its merits and there should be no pre-judged outcome. Thus, neither rejection nor approval is equivalent to "success". Second, although committees do not usually reject applications outright when they are first presented, more often than not they request further information, frequently seeking additional material to justify the use of animals. The statistics of the numbers of applicants who do not respond to this request are not available, but it is likely that, in at least some cases, the investigator has recognised that the use of animals cannot be justified. I am aware that this has been the case for some protocols at the University of Sydney and have no doubt that similar situations occur elsewhere.

Workshops for chairs of committees and members in categories C (animal welfare representatives) and D (lay persons) and annual ANZCCART conferences ensure that ideas, knowledge and operating procedures are shared. There are also controls in place to check that committees function according to the *Code of Practice*. Both the NHMRC Animal Welfare Committee and various State bodies monitor institutional committees. Furthermore, the system ensures a high level of public accountability (noticeably more so than that which controls research using humans).

The AEC system which operates in Australia is unique. From an international perspective, Australia is highly regarded for the *Code of Practice* and the control of animal experimentation by AECs. The system has facilitated effective dialogue between animal users and members of animal rights or animal welfare groups. Despite the differences in the philosophies of these individuals, as long as they can continue to work together, animal welfare will continue to improve. It is vital that the constructive dialogue which has been carefully developed does not degenerate into bitter and antagonistic behaviour which depletes the resources of all concerned and does nothing to improve the welfare of animals.

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Functioning of a busy New Zealand Animal Ethics Committee

Research, demonstrations, and teaching involving live animals in New Zealand must, by law, have the animal use approved in advance by an institutional animal ethics committee (AEC) as specified in amendments to the Animals Protection Act (1960). A rewritten and revised Act is currently passing through Parliament.

The Ruakura Agricultural Research Centre is the largest animal research centre within the New Zealand Pastoral Agricultural Research Institute Ltd (AgResearch for short), one of the several Crown Research Institutes resulting from the restructuring of Government research. Our research centre has one of the busiest AECs in the country, handling approximately 250 animal use applications per year.

As required by the National Animal Ethics Advisory Committee (NAEAC) - the ethics committees oversight group serviced by the Ministry of Agriculture - our AEC has submitted and had approved an AgResearch Code of Ethical Conduct for Animal Experimentation. This code contains the main features found in the *Code of Recommendations and Minimum Standards for the Care and Use of Animals for Scientific Purposes* published by the Animal Welfare Advisory Committee (AWAC) which was established by the Minister for Agriculture to facilitate the development of animal welfare policy and practice in New Zealand. AgResearch has four other AECs which operate independently at four other research campuses.

The Ruakura AEC has eight members, six external and two internal members. The external members include a nominee of a welfare organisation (RSPCA) who happens to be a veterinarian, a nominee to represent the public (nominated by a local body, Environment Waikato), a nominee of the NZ Veterinary Association, and a veterinarian nominated by MAFQual (Ministry of Agriculture), an Animals Protection Act Inspector who normally may be called in to investigate animal welfare complaints in the district. The committee also contains a nominee of Waikato Federated Farmers, chosen to encourage an information flow between a welfare committee such as ours and farmers, and also a veterinarian contracted to the committee to assess research, teaching, and demonstration applications submitted to the committee and to comment on the skills and facilities to be used for any proposed experiment. This veterinarian was formerly employed as the Centre veterinarian and animal welfare officer before the post was dis-established and tenders called for the AEC position.

The two internal members include a scientist nominated by the General Manager to chair the committee, and an animal technician nominated in her own right as a member of the committee, but who also takes minutes and distributes copies of all proposals to all committee members. Our committee meets as a group at least once monthly and occasionally more frequently when special issues arise or it is desirable to observe a particular experiment in progress. Most of our proposals for consideration concern the use of farm animals, in many cases involving their use in a manner similar to that which would occur normally on any farm, but making many individual observations.

Research, teaching or demonstration proposals must be accompanied by a cover sheet listing the staff to be involved in the trial, giving the manipulations they are to undertake, and signed by both the experimental proposer and his / her manager certifying that the staff are competent to undertake these manipulations. This form provides a written record to indicate that both the proposer and the manager have considered staff competence and can be held accountable if later evidence suggests staff have been wrongly certified. If the experimental proposer is uncertain of the competence of the staff, he / she can ask the AEC to organise their training or observe them in action if it is believed that they have been previously trained. All proposals are initially sent to the veterinarian contracted to the AEC who reads them, and assesses the competence of the staff involved for their nominated manipulation and the suitability of the chosen animals and listed facilities for the task in hand. The proposals are dated, given an AEC identification number, and coded for the severity of the manipulations involved. A copy of each proposal is sent to all committee members.

If the manipulations are deemed to be minor and the staff nominated are know to be competent, the AEC veterinarian may approve them without delay, notifying the proposer on a standard approval form. Where changes need to be made, a conditional approval may be given, i.e., approval provided certain nominated changes are made before the trial is commenced. A record is maintained on file of all approvals given. Despite an early approval having been given, any approved project may be stopped at any time if any other member of the committee becomes concerned that an important welfare consideration has been or is being overlooked.

Where more severe manipulations are involved (e.g., surgery, toxicology studies) two of the external committee members have their names placed on the front of the proposal. They must respond affirmatively to the AEC veterinarian before a proposal may be approved and proceed. Any of the other committee members may also respond with queries or questions if they have any concerns. The copies of the projects distributed will have comments and questions noted by the AEC veterinarian to draw to the attention of the other AEC members. They may wish to take up these matters directly with the experimental proposer and ask questions or suggest changes that may overcome perceived problems. In such cases conditional approvals are more frequently given. Although the AEC only very infrequently turns any proposal down, it is more common for the proposer to withdraw his / her initial project because of the conditions applied or to see if he / she can get the answer required by a different method. However, proposals are frequently returned for revision if the original proposal is considered to be unsatisfactory. All experiments to be considered

References (from previous page)

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will have been previously approved for funding by one of the science funding groups so that all should be soundly designed to answer questions considered important by the funders.

At the monthly AEC meeting, the proposals approved since the previous meeting are discussed and ratified and the most recently received proposals are considered, approved or questioned. Matters requiring satisfactory answers are noted for transmission to the proposer before approval is given. Even at this late stage is it possible (but highly unlikely) that a previously approved project can be stopped. This is more likely to happen when an unexpected complication occurs during the course of a trial.

We are in the process of evolving a system for handling prescription animal remedies (PARs), especially those involving class two or three drugs that are normally only able to be purchased and administered by a veterinarian. Some research organisations have trained scientific (and occasionally technical) staff who are as skilled as veterinarians in certain specialist areas. Because of their training, they may even be more skilled than many veterinarians who don't often use those skills. Under terms of a new Animal Remedies Act currently going through Parliament, only veterinarians will be able to administer some PARs, other drugs will only be able to be administered by a trained scientist or technician in the presence of a veterinarian, and the drugs of least concern may be administered by a scientist or technician if previously given veterinary approval. All PARs must be kept in locked storage and a log book must be kept to allow reconciliation between drugs signed out and the remaining unused material. The AEC must give written approval for the use of PARs in any experiment and include in their records the quantities approved and the name of the staff member permitted to administer these. An appropriate form has been designed to cope with this new requirement resulting from changes to the Act. From time to time the AEC can expect to be audited on their keeping of records of PAR use and documentation covering the purchase of all PARs.

For experimental, teaching or demonstration proposals to proceed through our AEC, we ask for proposals to be written as far as possible in lay English and to avoid the scientific jargon from the field where the proposal originates. The following questions should be asked:

- What is the purpose of the experiment?
- What knowledge can be gained that adds to existing knowledge? (Previous similar experiments - include copies of relevant papers and supporting results)
- Why is the use of animals justified? (non-animal techniques)
- What manipulations will be carried out?
- Who will undertake the various manipulations?
- Where will the animals be run / housed?
- When will the trial be undertaken?
- How many animals will be used (breed, sex, age etc.)?
- If PARs are to be used, how much and who will administer?
- Has the trial been approved by a biometrician in terms of animal numbers where appropriate?
- Identification of and justification for procedures which may cause pain or distress and proposed methods to relieve the same.
- What are the recovery procedures / facilities (if applicable)?
- What is the fate of the animals at the end of the trial?

Changes to approved protocol

Where there are changes in personnel, changes in dates for a trial, or there is a need to change trial design during the course of the trial in the light of experience gained, the AEC must be notified in writing so that the changes may be approved. Such measures protect both the animals and those undertaking the experiments.

Addenda

Where there is reason to carry out an additional trial to clarify issues in the main trial, these may be handled by a short submission where the previous trials and literature have been documented in the original submission.

We require any trial proposal to be shown to all staff listed to participate in some aspect. When any trial is completed, the project proposer is required to complete an animal use return. The figures are collated each year and a summary is sent to the Ministry of Agriculture which summarises data on the numbers and types of animals used for research and demonstration purposes nationally. As Ruakura is a farm animal research station, most animals are available to be seen by the public and we have few locked gates or locked doors. This helps maintain the public perception that we have nothing to hide. Animal welfare is also one of the matters covered during open days for schools and we supply information to secondary school students for school projects.

Much of our research is directed to finding solutions to animal disease problems caused by toxic substances (as in facial eczema and ryegrass staggers) or metabolic compounds (leading to bloat in cattle). We are investigating genetic solutions (selecting animals naturally resistant to those problems and internal parasites) so that the animals can be protected without the need for, or with a lower need for, chemicals such as those in the drenches used to control parasites.

We believe AECs play an important role in New Zealand. They are important for assessing the welfare aspects covering our research animals, preventing any cruelty and protecting their interests.

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ANZCCART to participitate in other conferences

One of the initiatives determined by the Board following the 1995 Review of ANZCCART was the sponsorship of key lectures or workshop sessions at conferences of biomedical societies in Australia and New Zealand. This has the benefit of increasing ANZCCART's profile among scientists in this area, as well as focussing their attention on the issues which should concern them about animal use in science. Four conferences have been identified this year in Australia in which ANZCCART is likely to participate. These are:

- Australian Mammal Society, Clare, SA, 7 - 9 July
- Australian Physiological and Pharmacological Society (APPS), Adelaide, SA, 29 September - 1 October
- Australian Society for Medical Research (ASMR), Adelaide, SA, 23 - 26 November
- Australian Society of Clinical and Experimental Pharmacologists and Toxicologists (ASCEPT), Canberra, ACT, 1-3 December.

The Dog as an Experimental Animal

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ANZCCART Facts Sheet

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Introduction

The domestic dog (*Canis familiaris)* is a species with a large number of breeds rather than genetically defined strains. There is a marked difference between breeds in their size, appearance, and life expectancy (e.g. the Chihuahua at one kg, St. Bernard at 90 kg). The dog has been used as a model for many human conditions in areas such as cardiovascular research, diabetes mellitus, ulcerative colitis, open heart surgery, organ transplantation, pharmacology and toxicology. This paper is intended as a guide for animal technicians and researchers involved in the care and use of the dog as an experimental animal.

Sources

Dogs used for research or teaching may be purpose-bred (e.g., beagle). A second source may be city pounds which allow the release of stray, unidentified animals to research and teaching institutions. Regardless of the source, researchers should ensure careful selection of an animal for suitability to the experimental situation. This selection should consider the dog's temperament, health status, and physical characteristics. For example, highly excitable breeds (e.g. red setters, dalmations and German short-haired pointers), may be unsuitable for long-term experimental conditions. Likewise, long-haired breeds (e.g. afghans, saluki) may be unsuitable for cardiovascular research.

When using animals obtained from city pounds, researchers must be fully aware of the emotive issues associated with this source of dogs, and of local legislative requirements regarding the procurement, holding periods, identification and records related to these animals. All animals should be quarantined on arrival at the animal unit unless they are bought from a source of known reliability, and are of known health status.

Housing

Caging

Dogs are gregarious, social animals and live well in a kennel environment with a defined social order. Because of their social needs with respect to other members of their species, housing should provide an opportunity for each animal to at least see and smell other dogs, especially if no contact is possible. Dogs may be housed in indoor pens, with or without outdoor attached runs. The use of cages should be limited to short periods only. Dogs are best housed in pairs or in groups. Single housing may be necessary if the dogs are incompatible or because of the demands of an experiment (e.g., animals recovering from surgery, or with exteriorized cannulae). Where not used for breeding, females in oestrus should be housed away from males.

There is considerable variation in the recommended space allowances for housing dogs in pens and runs (Table 1). The *Australian Code of Practice* (NHMRC, 1990) states that pens and cages should be designed to ensure the comfort and well-being of the animals. The size and suitability of allotted housing is determined by the size and activity of the individual dog and whether an exercise run is available.

Materials used in dog facilities should be smooth and resistant to corrosion, denting, cracking or chipping. Indoor caging should provide a comfortable place for the animal to lie down and enough room for the animal to defecate away from the sleeping area. Bedding should be warm and dry, preferably raised from the floor, and composed of material which is resistant to chewing. Trampoline beds are recommended, with the size dependent upon the size of the dog. The use of cages with wire floors results in the animal's weight being borne on a relatively small area of the footpad and is therefore not recommended. Outside housing should provide a dry sleeping area, some shade and shelter from wind and rain, and should be well drained.

Environmental enrichment

Dogs housed in restricted environments are likely to develop abnormal stereotypic behaviour (e.g. repetitive aimless movements). Because of the dog's naturally sociable nature, contact with other dogs and with people is important for their general well-being. Frequent handling, especially during the critical period between six and eight weeks of age, ensures that puppies become accustomed to human company as they mature. Likewise, purchased animals should be given similar attention during their period of quarantine and conditioning. All animals should receive regular contact, at least daily, with the animal attendant and/or researchers to ensure that they become adapted to the experimental conditions and are amenable to handling. Attempts to vary their environment may include the provision of outside runs (so that they can "watch the world go by"), provision of objects for chewing (large uncooked bones, toys which can be safely chewed or which contain food treats) and socialisation with other dogs and with people. Where an outside run is not available, an opportunity should be provided daily for dogs to leave their normal cage. The NHMRC (1996) recommends periods of at least 30 minutes each day, even in bad weather, when they are taken outside to run freely or taken for a walk on a leash.

It is important to remember that there are wide within-breed and within-sex differences in behavioural needs. Hence, it is essential that animal attendants and researchers know the individual animal so that its needs can be met.

Environmental conditions

While dogs are extremely adaptable to external temperature, it is important that housing be designed to avoid extreme

fluctuations in environmental conditions. In general, for inside housing, the conditions recommended for a range of laboratory animals are also suitable for dogs .

Temperature:	18 -21^0 C
Air Changes:	8 - 12 per hour
Lighting:	12 hour light/dark cycle.
Humidity:	35 - 70%

High humidity may be a problem in indoor housing when floors are cleaned by hosing down with water. There is no evidence that either light intensity or duration affects the breeding cycle of the bitch (MacArthur, 1987). Attention must be given to reducing noise that may be within the dog's auditory range.

Cleaning
The frequency of cleaning cages will largely depend on their design. All faeces should be removed from both indoor and outdoor housing at least once daily. Since eating stimulates defaecation, it may be helpful to provide meals prior to cleaning. For puppies and younger dogs, cages may need to be cleaned twice or three times daily.

Identification

An excellent method of identification for dogs is a Microchip implant (e.g. Trovan®), inserted beneath the skin between the shoulder blades. Other methods include the use of collars, identification of characteristic markings of individual animals and the application of an ear tattoo (which must be performed using anaesthesia or heavy sedation). Clipping of hair or using colour marking with non-toxic solutions may be used as temporary identification.

Handling and physical restraint

A minimum of physical restraint should be necessary in laboratory dogs if they have been selected for temperament and acclimatised to the experimental situation. Every effort should be made to accustom the dogs to their handlers and surroundings before experiments commence. For most common procedures, it is sufficient for the handler to hold the animal close to their body. Ensuring that the back of the dog is close to a wall or a corner may prevent the animal from "backing away" from the operator during the procedure. When the safety of the handler is in question, a soft bandage muzzle should be applied around the nose of the dog and tied behind its head . Signs which may indicate the necessity for a muzzle include tenseness, growling, or a "wide-eyed" or anxious facial expression.

Common procedures

Recording body temperature
The body temperature of the dog is usually recorded using a rectal thermometer (mercury or digital). In the anaesthetised animal, core temperature is measured using a rectal or oesophageal thermistor. The normal range is 39.0 $\pm$ 0.5^0 C and may be influenced by disease, ambient temperature, exercise, and individual variation.

Oral dosing
For the administration of tablets, (for a right-handed person) the head is elevated by placing the left hand over the muzzle such that the tips of the thumb and second finger rest in contact with the lips immediately behind the canine teeth. With the tablet held between the thumb and second finger of the right hand, the mouth is then opened with the index finger of that hand placed against the lower incisors. Place the tablet at the back of the tongue, close the mouth and hold the dog's head tilted upwards for several seconds or until you can see swallowing movements. If medication is to be administered with food, it is best to mix it with only a small amount of the meal. Ensure that the dog eats all of this food before giving the rest of the meal.

Fluid can be given by syringe directly into the mouth with the dog's head tilted upward. Unpalatable fluids or large volumes of material may have to be administered by a stomach tube. This procedure is usually accepted by the conscious dog if it is done properly. Open the mouth as described previously. To ensure that the dog does not bite the tube, a gag may be placed into the mouth. A suitable gag may be purpose-made for the procedure. Alternatively, a partially-used roll of elastoplast may be adequate. The operator can then introduce a lubricated rubber or soft polythene tube through the gag and over the tongue into the oesophagus sufficiently slowly for the dog to swallow as the tube passes the tracheal opening.

Sub-cutaneous (s.c.) injection
The skin of dogs is so loose over the neck, back and flanks that injections can be made at virtually any of these sites. The skin is held up with the fingers of one hand to make an inverted "V" shaped tent. A 21-22 G needle is inserted through the skin using the other hand, directed slightly downwards. Care should be taken to ensure that the needle does not penetrate through both sides of the "tent" in the skin. Large volumes of fluid can be injected if given at multiple sites (10 - 12 ml/kg per injection site). A lesser volume per site (15-30 ml) is preferable.

Intradermal (i.d.) injection
This is simple in dogs as the skin is relatively thick. The skin must be carefully shaved and cleaned before injection. A 26-30 G needle is inserted almost parallel to the skin. If the injection is successful, a "blister" will appear in the skin.

Intramuscular (i.m.) injection
The anterior thigh muscle (quadriceps) provides the safest site for injection. The belly of the muscle should be gripped between fingers and thumb of one hand. Alternatively, the triceps or paralumbar muscles can be used. If injecting into the posterior thigh muscles, care must be taken to avoid the nerves and large vessels located in that region. Intramuscular injection at any site is painful.

Intravenous (i.v.) injection
The cephalic vein on the anterior aspect of the forelimb is the most convenient vessel for injection. The vessel is easily seen if the area is carefully clipped and swabbed with alcohol. Dilation and stabilisation of the vessel is achieved by the assistant pushing the dog's forelimb into extension using the palm of his/her hand behind the dog's elbow. The assistant's thumb is then placed over the anterior aspect of the dog's upper forelimb, dragged slightly laterally and then held firmly. The operator penetrates the vein from the antero-medial aspect. The vein may be stabilised using the thumb of the opposite hand. A 21-22 G needle is suitable for most i.v. injections. Alternatively, butterfly needles (25 mm, 21 G) or a 21-23 G Medicut® indwelling catheter can be taped in place and connected directly to a syringe or to a three-way tap for sequential injections or for withdrawal of blood. The recurrent tarsal vein on the lateral aspect of the

hind limb is less easily stabilised for venepuncture but is a useful alternative to the cephalic vein. Immediately following venepuncture, firm pressure is applied to the injection site until any bleeding has stopped.

Specimen collection

Blood collection
Up to 20 ml of blood (not exceeding approximately 1 per cent of body weight) may be collected from the cephalic vein using a syringe and needle. Volumes of 1-50 ml can be collected from this vessel with a butterfly infusion set (21G) or Medicut catheter. Pressure should be maintained above the elbow by an assistant. Alternately squeezing and flexing the foot will increase the rate of venous return and flow.

Larger volumes of blood (100 ml or even more) can readily be collected from the jugular vein percutaneously and without the need to sedate the animal unless it is particularly fractious. The site over the jugular vein should be clipped closely and swabbed with alcohol. The vein is distended by pressing the thumb into the jugular groove at the point of entry into the thorax. The needle (21 G) is introduced first into the skin then advanced almost parallel to the surface to puncture the vein. Haemostasis is achieved by firm digital pressure over the puncture site.

Because of the risk of haemorrhage into the pericardial sac, cardiac puncture should be performed only in the anaesthetised animal and as a terminal procedure. A 21-23 G needle 4-5 cm long is introduced into the left side of the chest between the fourth or fifth intercostal space over the maximum heart beat. For exsanguination, larger bore needles (9-16 G) can be used.

The femoral artery is commonly used for collection of blood for transfusion purposes. This is performed in the anaesthetised animal as a terminal procedure. The skin of the upper medial thigh is surgically prepared. Using aseptic techniques, the skin is incised over the area where the pulse is palpable. The femoral artery is surgically exposed. Blood is collected using a wide bore needle.

Urine collection
For urinanalysis not involving microbiological studies, a "mid-stream" urine sample may be adequate, i.e. a sample collected in a clean container in the middle of the dog's normal act of urination.

Urethral catheterisation can usually be carried out in unanaesthetised dogs but aggressive or frightened dogs should be sedated or even lightly anaesthetised. To avoid introduction of micro-organisms into the bladder, sterility must be maintained when performing this procedure. Males are laid on one side, the penis is extruded from the prepuce and the tip is gently cleaned. A lubricated (K-Y or xylocaine gel) human urethral catheter (44-10 FG) is then introduced into the urethra and can usually be advanced without difficulty into the bladder. Slight resistance may be felt when the catheter passes either the caudal end of the os penis or around the pelvic flexure. This resistance may be overcome by moving the penis and prepuce towards the operator. Catheterisation of females is comparatively more difficult and is best performed with the animal standing up or in sternal recumbency. The urethral opening in the vagina is located by direct visualisation via a lubricated (K-Y Jelly) speculum. It is located in the centre of a slightly raised papilla on the ventral surface of the vagina. A lubricated catheter is inserted into the urethra and can usually be advanced into the bladder without resistance.

For cystocentesis, it is essential to be able to palpate the bladder for accurate insertion of the sampling needle. With the dog lying on its back or on its side, the skin overlying the bladder is clipped and cleaned with alcohol. If the urine sample is being collected for microbiological studies, the skin must be surgically prepared. The bladder must be palpated in the posterior abdomen and grasped by one hand through the body wall. A 21 G needle, 4-6 cm long, can then be introduced through the body wall in the midline and directed caudally at an angle of about 45^0 so that it punctures the posterior bladder and remains within the lumen whilst urine is aspirated into a syringe.

Table 1. Space requirements for each dog

Source	Weight (kg)	Floor area (m^2)	Minimal height (m)	Group or loose housing (m^2)
CCAC (1984)	12	0.75	0.8	1.5
	15	1.20	0.9	2.0
ILAR Guide (1996)	15	0.72	-	-
	Up to 30	1.08	-	-
	30	2.16	-	-
MacArthur (1987)	15 -20	4.2 (may be used for two animals)	-	-

Table 2. Reproductive data

Age at puberty - male;	7-8 months,
- female	8-14 months
Cycle length	21 - 28 days
Breeding season (average)	bi-annual
Average oestrus interval	7 - 8 months
Gestation length	63 (53-71) days
Litter size - small breed,	
large breed	2 -3; 4 - 12
Average reproductive span	
- male; female	5 - 7 years; 4 - 5 years

Faeces
Fresh samples can be collected immediately following defaecation, or directly from the rectum using a lubricated gloved finger, a swab or small speculum.

Vaginal fluid, vaginal cells
Vaginal smears are a common requirement in laboratory dogs. A sterile swab is introduced into the vagina, turned, withdrawn and smeared onto a glass slide. Alternatively, a small volume of isotonic saline is instilled into the vagina via a blunt-ended glass pipette, aspirated and dropped onto a glass slide. During oestrus, over 1 ml of fluid can be aspirated directly from the vagina using a blunt-ended glass pipette. Vaginal smear cytology at different stages of the oestrus cycle is well described (Nett and Olsen, 1983).

Additional procedures

References for some additional procedures are as follows: collection of cerebrospinal fluid (CSF tap; cistern and lumbar puncture) - Green and Oliver (1983); collection of semen - Olson (1992); chronic vascular access - Lumley *et al.,* (1990); anatomy - Evans and Christensen (1993); surgical techniques - Bojrab (1990), Slatter (1993), Piermattei (1993); electrocardiogram - Tilley (1992), Edwards (1987).

Breeding

Reproductive data for the dog are shown in Table 2. The canine ovarian cycle can best be understood in terms of the follicular and luteal phases. Bitches ovulate spontaneously following a follicular phase during which the elevated oestrogen levels cause increasingly evident external signs of pro-oestrus. This phase often lasts 5 to 10 days (range: 2 to 22 days). The first evidence of pro-oestrus may be vulval enlargement followed 1 to 4 days later by a bloody vaginal discharge. Some bitches may be so fastidious in licking their genitalia that the bloody discharge is not observed on the vulva although it is present intravaginally. During this period the bitch is attractive to, but will not accept, the male. Oestrus usually corresponds with the peak of luteinising hormone and commences when the female accepts the male with the characteristic lordosis and sidewards deviation of the tail. The behavioural change from pro-oestrus to oestrus may occur rapidly (over an 8 to 12 hour period) or slowly (over 1 to 3 days). With the behavioural change, the bloody discharge begins to subside. The transition from late pro-oestrus to oestrus can be determined by testing the bitch's response daily with the male. When mating occurs, the bitch and the dog remain "tied" for twenty to thirty minutes. Oestrus lasts from 6 to 12 days during which time the female may continue to permit mating. Ovulation, however, occurs within 1 to 2 days after first acceptance of the male and is spontaneous. Onset of metoestrus is defined behaviourally as the first day after a period of oestrus that the bitch refuses the male. This period is characterised by a gradual decrease in the size and turgidity of the vulva and usually lasts 2 to 3 months in the absence of pregnancy. Following a reproductive cycle, the bitch enters a period of ovarian quiescence called anoestrus. This period can last from two to ten months. Concannon and Lein (1989) provide extensive information on the correlation between hormonal and behavioural changes in the bitch's reproductive cycle.

Changes in exfoliated vaginal epithelial cells occur as a result of changing secretory patterns of ovarian hormones. The daily or alternate daily examination of vaginal smears can be helpful in analysing phases of the oestrus cycle and in determining optimum breeding times. The cell types found in vaginal smears taken during the oestrus cycle have been described by a number of authors (Nett and Olsen, 1983, MacArthur 1987, Concannon, 1989).

Detection for pregnancy

Pregnancy can be detected by palpating the abdomen of the bitch (unreliable in mid-pregnancy), by ultrasound (from about 17 to 21 days after ovulation) or by X-ray (in the last 3 weeks of pregnancy).

Some bitches show signs of pseudo-pregnancy (or false pregnancy) beginning 6 to 8 weeks after the oestrus period. These animals may exhibit one or all of the following signs: distended abdomen, engorged uterus, development of mammary glands, lactation, and various behaviours such as nervousness, nesting, guarding enclosed areas, and mothering objects.

Parturition

The most consistent physical sign of impending parturition is palpable relaxation of pelvic and abdominal musculature accompanied by increased friendliness and loss of appetite. The first stage of parturition may last several hours during which the bitch may appear agitated. At the end of this stage, the bitch may begin to exert voluntary pressure. The allantochorion or "water bag" of the first foetus appears at the vulva and is often ruptured by the bitch. Shortly after, the first foetus is presented in the cervix and strong abdominal contractions will occur. The expulsion of the first foetus may take from only a few minutes to a couple of hours. A longer delay indicates that assistance is required. The bitch will chew the umbilical cord and eat the placenta. Her continual licking of the puppy stimulates respiration during the first minutes of independent life. Further puppies will follow at intervals of up to one hour.

Breeding systems

A colony ratio of 1 male to 10 females is acceptable for most breeding systems. Dogs may be bred in packs of 1 male with up to 12 bitches. Once a bitch is obviously pregnant, she is removed to separate accommodation for whelping. This system has the advantage that oestrus detection by the animal technician is unnecessary. However, conception rates may be reduced if several bitches are in oestrus simultaneously. A second system involves bringing the bitch to the location of the male when the bitch is fertile. This practice is appropriately protective of the male's libido and territoriality but requires daily examination of each bitch for signs of pro-oestrus. A bitch is put with the male approximately 10 days following pro-oestrus detection and remains with the male for about 5 days, or the dog and bitch may be put together daily over the same 5 days, for at least 1 hour each day.

Hormonal manipulation of reproduction

Naturally produced and synthetically prepared reproductive hormones are frequently used in canine reproduction to improve reproductive efficiency or to treat specific disorders (e.g. oestrus induction, induction of ovulation, oestrus suppression and pregnancy prevention, reduction of signs of pseudo-pregnancy, and termination of unwanted pregnancy). The potential side-effects of these drugs in intact bitches include endometritis and pyometron (Braakman *et al.*, 1993; Cain, 1995).

Development of the newborn

Newborn puppies commence sucking immediately after they have been licked clean by the bitch. It is important that puppies suck adequately during the first 24 hours of life to ensure absorption of maternal antibodies from the colostrum. Puppies are born with their eyes and ears closed, with eyes fully open and ears becoming patent by day 10-14. Puppies are usually walking steadily by day 21 and achieve voluntary control of micturition and defecation between days 16 to 21. By about 3 weeks of age, puppies will begin eating solid food. Separation from the bitch may occur as early as 6 weeks of age. However, some studies have shown that disease susceptibility and mortality is higher in puppies with a short maternal contact period and have recommended that maternal contact be maintained until 12 weeks (Slabbert and Rasa, 1993).

Hand rearing of puppies is best achieved by fostering on to a lactating female. Alternatively, puppies can be successfully hand reared using a commercial milk substitute (for example — Divetalac ®, Animalac ®). For further reading on orphan feeding and care, see Lewis *et al.*, (1987).

Feeding
Dogs vary enormously in both adult size and growth rate. The nutritional requirements of dogs are provided in detail in Lewis *et al.*, (1984) and IVS Annual (1994). The requirements of the average adult non-breeding dog can be met by feeding a good quality canned, semi-moist or dry commercial dog food. Home-made diets may require supplementation with essential vitamins, minerals or fatty acids. Some canned diets contain added cereals so that they constitute a complete diet, whilst others with a higher protein content are intended to be fed together with a cereal biscuit. The semi-moist diets usually constitute a complete diet and should be fed with an ample supply of drinking water. Dry diets should also be fed with ample drinking water. Dry diets can be fed from a food hopper where the food can remain fresh for several days. This *ad lib* availability enables the dog to develop a nibbling pattern of feeding. In some animals this may lead to obesity, so that restricted meals offered twice daily become necessary. The temperature at which food is fed may affect its acceptability. The sudden intake of very cold foods or sudden changes in diet may be poorly tolerated and result in diarrhoea. Intermittent large meals should be avoided, as acute gastric dilatation may result.

Attention to nutritional requirements is especially important in the following situations:

- the pregnant bitch, especially during the last three to four weeks of gestation and throughout lactation (e.g. prevention of lactation tetany);
- puppies before and after weaning;
- during the growth period (e.g. prevention of secondary nutritional hyperparathyroidism); and
- during periods of stress (e.g. following surgery).

The reader is referred to Lewis *et al.*, (1987) and Donoghue (1992) for further information.

Health and disease

Signs of health
The normal healthy dog is active, alert and responsive to human presence. Appetite and body condition should be good and the animal should not be obese. Eyes and ears should be clear of any discharge. Teeth should be clean. Gums are normally smooth and moist, and pink in colour. The coat should be clean and shiny and no lesions should be visible on the skin. Urine and faeces should be passed without difficulty. The urine of a dog is normally clear or straw coloured. While the faeces are normally dark brown, the colour and consistency varies with the diet. Pale, bulky faeces are abnormal. Body weight should be monitored regularly (e.g. weekly). Dogs should be clinically examined by a veterinarian on a regular basis, especially if the animal is part of an experimental protocol. Because of enormous variations in behaviour, appearance and clinical signs of individual animals, it is important to record baseline data for each animal so that abnormal signs may be detected more easily. Any dog exhibiting abnormal clinical signs should be referred to a veterinarian for examination and diagnosis.

Disease prevention

Vaccination
Regular vaccination protocols should be followed in breeding colonies, and dogs obtained from local pounds should be vaccinated prior to release to an experimental protocol. Vaccinations are recommended against distemper virus, hepatitis virus, parvovirus, and two organisms implicated in infectious tracheobronchitis (parainfluenza virus and *Bordatella bronchiseptica*). To ensure high levels of maternal antibodies in the colostrum, breeding bitches should be vaccinated annually. Veterinary advice should be obtained on the vaccination protocol required.

Intestinal parasites
There are a large number of drugs available for the treatment of internal parasites (see IVS Annual, 1996) . The most common intestinal parasites in dogs are roundworm, hookworm, whipworm and tapeworm. It is common practice to treat dogs either with a broad-spectrum anthelmintic active against the most common parasites (e.g. Drontal ®, Popantel ®, Canex ®), an anthelmintic active against the common parasite for the age of the dog (e.g. Canex Puppy Suspension ® for roundworms and hookworms), or a specific anthelmintic based upon the results of a faecal analysis. Infestation with intestinal parasites in breeding colonies is prevented by adequate cage/run cleaning protocols, regular faecal floats of a sample population, and an appropriate de-worming schedule of all animals. Roundworm is the most common problem in puppies and breeding bitches, while tapeworm infection is usually concomitant with flea infestation. Recommended de-worming schedules for puppies normally concentrate on possible roundworm and hookworm infestation (pyrantel embonate every 2 weeks until 12 weeks of age; every month between 3-6 months of age, then a 3-6 monthly intervals). Regular broad-spectrum treatment of adult dogs is recommended at 3-6 monthly intervals (e.g. Drontal®). In adult dogs of unknown history, initial treatment should consist of two doses given 3 weeks apart. Breeding bitches should be treated in the last trimester of pregnancy so that transplacental and transmammary transfer of roundworms is prevented.

Heartworm prevention
Dogs are infected with heartworm when the immature stages of the parasite are injected into the blood stream via the bite of the mosquito. The presence of the adult worms in the right ventricle and pulmonary artery of the heart can result in a long period of sub-clinical disease, followed by clinical disease and death. All dogs with an unknown history should be tested for heartworm disease prior to release to an experimental protocol. Detection of heartworm infestation is best done using a highly specific and sensitive antigen test (SNAP ®, Vetred ®) which detects antigen specific to mature or immature worms. Due to a lower sensitivity when compared with antigen tests, high false-negative rates are possible when testing only for the presence of microfilaria (larvae) in the peripheral blood. Dogs which test positive for the presence of heartworm should not be used as experimental animals. In dogs which are heartworm negative, the disease is easily prevented by the administration of appropriate compounds which kill the

immature tissue stages of the parasite. These drugs can be administered either daily (diethylcarbamazine) or monthly (ivermectin, milbemycin oxime, moxidectin). The newer forms of the monthly preparation also act against intestinal parasites (milbemycin oxime - Endovet ®), or include compounds which act against selected intestinal parasites (Ivermectin and pyrantel - Heartguard Plus ®).

External parasites
Without doubt, the most common external parasite of the dog is the flea. Regular treatment with insecticidal washes (e.g. organophosphate preparations at 7-14 day intervals), sprays (Frontline® at 8-12 weekly intervals), oral organophosphate dosing (Proban ® every 2-3 days) or spot on preparations (Advantage ® once monthly), is recommended if flea infestation is observed. However, good hygiene within the kennel environment and defleaing of any new dog entering the colony will largely prevent this problem. Another common and often endemic infestation in colony dogs is ear mites (*Otodectes cynotis*). Scratching of the ear or a dark brown crusting discharge from the ear canal is highly suggestive. Treatment with Ivermectin® (200-400 µg/kg s/c at two weekly intervals for 2-3 treatments) is very effective. Other, less common external parasites include sarcoptes, demodex, and chyletellia mites, ticks and lice. In such cases, clinical signs such as scratching, hair loss or visible presence of the parasite should warrant examination and diagnosis by a veterinary surgeon.

Physiology, biochemistry, haematology

There is a wealth of physiological data on the dog. Jacobs et al (1995) provide the most comprehensive reference values, including cerebrospinal fluid analysis, gastrointestinal and endocrine function tests and coagulation screening tests. Other references include Lumley et al (1990) and Loeb and Quimby (1989). Physiological, biochemical and haematological data in greyhounds differs significantly from other breeds of dogs. For information on this breed, see Lording (1983).

Sedation, analgesia and anaesthesia

Common injectable agents for premedication, analgesia and analgesia are listed in table 3. For general references on anaesthesia, sedation and analgesia in the dog, see Bednarski (1992); Flecknell (1996); Lumley *et al.,* (1990); Green (1982;) Mandsager and Raffe (1989) and Quandt and Rawlings (1996).

Sedation
Sedation is often used as a chemical restraint for many diagnostic and therapeutic procedures when animals are fractious or unco-operative, or because the procedures produce discomfort or pain or require lack of motion. Sedatives are also used as part of pre-anaesthetic medication to reduce the anxiety of the animal and assist in its restraint and to ensure a smooth induction of anaesthesia and provide a quiet and gradual recovery. Following the use of a sedative, the dose of some anaesthetic agents may need to be reduced. Sedatives may be used alone while others are more effective in combination.

Analgesia
Analgesic agents can be used in the treatment of post-operative pain, in combination with sedatives to produce effective chemical restraint, or as part of pre-anaesthetic medication. When given pre-operatively, they act to inhibit nociceptive input to the central nervous system, thus providing a degree of prevention as opposed to treatment of pain. Single agents used for this purpose include pethidine, buprenorphine and carprofen. The last two have the advantage of long periods of effect (up to 12 hours and 24 hours respectively) when compared with pethidine (2 hours).

Anaesthesia
Animals subjected to anaesthesia should be healthy and free from hepatic, renal, cardiac or respiratory disorders. To reduce the incidence of regurgitation during induction, food should be withheld for a period of 12 hours. Premedication is usually given 30-40 minutes prior to induction of anaesthesia, and may consist of a combination of sedative, anticholinergic and analgesic agents. Anticholinergic agents (e.g. atropine 0.05 mg/kg i.m. or s.c.) will reduce the side effects of many anaesthetic drugs, e.g. the stimulation of respiratory secretions and the parasympathetic stimulation of the cardiopulmonary system. Acclimatisation of the animal to handling will reduce the effects of stress and the possibility of injury to animal and personnel during induction of anaesthesia.

Injectable anaesthetic agents
Anaesthesia can be achieved via i.v. administration of the drug using the cephalic vein. Short acting anaesthetic drugs (e.g. thiopentone, methohexitone and propofol) are most commonly used as induction agents for general anaesthesia. Pentobarbitone may be used for its longer acting effects (45-60 minutes of light anaesthesia following a single intravenous dose) with long periods of anaesthesia being achieved using a continuous infusion. This drug has the disadvantage of providing inadequate analgesia for major surgical procedures, unless dangerously high doses are administered. Even at lower dose rates, it produces respiratory and cardiovascular system depression. The use of barbiturates in hound breeds (e.g. greyhound, saluki) results in prolonged periods of recovery and should be avoided.

Propofol can be used both as an induction agent and to maintain anaesthesia by constant infusion (Robinson *et al.*, 1995). However, neither sedation nor anaesthesia produced by propofol are associated with complete pain relief. Lack of reflex response may only be complete at deep levels of anaesthesia. The drug must be administered slowly to avoid respiratory arrest and apnea.

Chloralose is not suitable for routine use as an anaesthetic but is of value in providing long lasting (6-10 hours), stable, light anaesthesia with minimal cardiovascular and respiratory depression. The degree of analgesia is usually inadequate to allow surgical procedures to be undertaken. For this reason, it is often combined with pentothal or urethane to produce sufficient analgesia to allow surgical procedures. Urethane is carcinogenic and its use should be discouraged.

Inhalational agents
Long periods of stable anaesthesia can be induced using a face mask in the sedated animal, or by an i.v. short-acting anaesthetic agent. Following induction, the animal is intubated and maintained using a volatile inhalational agent (e.g. halothane 1-2%, isoflurane 2-3% or enflurane 0.8-2%). For small dogs (10 kg) an Ayres T-piece or a Bain coaxial circuit should be used. Intubation is easily performed with the animal lying on its side with its jaws held open by an assistant. The larynx can be visualised using a

Table 3. Common injectable agents for premedication, analgesia and anaesthesia in the dog.

Drug	Tradename	Dosage	Route	Comments
Atropine	Atrosine mitis	0.05 mg/kg	s.c. i.m.	-
Acepromazine	Promez ACP	up to 0.25 mg/kg	s.c. i.m.	S ✓
Diazepam	Valium Pamlin	0.2-0.6 mg/kg	i.v.	S ✓✓
Xylazine	Rompun	2.0 mg/kg	i.m.	AC, A ✓, S ✓✓, M ✓✓, R, V
Pethidine	-	1.0 mg/kg	i.m.	A ✓✓, S ✓
Buprenorphine	Temgesic	0.01 mg/kg	i.m. i.v.	A ✓✓✓,S ✓
Carprofen	Zenecarp	4mg/kg (initial) 2 mg/kg (top-up to 24 hrs)	i.v. s.c.	AA ✓✓✓, NSAID
Medetomidine	Domitor	0.01-0.08 mg/kg	i.m. i.v.	A ✓✓, S ✓✓, M ✓✓, R
Droperidol - fentanyl	Leptan, Innovar - vet	1.0 ml/10 kg	i.m. i.v.	AC, A ✓✓✓, S ✓✓ R (fentanyl only)
Fentanyl- fluanisone	Fentaz, Hypnorm	0.2 ml/kg	i.m.	AC, A ✓✓✓, S ✓✓, R
Tiletamine / zolazepam	Zolitil, Telazol	7mg/kg	i.m.	AC, S ✓✓, A ✓✓, M ✓ (Recovery may be prolonged or rough)
Thiopentone 2.5 - 5% solution	Pentothal Intraval	10 - 20 mg/kg	i.v.	A,✓, M ✓, T✓✓
Methohexitone	Brietal	4 - 8 mg/kg	i.v.	A ✓,H ✓,T ✓✓
Pentobarbitone 6% solution	Nembutal	20 - 30 mg/kg	i.v.	A poor, M ✓
α-chloralose 1% solution	-	80 - 100 mg/kg	i.v.	A poor , NR
α-chloralose - urethane	-	80 mg/kg 500 mg/kg	i.v. i.v.	A ✓,M ✓,NR
Propofol	Diprivan	2 - 8 mg/kg	i.v.	A poor, H ✓

AC = prior administration of an anticholinergic drug recommended ; **A** = analgesia; **S** = sedation; **M** = muscular relaxation; **R** = reversible or capable of reversing agonists; **V** = Vomiting common; **NSAID** (Non-steroidal antiinflammatory drug); **H** = Useful in hound breeds and puppies (10 weeks of age); **NR** = Use in non-recovery experiments only; ✓ = Degree of action

laryngoscope or a strong overhead light. Some operators prefer to hold the animal's tongue while manipulating the endotracheal (ET) tube. The size of the ET tube used varies with the size of the animal (5mm - chihuahua, 16mm - St Bernard). A cuffed ET tube prevents the aspiration of fluid/stomach contents into the lungs. At the completion of the anaesthesia, the ET tube must not be removed until the swallowing reflex has returned, and the cuff deflated.

Local anaesthesia

To reduce the side effects of anaesthetic and analgesic agents, anaesthetic drugs may be administered locally instead of systemically. For procedures involving the caudal half of the body, an epidural anaesthetic may be considered. Analgesia following thoracic surgery can be produced using an intercostal nerve block or the interpleural administration of local anaesthetic agent (Conzemius *et al.*, 1994; Pascoe and Dyson, 1993). A good review of local anaesthetic and analgesic techniques is provided by Quandt and Rawlings (1996).

Anaesthetic monitoring

All animals undergoing general anaesthesia must be monitored to ensure an adequate level of anaesthesia for the procedure being performed, and to minimise peri-operative mortality and morbidity. Factors which should be monitored may include depth of anaesthesia (e.g., eye reflex, pedal reflex), respiratory function, cardiovascular function, body temperature and, when using a neuromuscular blocking agent and ventilation, neuromuscular function. Nicholson (1996) provides an overview of monitoring techniques.

Euthanasia

The most humane manner of performing euthanasia in dogs is by rapid i.v. injection of a concentrated solution (300 mg/ml) of pentobarbitone at 150 mg/kg. Dangerous or fractious animals may need prior sedation (e.g., medetomidine or xylazine i.m.). Euthanasia in the anaesthetised dog can be carried out by exsanguination, or by i.v. or i.c. injection of pentobarbitone.

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Book Review

The Exploitation of Mammal Populations. Edited by Victoria J. Taylor and Nigel Dunstone. Published by Chapman and Hall, 1996.ISBN 0-412-64420-7. Price £39.50.

Based, in part, on a joint symposium held by two scientific animal charities — the Universities Federation for Animal Welfare (UFAW) and the Mammal Society — this book is necessarily a compendium of diverse views on the relationships between one highly successful mammal (*Homo sapiens*) and all the other mammalian species.

The diversity of views and experiences of the authors (most papers are collaborative efforts) and their well reasoned arguments made this book difficult to review, yet exceedingly worthwhile. As the editors state in their introduction, *it is difficult to think of any wildlife that is unaffected by humans or their actions*. This simple truth reflects the present situation of planet Earth and all its inhabitants. We are searching for compromises between ever growing numbers of human beings, and equally important, the ever increasing aspirations of almost every individual human being, every one of whom wants to consume more of the planet's resources.

This book explores how we may achieve such compromises by exploiting mammals. For the word 'exploitation' in the context of this book, we should possible substitute the currently fashionable phrase 'sustainable use' and remember that what applies to mammals applies to all fauna and flora.

Mostly the papers reflect careful research of the topics covered and do not hesitate to probe, and where justified, challenge long held beliefs. Many papers express concerns about animal welfare as well as species conservation. Too often these topics are considered as mutually exclusive, which in the experience of this reviewer is certainly not so. For most of us the conservation ethic was born of an interest in and concern for individuals within a species, before increasing maturity and knowledge continually widened the areas of concern.

In a valuable overview paper on assessing the impacts of uses of mammals, Robert and Christine Prescott-Allen make the point that kangaroo control by legal shooting is likely to be as humane, **if not more so** than the treatment of domestic livestock (the emphasis is mine).

Many suggestions for sustainable use are put forward. Of these, eco-tourism is to many the most benign and therefore attractive, but there are limitations. Many of us are already aware of over-exploited tourist areas where the visitor experience is shared with too many other humans, and the behaviour of animals is too much conditioned by the presence of people and vehicles and artificial provisioning of food and water. Because of often artificially contrived visitor viewing (and the physical constraints of wildlife parks and reserves) particularly of large mammals, much eco-tourism is not unlike a zoo visit, other than in distances to be covered! In times of water plenitude, tourists may be disappointed at how little wildlife they see during their expensive "experience" and may even be lost to the conservation cause if the situation is not well explained. Few begin, or end, their eco-tourism experience with adequate ecological appreciation.

Another concern is the growth in the number of facilities for overseas visitors to the more popular parts of Africa. Game viewing, often combined with game ranching, has become a profitable alternative to more traditional land uses. Almost certainly supply will at some point surpass demand, leaving a problem of future animal management and disposal.

Sport hunting is dealt with extensively in a number of papers, including one dealing with hunting of both foxes and deer by hound. Undoubtedly this form of consumptive use can provide considerable income from land where alternative uses would be less financially rewarding and where the impact on populations is either controllable or in the case of hunting with hounds, inherently negligible. Hunting with hounds has controversial welfare aspects, although an interesting point is made that killing among species of *canidae* occurs in nature.

In a particularly useful paper on programs in Zimbabwe, Michael Kock asks if a small percentage of older adult male Black Rhinoceros was selected and offered on quota for sport hunting, whether the enormous earnings (estimated at US$100,000 - 200,000) might have stemmed the decline of this species in that country. While unattractive to many, this is unlikely to cause the decline of a species and may well place a value on animals which brings about protection. Care should always be exercised to avoid an emphasis on trophy animals which might in time result in a genetic bias.

Much more complex is the issue of consumptive use of mammals for flesh, hides and body parts. Legal "harvesting" of wild populations may prove difficult to control (and indeed this is demonstrably already the case particularly with non-mammalian species for the pet trade). The "use it or lose it" school of thought dominates much of current thinking on this aspect and may well be unstoppable. Profit motives may well cause both use and loss to occur if not monitored closely. As is pointed out by a number of authors, the major profits seldom return to the indigenous peoples who are the first link in the hunting chain.

Farming of wild animals is suggested as providing a secure future for some species, and another non-mammalian species (the African crocodile) is an example. Care must be taken, however, to avoid domestication. There is a grave danger of conscious or unconscious selection for docility and fecundity under captive conditions which commercially would be attractive. The closer cooperative management of individuals in zoo situations avoids this.

Passionate views are expressed **against** consumptive use, and these too should receive consideration. Appropriate questions are asked about the effectiveness of controls and the extra consideration that should be given to animals of perceived higher intelligence such as the anthropoid apes and cetaceans. Ian Redmond, in a paper on elephant family values, suggests that it is no more acceptable to cull elephants than it would be to perform a similar operation on family groups of gorillas or chimpanzees.

A passionate and appropriate paper by Valmik Thapar entitled 'The tiger — road to extinction', makes a plea for conservation pure and simple. Given the plight of all extant subspecies of tigers, I would trust that all would agree to outright and rigorous protection with **no** compromises.

Readers of this volume will have to judge the merits of different and differing viewpoints and relate these to the great variety of situations of species, habitats, economics and national attitudes which affect species conservation and the negative and positive aspects of exploitation of mammal populations.

JM Knowles
Marwell Preservation Trust
Colden Common, Winchester
Hampshire, UK

Letters

AWIC services in Australia and New Zealand

Thank you for your inquiry whether the US Animal Welfare Information Center (AWIC) provides a service in searching databases for alternatives to animal use in research and teaching.

AWIC's services are extended to both investigators and members of animal ethics committees or to anyone who requests information on animal welfare. However, our primary patrons would be in the first two categories. We officially charge for searches that exceed US$25. Our billing is through the National Technical Information Service which adds a US$10 processing fee. These fees are generally incurred for searches that are performed through the Dialog database system. Recently, the National Agricultural Library has secured access to other systems that allow us to access most of the databases that we normally use, but without having to charge a fee. We also use the PREX database of Utrecht University. This service also does not incur a charge for the patron. Unless the request is very complex, patrons generally incur no charges or only minimal charges.

The information that is returned includes the literature citations with or without abstracts (abstracts usually double the cost of the search), keyword descriptors for each citation, list of databases searched, and the search strategy. The search can be returned via e-mail or postal mail. For certain types of requests, we may also include articles from our files (e.g., anaesthetic dosages, environmental enrichment articles, etc.). The turn-around time is usually three to five working days, although it may be longer when things are busy (we will give the patron a time frame for return of information).

We offer our services to everyone. I have done a number of searches for investigators and ethics committee members in both New Zealand and Australia and would be happy to continue assisting in anyway I can.

Tim Allen
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Animal Welfare Information Center
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tallen@nal.usda.gov

Blood samples from rats by venipuncture

Researchers using experimental animals frequently require serial blood samples to monitor the progress of experiments. With rats, as with other small laboratory animals, this presents practical as well as ethical problems.

The two methods used most commonly to obtain venous blood samples are bleeding from the retro-orbital venous plexus using a glass pipette and venesection by progressive amputation of small segments of the tail followed by cautery. Mice are often bled from the retro-orbital plexus without anaesthesia, but in rats the conjunctival tissues are tougher, the animals are more difficult to restrain, and in my view anaesthesia is obligatory. Furthermore, in either species, retro-orbital bleeding can lead to acute or progressive ocular damage.

I have preferred amputative venesection of the tail, while recognising that this method is viewed as mutilating and unaesthetic by many workers. The method yields a mixture of venous and arterial blood; requires anaesthesia and must be followed by cauterisation of the tail stump using a hot-plate (or similar hot instrument).

Recently, I stumbled upon a non-mutilating method for venipuncture in the rat. Finding myself in a barrier area of the animal house without any implement suitable for cautery, I was unwilling to risk cardiac puncture. The following method, for which I do not claim precedence (because of its simplicity, it may already be used by others), is the fruit of desperation. It requires only a suitable anaesthetic and hypodermic needle.

For quick bleeding of group rats, a suitable anaesthetic is xylazine / ketamine. Given by the intraperitoneal route, it produces anaesthesia within two to five minutes that lasts for more than thirty minutes, thus allowing animals to be prepared one or more cages at a time. At the ambient temperature of our animal house (23^{0}C), I have not found that it is necessary to warm the animals to produce vasodilation, although this could be an advantage. Light anaesthesia, by maintaining blood pressure, produces better flow rates.

With the rat lying on its side near the edge of the bench, the lateral vein is compressed lightly at the base of the tail — either with an assistant's finger or with a suitable weighted object. The vein is entered with a disposable 22 gauge needle and entry into the vein is signalled by rapid filling of the plastic adaptor with blood. With the tail dependent over the edge of the bench, blood drips under gravity and volumes of 0.5 - 1.0 ml are easily achieved. The needle is then withdrawn and bleeding stopped by pressure over cotton wool. The blood remaining in the needle need not be wasted — if the needle point and shaft are inserted into the barrel of a one ml disposable syringe via the nozzle, making a seal with the plastic adaptor of the needle, the blood can be expelled by driving down the plunger.

The method is non-mutilating, simple, quick and it can be repeated without lasting damage. Counter-intuitively, a larger needle finds a vein more easily than a fine needle, while also proving a better flow rate and therefore less opportunity for clotting before sample collection is complete. All that is required, apart from simple equipment, is some easily acquired skills in venipuncture – a must for all animal experimenters. The temptation to apply a syringe to the needle should be resisted — almost invariably, the vein collapses and yields little blood.

Feedback on the success or otherwise of the method in the hands of others would be welcome.

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The AIAST policy on the welfare of farmed and research animals

The Australian Institute of Agricultural Science and Technology (AIAST) affirms that humane treatment of both farmed and research animals is a basic tenet in its commitment to the maintenance of economically and environmentally sustainable farmed animal industries for the benefit of Australia and its people. It is also committed to the conduct of the research and other animal-based scientific procedures that underpin such industries where options which exclude the use of animals are unavailable. It is also committed to research leading to advances in the welfare of farmed and research animals.

AIAST expects its members to be proactive in the promotion of humane treatment of animals and to take appropriate action when inhumane treatment is brought to their attention. AIAST is committed to ensuring that, among its members, community sensitivities and expectations about the husbandry, transport and harvest of farmed animals, and about the conduct of animal-based scientific procedures continue to be understood and appropriate studies developed.

Farmed animals

AIAST is committed to the humane husbandry, transport and harvesting (including slaughter) of farmed animals. AIAST expects that such activities be conducted by its members in accord with relevant animal welfare legislation and with relevant Codes of Practice. These codes are produced under the auspices of the Agriculture and Resource Management Council of Australia and New Zealand and are often gazetted under legislation.

Animal-based scientific procedures

AIAST believes that animal-based scientific procedures, when scientifically justified and carried out humanely with full public accountability, are a legitimate activity in support of the well-being of the farmed animal industries, and the welfare of such animals.

AIAST requires its members to familiarise themselves and comply with relevant animal welfare legislation and adhere to the principles and standards set out in the *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes*. Further, AIAST expects that its members investigate and, where possible, adopt techniques that make it possible to reduce or replace the need for animals in scientific procedures, and to refine such use.

Policy

- AIAST affirms that treatment of both farmed and research animals is a basic tenet in its commitment to the maintenance of economically and environmentally sustainable farmed animal industries for the benefit of Australia and its people.
- The AIAST is committed to the conduct of the research and other animal-based scientific procedures that underpin such industries, and that also lead to advances in the welfare of farmed and research animals.
- The AIAST expects its members to be proactive in the promotion of humane treatment of animals and to take appropriate action when inhumane treatment is brought to their attention.
- AIAST is committed to ensuring that community sensitivities and expectations about the husbandry, transport and harvest of farmed animals, and about the conduct of animal-based scientific procedures continue to be understood by its members and appropriate attitudes developed.
- AIAST requires its members to familiarise themselves and comply with relevant animal welfare legislation and adhere to the principles and standards set out in the *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes*.
- The AIAST expects that activities involving animals be conducted by its members in accord with relevant animal welfare legislation and with relevant Codes of Practice.
- AIAST expects that its members investigate and, where possible, adopt techniques that make it possible to reduce or replace the need for animals in scientific procedures, and to refine such use.

ANZCCART seminars on alternatives

ANZCCART, in conjunction with the Australian Veterinary Association (AVA) and the Australian and New Zealand Society for Laboratory Animal Science (ANZSLAS) is pleased to assist in sponsoring three seminars by Dr Joanne Zurlo, of the Centre for Alternatives to Animal Testing (CAAT), Baltimore, USA.

Dr Zurlo is Associate Director of CAAT, which is based in the Johns Hopkins University School of Hygiene and Public Health. CAAT, through its Director, Dr Alan Goldberg, sponsored the first World Congress on Alternatives and Animal Use in the Life Sciences in Baltimore in 1993. This was so successful that the Congress has become a major international event, being held every three years in different parts of the world. Dr Zurlo is visiting Australia to lead a session at the AVA Conference in Brisbane on 8 May on alternatives to the use of animals in research. She is a toxicologist and has published widely in this area.

While Dr Zurlo is in Australia, ANZCCART and ANZSLAS will be providing sponsorship for her to visit Sydney and Melbourne, where she will give seminars on alternatives to animal use and how to find them. The dates and venues will be:

- Monash University, Melbourne, Monday, 12 May (4.30pm)
- University of Sydney, Thursday, 15 May, (9.30am)
- University of NSW, Thursday, 15 May (noon)

Further details of the times and exact venues can be obtained from Dr Thomas Martin, Director of Animal Care, University of NSW (tel. 02-9385 1083; fax: 02-9385 1081; email: T.Martin@unsw.edu.au).

1997 Annual General Meeting of ANZCCART

This is to be held at the University of Melbourne at 2 pm on Monday, 19 May. The AGM has previously been held in conjunction with the annual conference, but must be brought forward to satisfy the legal requirements of the Australian Securities Commission. A meeting of the Board will be held at 10 am that day at the same venue.

ANZCCART's 1997 Conference

This year's conference will be held in Auckland on 19 and 20 September on the theme "Ethical approaches to animal-based science". The venue will be the University of Auckland Conference Centre. The conference is being co-sponsored by the New Zealand National Animal Ethics Advisory Committee (NAEAC), whose mission is to provide independent, high-quality advice to the Minister for Agriculture on policy and practices relating to the use of animals in research, testing and teaching. NAEAC promotes the implementation of refinement, reduction and replacement in animal use.

This conference will be valuable to anyone interested in the place of ethics in science. Animal-based scientists, including researchers, teachers and students, will find it particularly relevant, as will all others concerned about animal welfare, emerging environmental pressures as they affect animal welfare, the effectiveness of animal ethics committees, and the promotion of humane practices in the use of animals in science.

Value systems are important to everyone concerned with animal-based science, whether as proponents or opponents of it. Until recently science was conducted as if it were value-free. Now there is a growing recognition among scientists and the wider community that in addition to their traditional preoccupation with the content of science (i.e., the acquisition of knowledge and its beneficial application), scientists must also participate fully in wider discussions about the value context of their work. That context currently includes consideration of achieving a sustainable biological future nationally and globally, maintaining ecological balance, and harmonising concern for animal welfare with the use of animals for human purposes. These issues in their turn influence what our society considers to be acceptable and unacceptable animal use, the limits which are imposed on animal use through the law, regulations, institutional mechanisms and personal ethical standards, and the trust generated in those mechanisms.

Replacement, reduction and refinement - the three Rs - as principles which minimise the number of animals used and minimise the pain / suffering (harm) they may experience, will be given prominence throughout the program, in view of their central place in providing credibility to harm-benefit arguments advanced in support of specific uses of animals in research and teaching.

There are six sessions which will cover the following areas:

- value systems and animal-based science;
- societal consensus, public policy and animal welfare awareness;
- humane end-points;
- effective operation of animal ethics committees;
- researching vertebrate pest control methods; and
- point and counterpoint.

The last session will include brief statements of strongly-held views on prioritising animal, human, scientific and environmental issues.

Two eminent speakers have been invited from the UK; Professor Sir Colin Spedding, head of the Farm Animal Welfare Council and Professor David Morton from the University of Birmingham.

A conference program and registration form is enclosed with this issue of ANCCART News. For further information, please contact:

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ANZCCART Student Award

The Board of ANZCCCART is offering this award in association with the 1997 joint ANZCCART / NAEAC conference, for the best abstract of a paper provided by an honours or post-graduate student in New Zealand or Australia. The conference will be held in Auckland on 19 and 20 September, on the theme "Ethical approaches to animal-based science".

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

Applicants should be students of any New Zealand or Australian tertiary institution and be under 30 years of age. The Award this year will be to the value of $NZ1000, to offset costs of conference attendance, and will be presented during the conference. The successful applicant will be required to give a ten-minute paper on their winning topic at the conference.

Applications should include full name, postal address, facsimile and telephone numbers, and should be submitted by 31 July 1997 to:

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New ANZCCART publications in 1997

Over the next few months, four new publications will be published. They are:

- Proceedings of the 1996 Conference, *Animals in Education: Value, Responsibilities and Questions*;
- Proceedings of the 1994 Workshop on *The Use of Immunoadjuvants in Animals in Australia and New Zealand*;
- *Housing of Laboratory Animals;* and
- 1996 Annual Report

Further information will be provided in the next issue of *ANZCCART News*.

Tasmania joins ANZCCART

The Tasmanian Department of Primary Industries and Fisheries has accepted the invitation to join the Council of ANZCCART. Its nominee will be Dr Michael Manuel. All States (but not the ACT or NT) are now represented on ANZCCART, as is the Australian Government through its Department of Primary Industries and Energy.

The New Zealand Government is represented by a number of organisations, principally the Royal Society of New Zealand.

Obituary: Professor Geoffrey Donald Thorburn, AO, FAA, 1930 - 1996

Geoffrey Donald Thorburn retired as Head of the Department of Physiology at Monash University at the end of 1995 after an exceptional and distinguished academic career. Following his retirement, he continued his research interests in the Department studying the control of foetal growth, foetal development and the perinatal period. He passed away on October 18, 1996 at the age of 66 years.

Geoffrey Thorburn was born in Sydney in 1930 and graduated from Sydney University with a BSc (Honours) degree (1954) and MBBS in 1956. He completed a Doctor of Medicine in 1971. His long and distinguished research career essentially began in 1958 in the Department of Physiology at Sydney University where he worked as a cardiovascular physiologist with Professor Paul Korner. He then spend two years at the Harvard Medical School, Boston, in the laboratory of Professor AC Barger before returning to Australia, to take up the position of Senior Lecturer in the School of Physiology at the University of NSW. He joined the CSIRO at Prospect as a Research Scientist in 1966.

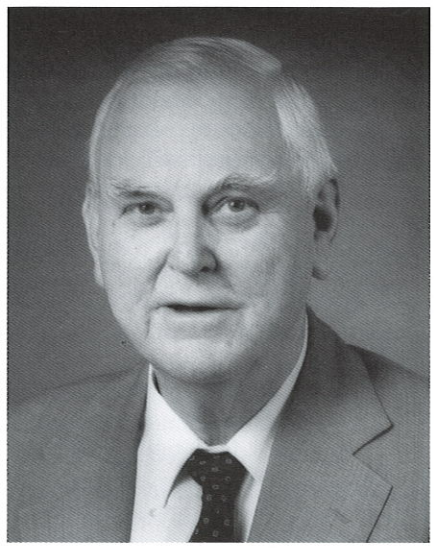
At CSIRO his cardiovascular research interest expanded to encompass the endocrinology of reproduction. Geoffrey Thorburn largely pioneered research into the endocrinology of the oestrous cycle and early pregnancy in domestic and native animals and, through the development of one of the world's first chronic foetal sheep preparations, the study of foetal metabolism, foetal growth and development and parturition.

Between 1972 and 1978 he worked at the Nuffield Institute for Medical Research and Nuffield Department of Obstetrics and Gynaecology, Oxford and held a Medical Research Council (UK) Program Grant in Foetal Development. He returned to Australia in 1977 to take up a Chair in the Department of Physiology and Pharmacology at the University of Queensland before moving to Melbourne in 1981 as Head of the Department of Physiology at Monash University.

Geoff Thorburn continued an active research career up to his death and was responsible for training, influencing and inspiring many foetal physiologists who are now world leaders in their respective fields of research. Many of his seminal ideas are embodied in the *Textbook of Foetal Physiology*, which he co-edited with Richard Harding. He was elected a Fellow of the Australian Academy of Science in 1991 and served on the Board of ANZCCART as the representative of the Australian Research Council from 1993 until 1995. His services to perinatal physiology were recently recognised by his being named an Officer of the Order of Australia for services to medicine and to research in the field of foetal physiology.

He leaves behind a galaxy of colleagues and trainees who worked with him, and were inspired by his example, camaraderie and commitment to excellence. We extend our condolences to his family.

Graham Jenkin
Department of Physiology
Monash University
Melbourne



Professor Geoffrey Thorburn

Coming up ...

Australian Veterinary Association Annual Conference
4 - 9 May, 1997
Brisbane, Queensland
Contact: Mrs Doreen Culliver, AVACOS
7 Phipps Place, Deakin, ACT 2600
Tel: 06-285 3600
Fax: 06-285 3913

Scandinavian Association for Laboratory Animal Science 27th Annual Symposium
The implication of welfare in laboratory animal science
22 - 24 May, 1997
Contact: Dr Alex Hansen
Dept of Experimental Medicine
University of Copenhagen
DK-2200 Copenhagen, N, Denmark
or Ernst Hansen
Tel: 45-39-69 6600
Fax: 45-39-66-0100
Email: evh@lst.min.dk

CONASTA 46
The Australian Science Teachers' Association Annual Conference
29 June - 4 July, 1997
University of Melbourne
Contact: Conference Secretary
Fax: 03-9428 4876
Email: stav@netspace.net.au

Netherlands School for Research in Practical Philosophy Conference on Perspectives in Animal Consciousness
3 - 4 July, 1997
Wageningen, The Netherlands
Contact: Dr Ruud van den Bos
University of Leiden, PO Box 9516
2300 RA Leiden, The Netherlands
Tel: 31-71-527 4921
Fax: 31-71-527 4900
Email: VANDENBOS@mullf2.medfac.leidenuniv.nl

Twenty-first Annual ANZSLAS Conference*
22 - 24 September, 1997, Brisbane
Contact: Dr Ivor Harris, CABH.
University of Queensland, PO Box 125
Kenmore, Queensland 4069
Tel: 07-3365 5275
Fax: 07-3365 5784
*** Note change of dates**

Australian Physiological and Pharmacological Society Annual Conference
29 September - 1 October, 1997, Adelaide
Contact: Dr Dan McHolm,
Dept of Physiology, University of Adelaide, SA 5005
Tel: 08-8303 4732
Fax: 08-8303 3356
Email: dmcholm@physiol.adelaide.edu.au

Australian Society for Medical Research Annual Conference
23 - 26 November, 1997, Adelaide
Contact: Ms Jenny Blanchard
PO Box 153, Nairne, SA 5252
Tel / Fax: 08-8388 6164
Email: dleaver@medicine.adelaide.edu.au

News from overseas

ECVAM Workshop reports available

The European Centre for the Validation of Alternative Methods (ECVAM) is based at the Joint Research Centre, Environment Institute of the European Commission at Ispra, Italy. Its Director is Professor Michael Balls.

ECVAM was established by the Commission to:

- coordinate the validation of alternative test methods at the European Union level;
- act as a focal point for the exchange of information on the development of alternative test methods;
- establish, maintain and manage a database on alternative procedures; and
- promote dialogue among legislators, industries, biomedical scientists, consumer organisations and animal welfare groups, with a view to the development, validation and international recognition of alternative test methods.

ECVAM seeks to promote the scientific and regulatory acceptance of alternative methods which are of importance to the biosciences and which reduce, refine or replace the use of laboratory animals in accordance with the three Rs concept of Russell and Burch. ECVAM has held 21 workshops to date, the results of which have been published as reports in the journal *ATLA* (Alternatives to Laboratory Animals). The 21 workshops cover the following topics:

1. The practical applicability of hepatocyte cultures in routine testing.
2. *In vitro* phototoxicity testing.
3. *In vitro* neurotoxicity testing.
4. Alternatives to animal testing in the quality control of immunobiologicals: current status and future prospects.
5. Practical aspects of the validation of toxicity test procedures.
6. A prevalidation study on *in vitro* skin corrosivity testing.
7. Development and validation of non-animal tests : the identification of a coordinated response to the challenge and the opportunity presented by the Sixth Amendment to the Cosmetics Directive (*76/768/EEC*).
8. The integrated use of alternative approaches for predicting toxic hazard.
9. Safety and efficacy testing of hormones and related products.
10. Nephrotoxicity testing *in vitro*.
11. The Three Rs: the way forward.
12. Screening chemicals for reproductive toxicity: current alternatives.
13. Methods for assessing percutaneous absorption.
14. The use of *in vitro* systems for evaluating haematotoxcity.
15. The use of biokinetics and *in vitro* methods in toxicological risk evaluation.
16. Acute toxicity testing *in vitro* and the classification and labelling of chemicals.
17. Alternatives to the animal testing of medical devices.
18. *In vitro* tests for respiratory toxicity.
19. Alternative methods for skin sensitisation testing.
20. The use of tissue slices for pharmacotoxicology studies.
21. The production of avian (egg yolk) antibodies: IgY.

Each of these is edited by Dr Julia Fentem and reprints are available free of charge from ECVAM, TP580, JRC Environment Institute, 21020 Ispra (VA), Italy.

UK

1995 statistics on scientific procedures on living animals

The 1995 data have recently been published by the UK Home Office and continue the downward trend in the use of animals for scientific procedures which has prevailed since the mid-1970s. The total number of procedures was 2.7 million, compared with 2.84 million in 1994.

Fundamental biological research and applied studies in human medicine, dentistry or veterinary medicine comprised 2.1 million (78 per cent), with the remainder being mainly for safety evaluation and the production of biological material. Mice accounted for 54 per cent of procedures, rats 26 per cent, other rodents (mainly guinea pigs) 5 per cent, birds 5 per cent, fish 5 per cent and rabbits 2.3 per cent. Dogs, cats and primates accounted for 0.3, 0.1 and 0.2 per cent of procedures respectively.

The Animals (Scientific Procedures) Act of 1986 regulates experiments involving animals. Researchers proposing to utilise animals in any experiments which might cause pain, suffering, distress or lasting harm to the animal are required to be licensed under the Act and the projects themselves must each be licensed with the Home Office.

(Source: Veterinary Record, February 22, 1997, p. 190).

ANZCCART News is published quarterly by the Australian and New Zealand Council for the Care of Animals in Research and Teaching Limited.

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

or

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PO Box 598, Wellington, New Zealand

Tel. 64-4-472 7421: Fax. 64-4-473 1841
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http://webtwo.rsnz.govt.nz/anzccart/anzccart.html

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