NATIONAL ADVISORY COMMITTEE FOR LABORATORY ANIMAL RESEARCH
THE GUIDING PRINCIPLES FOR THE CARE AND USE OF ANIMALS FOR SCIENTIFIC PURPOSES

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CHAPTER 1: INTRODUCTION

1.1 Background

1.1.1 The National Advisory Committee For Laboratory Animal Research (NACLAR) was set up in 2003 to recommend guidelines for the care and use of animals for Scientific Purposes in Singapore. The guidelines consist of 3 parts:

(a) the Guiding Principles for the Care and Use of Animals for Scientific Purposes
(b) the Institutional Animal Care and Use Committee Guidelines
(c) the Training Guidelines

and shall be read together to form the NACLAR Guidelines.

1.1.2 The NACLAR Guidelines have been drawn up after a review of the principles and practices adopted in other countries such as Australia, Canada, New Zealand and the United States.

1.1.3 Other useful reference materials have been set out at Appendix I.

1.2 Purpose of the Guiding Principles

1.2.1 The purpose of the Guiding Principles is to:

(a) set out the framework for the NACLAR Guidelines
(b) promote the humane and responsible care and use of animals for Scientific Purposes in accordance with the principles of Replacement, Reduction and Refinement pertaining to the care and use of animals for Scientific Purposes.

1.3 Scope of the Guiding Principles

1.3.1 The Guiding Principles cover all live fish, amphibians, reptiles, birds and non-human mammals.

1.3.2 The Guiding Principles cover all aspects of the care and use of animals for Scientific Purposes including their use in teaching, field trials, environmental studies, research, diagnosis, product testing, and the production of biological products.

1.3.3 The Guiding Principles outline the responsibilities of Institutions, Investigators, Staff and others involved in the care and use of animals for Scientific Purposes.

1 Australian Guidelines of Practice for the Care and Use of Animals for Scientific Purposes by the National Health and Medical Research Council, Australia.
3 Good Practice Guide for the Use of Animals in Research, Testing and Teaching by the National Animal Ethics Advisory Committee, New Zealand.
4 US Government Principles for the Utilisation and Care of Vertebrate Animals Used in Testing, Research and Training; Guide for the Care and Use of Laboratory Animal by National Research Council, USA.
1.4 Framework to meet Purpose of Guiding Principles

1.4.1 The Institutions, CEO, Investigators, Staff and other persons involved in the care and use of animals for Scientific Purposes must of course comply with all current and relevant laws.

1.4.2 Institutions are to self-regulate and take responsibility for meeting the Guiding Principles through the establishment of Institutional Animal Care and Use Committees (IACUC) that in turn act to ensure and verify that the use and care of animals for Scientific Purposes are in accordance with the Guiding Principles.

1.4.3 Investigators are to undertake Projects in accordance with the Guiding Principles and the approvals or directions given by the IACUCs.

1.5 Definitions of terms and abbreviations

**Analgesia:** The temporary abolition or diminution of pain perception.

**Anaesthesia:** A state of controllable, reversible insensibility in which sensor perception and motor responses are both markedly depressed.

**Animal:** All live fish, amphibians, reptiles, birds and non-human mammals.

**Approved Project:** A Project for a Scientific Purpose involving the use of animals which has been approved by an IACUC.

**Attending Veterinarian:** A veterinarian engaged under formal arrangements by an Institution on a full-time or part-time basis to advise on the appropriate care and use of animals and provide adequate veterinary care.

**AVA:** The Agri-Food and Veterinary Authority

**Cachexia:** Severe generalized weakness, malnutrition and emaciation.

**Death as an end-point:** When the death of an animal is the deliberate measure used for evaluating biological or chemical processes, responses or effects.

**Distress:** An acute or chronic response of an animal caused by stimuli that produce biological stress, which manifests as observable, abnormal physiological or behavioural responses.

**Endangered species:** A species listed as endangered in the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES).

**Euthanasia:** The process of inducing a painless death.

**CEO:** The Chief Executive Officer (or person of like standing by whatever name called) of an Institution who is in the position to grant resources to the Institution's IACUC and to enforce the recommendations of the IACUC.

**Housing Facilities:** Buildings, yards, paddocks, grounds in which animals are kept.
**IACUC:** Institutional Animal Care and Use Committee constituted by Institutions.

**Institution:** Any institution, company, organisation, association, body or person that uses or intends to use animals for Scientific Purposes and is licensed to do so.

**Investigator:** A person who proposes or has approval to conduct a Project involving use of animals.

**Manipulation:** Any interference with the normal physiological, behavioural or anatomical integrity of the animal by deliberately depriving it of its usual care or subjecting it to a procedure which is unusual or abnormal; when compared with that to which animals of that type would be subjected to under normal management or practice and which involves exposing it to any parasite, micro-organism, drug, chemical, biological product, radiation, electrical stimulation, or environmental condition or any enforced activity, restraint, nutrition, or surgical intervention.

**Pain:** An awareness of acute or chronic discomfort, occurring in varying degrees of severity, and resulting from injury, disease, or emotional distress, as evidenced by biological or behavioural changes or both.

**Project:** An experiment or series of related experiments that form a discrete piece of work or research for a Scientific Purpose.

**Proposal:** A written outline of a Project put forward for consideration by an IACUC.

**Research Facility:** The site, building or room in which a Project is undertaken with use of animals.

**Scientific Purposes:** The acquisition, development or demonstration of knowledge or techniques in any scientific discipline, including for the purposes of teaching, field trials, environmental studies, research, diagnosis, product testing, and the production of biological products.

**Staff:** All persons involved in the housing, feeding and general care of the animals or who otherwise assist Investigators.

**Tranquillisers:** Drugs which are used to reduce anxiety or produce sedation.

**Wildlife:** All species of animals from free living populations whether indigenous or otherwise, but does not include domestic dogs and cats, horses, cattle, sheep, goats, domestic pigs, poultry and ducks.
CHAPTER 2: GENERAL PRINCIPLES FOR THE CARE AND USE OF ANIMALS FOR SCIENTIFIC PURPOSES

2.1 Matters to be considered

2.1.1 Projects involving animals must be designed and undertaken only after due consideration of their value to human or animal health and the advancement of knowledge on humans or animals weighed against the potential effects on the welfare of the animals.

2.1.2 Investigators and Staff must treat animals as sentient and must regard their proper care and use and the avoidance or minimisation of discomfort, distress, or pain as imperatives.

2.1.3 The approach known as the 3 Rs is to be considered at all times:

(a) Replacement of animals with other methods
(b) Reduction in the number of animals used
(c) Refinement of Projects and the techniques used to minimise impact on animals.

2.2 Replacement of animal experimentation with alternative methods

2.2.1 Alternative methods, such as mathematical models, computer simulation and in vitro biological systems, which replace or complement the use of animals must be considered before embarking on any Project involving use of animals and the alternative methods used wherever appropriate.

2.3 Reduction in the number of animals used

2.3.1 The number of animals used must be the minimum number required to obtain scientifically valid results.

2.3.2 The principle of reducing the number of animals used should not be implemented at the expense of greater suffering of individual animals.

2.3.3 Scientific activities involving the use of animals must not be repeated or duplicated unnecessarily.

2.4 Refinement of Projects and techniques used to minimise impact on animals

2.4.1 The following are to be considered in the selection of animals:

(a) Animals chosen must be of an appropriate species and quality for the scientific activities concerned taking into account their biological characteristics, including behaviour, genetic constitution and nutritional, microbiological and general health status.

(b) Wildlife should be taken from natural habitats only if animals bred in captivity are not available or are unsuitable for the specific Project or experiment concerned.
2.4.2 The following are to be done to minimise impact on animals:

(a) Projects must be designed to avoid pain or distress to animals. If this is not possible, pain or distress must be minimised.

(b) Unless the contrary is established, it must be assumed that procedures that will cause pain or distress in human beings will cause pain or distress in animals.

(c) Procedures with animals that may cause more than momentary or minimal pain or distress should be performed with appropriate sedation, analgesia, or anaesthesia in accordance with accepted veterinary practice.

(d) Surgical or other painful procedures should not be performed on unanaesthetised animals paralysed by chemical agents, unless the animals have undergone appropriate surgical procedure which eliminates sensory awareness. If such agents are used, continuous or frequent intermittent monitoring of paralysed animals is essential to ensure that the depth of anaesthesia is adequate to prevent pain or distress.

(e) At the end of, or, when appropriate, during the procedures, animals that would otherwise suffer severe or chronic pain or distress, that cannot be relieved promptly must be killed humanely.

(f) An animal which develops signs of pain or distress of a kind and degree not predicted in the proposal for the Project, must have the pain or distress alleviated promptly. Alleviation of such pain or distress must take precedence over finishing the Project. If severe pain or distress cannot be alleviated promptly, the animal must be killed humanely.

(g) If it is not possible to use anaesthetics or analgesics in any Project (or part of a Project), the end-point of the Project must be as early as possible to avoid or minimise pain or distress to the animals.

(h) Death as an end-point must be avoided if at all possible. If death as end-point must be used, the Investigator must ensure that the animal's distress or pain is minimised and use appropriate sedation, analgesia, or anaesthesia to relieve the animal's distress or pain.

(i) Projects involving the use of animals must be as brief as possible.

(j) The transportation, housing, feeding, handling of animals should meet species specific needs; including behavioural and biological needs.
CHAPTER 3: ANIMAL HOUSING AND MANAGEMENT

3.1 General

3.1.1 Housing Facilities where animals are kept should be appropriately staffed, designed, constructed, equipped and maintained to achieve a high standard of animal care and should fulfil scientific requirements.

3.1.2 In general, housing and management practices should be designed to provide a high standard of animal care, and should follow acceptable standards of animal welfare for the particular species concerned. In determining the standard of animal care, the criterion should be animal well being rather than the mere ability to survive under adverse conditions such as environmental extremes or high population densities.

3.1.3 The standard of animal care shall be maintained over weekends and holidays.

3.1.4 Emergency care procedures shall be available at all times.

3.2 Outdoor Housing Facilities

3.2.1 These should be compatible with the needs of the species, provide adequate shelter and water, protect the animals from predation, and comply with established farm, zoological garden or general outdoor housing practices.

3.3 Indoor Housing Facilities

3.3.1 Housing Facilities should be compatible with the needs of the species to be housed.

3.3.2 Housing Facilities should be designed and operated to facilitate control of environmental factors, exclude vermin, and limit contamination associated with the housing of animals, delivery of food, water, bedding, and the entry of people and other animals.

3.3.3 Housing Facilities should be maintained in good repair. Walls and floors should be constructed of durable materials with surfaces that can be cleaned and disinfected readily.

3.3.4 Housing Facilities should be kept clean and tidy, and operated to achieve maximum possible hygiene.

3.3.5 There should be a pest control programme to monitor and control vermin.

3.3.6 There should be adequate and appropriate storage areas for food, bedding and equipment.

3.3.7 The choice of detergents, disinfectants and pesticides should be made in consultation with Investigators in order not to contaminate the animal's environment. Deodorants designed to mask animal odours should not be used in Housing Facilities as they may expose animals to volatile compounds which can alter metabolic processes. In addition,
deodorants must not be used as a substitute for good cage and equipment cleaning practices and good ventilation.

3.3.8 Cleaning practices should be monitored on a regular basis to ensure effective hygiene and sanitation. This can include visual inspection, monitoring water temperatures and microbiological testing of surfaces after cleaning.

3.3.9 There should be proper water supply and drainage, as appropriate.

3.3.10 There should be adequate contingency plans to cover such emergencies as flooding and fire, or the breakdown of lighting, heating, cooling or ventilation.

3.3.11 In the interest of disease prevention and general animal welfare, access to the Housing Facilities by unauthorised persons should be restricted.

3.4 Environmental factors

3.4.1 Animals should be provided with environmental conditions which suit their behavioural and biological needs unless contrary conditions are approved by the IACUC for the purposes of a Project.

3.4.2 Air exchange, temperature, humidity, noise, light intensity and light cycles should be maintained within limits compatible with the health and well-being of the animals.

3.4.3 Effective ventilation is essential for the comfort of animals and the control of temperature, humidity, and odours. Ventilation systems should distribute air uniformly and achieve adequate air exchange, both within cages and within a room.

3.4.4 Noxious and potentially harmful waste gases, particularly ammonia, should be kept to a level compatible with the health and comfort of the animals. The adequacy of the ventilation system, design, construction and placement of cages and containers, cage population densities, number of cages in a room, effectiveness of housekeeping and frequency of bedding changes will all influence the level of noxious gases.

3.4.5 Environmental factors potentially affect the welfare of the animals and may affect the results of experiments. The IACUCs and the Investigators should be informed in advance of planned changes to the environmental conditions by the Staff who manage the Housing Facilities.

3.5 Pens, cages and containers and the immediate environment of the animals

3.5.1 Pens, cages and containers should be designed, constructed and maintained to ensure the comfort and well-being of the animals, taking into account the following factors:

(a) species-specific behavioural requirements, including free movement and activity, sleep requirements, privacy, and contact with others of the same species;
(b) species-specific environmental requirements such as lighting, temperature, air quality, appropriate day/night cycles and protection from excessive noise and vibrations;

(c) provision of single housing for animals when it is appropriate for the species or if it is necessary for the purpose of the experiment, e.g. during recovery from surgery or collection of samples;

(d) the need to provide ready access to food and water;

(e) the need to clean the pen, cage or container;

(f) protection from spread of pests and disease;

(g) requirements of the experiments; and

(h) the need to observe the animals readily.

3.5.2 Pens, cages and containers should also:

(a) be constructed of durable, impervious materials;

(b) be kept clean;

(c) be maintained in good repair;

(d) be escape-proof;

(e) protect the animals from climatic extremes;

(f) not cause injury to the animals;

(g) be large enough to ensure the animals' well-being - animals should be able to stretch out when recumbent and to stand upright and stretch;

(h) be compatible with the behavioural needs of the species.

3.5.3 Wire floor cages should not be used unless essential to the Project and then only for brief periods. Animals should have a solid resting area when housed in wire floor cages.

3.5.4 The population density of animals within cages, pens or containers and the placement of these in rooms should be such that acceptable social and environmental conditions for the species can be maintained.

3.5.5 Where it is necessary to individually house social animals, the conditions should be managed so as to minimise the impact of social isolation. Such isolation should be kept to a minimum.
3.5.6 Bedding and litter should be provided as appropriate to the species and should be comfortable, absorbent, dust-free, non-palatable, non-toxic, able to be sterilised (if needed).

3.5.7 Pregnant animals must be provided with nesting materials where appropriate to the species.

3.5.8 Changes in housing conditions may affect the welfare of the animals and the results of experiments. The IACUC and the Investigators should be informed in advance of planned changes to the housing conditions by the Staff who manage the Housing Facilities.

3.6 Enrichment and environmental complexity

3.6.1 Most animals used in Projects are housed in environments dissimilar to their natural habitats. Wherever possible, such animals should be provided with stimuli that promote the expression of normal behaviour appropriate to the species.

3.6.2 Almost all species of animals used in Projects have well defined social structures and prefer to live in groups, although care must be taken to ensure that animals are socially compatible. Individual housing is stressful for such animals, and social isolation should be avoided whenever possible and limited to meet specific Project objectives. The effects of physical isolation should be minimised where possible by:

(a) the use of non-contact communication, whether visual, auditory or olfactory;

(b) the judicious use of mirrors which can be helpful

(c) increasing the complexity of an environment such as with apparatus such as climbing equipment, objects and gnawing sticks as may be appropriate to the species concerned

3.7 Food and water

3.7.1 Animals should receive appropriate, uncontaminated and nutritionally adequate food according to accepted requirements for the species. The food should be in sufficient quantity and of appropriate composition to maintain normal growth of immature animals, normal weight of adult animals or provide for the requirements of pregnancy or lactation.

3.7.2 When animals are fed in groups, there should be sufficient trough space or feeding points to cater to the number and size of animals that eat together at one time so as to avoid undesirable competition for food, especially if feed is restricted.

3.7.3 Uneaten perishable food should be removed promptly unless contrary to the eating habits or needs of the species.

3.7.4 Any alteration to dietary regimes should be gradual.
3.7.5 Food should be stored such as to minimise deterioration of nutritional value and palatability and to prevent contamination by vermin.

3.7.6 Drinking water should be constantly and reliably available, and be clean, fresh and uncontaminated. Water sources should be designed to prevent faecal contamination.

3.7.7 Feed and water equipment should be constructed of materials that can be easily and effectively cleaned.

3.8 Routine husbandry procedures

3.8.1 Husbandry procedures such as clipping coats and nails must be performed by competent personnel and in accordance with acceptable practices to ensure that welfare of the animals is not compromised.

3.9 Identification of animals

3.9.1 Animals should be identified by a method such as tattoo, neck-band, individual tag, electronic numbering device, physical mark, or by a label or marking attached to the cage, container, pen, yard or enclosure in which the animals are kept.

3.9.2 The method of identification should be reliable and done such as to cause the least stress or injury possible.

3.10 Disposal of animal carcasses and waste

3.10.1 Appropriate provision must be made for prompt and sanitary disposal of animal carcasses and waste material in accordance with current laws and any other guidelines or requirements of the National Biosafety Committee, the Ministry of Health and the National Environmental Agency.

3.11 Admission of new animals

3.11.1 Institutions should have quarantine facilities for new animals to be housed separately from existing animals in the Housing Facilities and Research Facilities.

3.11.2 New animals should be immediately inspected by a veterinarian or a person designated by a veterinarian and then placed in quarantine. The new animals should be evaluated in terms of their:

(a) health;

(b) suitability for proposed Projects.

(c) The quarantine period should be sufficient to allow the animals to acclimatise to the Housing Facility and the Staff; provided that for imported new animals, the duration of quarantine and site of quarantine will be as determined by the AVA.
3.11.3 New animals in quarantine are not to be used for any Project but they may be bred.

3.11.4 New animals that do not adapt satisfactorily to their new environment should not be kept.

3.12 Minimum standards

3.12.1 Apart from the general principles set out above, detailed minimum standards that must be met for housing, environmental conditions and other physical facilities are set out in Appendix II.

3.12.2 Where minimum standards have not been set out, judicious extrapolation from existing knowledge and consultation with veterinarians, laboratory animal specialists and other relevant individuals should be done to arrive at housing and environmental setups that will be conducive to the well being of the animals.

3.13 Non-human Primates

3.13.1 Non-human primates are recognised as having highly developed mental and emotional capacities, more so than most other animals. In many ways, they are similar to humans and exhibit many similar external manifestations of emotions such as facial expressions, vocalisations, postures, gestures, and reactions. They have been known to react in ways similar to humans under comparable situations. Investigators, Attending Veterinarians and Staff should familiarise themselves with the references and information in Appendixes I and III.
CHAPTER 4: PROCUREMENT AND TRANSPORT OF ANIMALS

4.1 Animals from a local source

4.1.1 All animals obtained locally must be from a licensed or otherwise legally permitted source.

4.1.2 For animals such as dogs, cats and farm animals such as pigs, sheep, goats and cattle, the animals should be properly identified and the supplier must have appropriate papers to prove legal ownership of the animals.

4.1.3 Under the Wild Animals & Birds Act, all wild animals are protected by law except those listed in the Schedule. A permit must be obtained from the AVA to kill, take or keep any wild animal.

4.2 Animals from an overseas source

4.2.1 No animal is to be imported without a permit from the AVA under the Animals & Birds Act.

4.2.2 The source of the animal must be recognised by the exporting country as a legitimate supplier of the particular species of animal.

4.2.3 The import and use of genetically modified (GM) organisms and animals shall be in accordance with the guidelines set out by the Genetic Modification Advisory Committee.

4.3 Particular considerations in procurement of endangered animals

4.3.1 No Endangered animal is to be imported without proper CITES certificates and export permits from the exporting country and import permits from AVA, as required under the Endangered Species (Import and Export) Act.

4.3.2 An Endangered animal must not be used in Projects unless the Project concerned will be of direct benefit to the conservation of that species or a closely related species and will not further endanger the species.

4.4 Particular considerations in procurement of wildlife

4.4.1 Animals are to be taken from natural habitats only if animals bred in captivity are not available or unsuitable for the specific scientific activity.

4.4.2 Capture and restraint is stressful to animals. Strategies must be employed to minimise distress during capture and disruption of the colonies from which they are taken. There must be careful choice of suitable capture techniques, skilled persons must be used, and appropriate and safe enclosures or caging must be used. Animals must be monitored for signs of distress following capture and appropriate measures taken to minimise the
stress. Any animal suffering from capture-induced trauma should receive treatment without delay.

4.5 Transport of animals

4.5.1 Transportation can cause distress due to confinement, movement, noise and changes in the environment and personnel. The extent of any distress will depend on the animals' health, temperament, species, age, sex, the number travelling together and their social relationships, the period without food or water, the duration, the mode of transport, environmental conditions, (particularly extremes of temperature) and the care given during the journey.

4.5.2 The animal must be provided with adequate shelter, food and water and shall have sufficient space to lie down, stand and stretch.

4.5.3 Animals must be transported under conditions which are appropriate to the species and which meet standards generally adopted in veterinary and laboratory animal medicine so as to ensure that the welfare of the animals is not unduly compromised. Potential sources of distress should be identified and steps taken to avoid or minimise their effects on the animals.

4.5.4 Containers must be escape and tamper proof and there should be adequate nesting or bedding material where appropriate.

4.5.5 Animals should be protected from sudden movements and extremes of climate.

4.5.6 Institutions must ensure that animals are received by a responsible person and transferred to appropriate accommodation without delay.

4.5.7 The transfer of GM animals between approved institutional containment facilities shall be in accordance with the guidelines set out by the Genetic Modification Advisory Committee.

4.5.8 Transport by air must be in accordance with IATA (International Air Transport Association) regulations or other applicable regulations.
CHAPTER 5: STAFF AT HOUSING AND RESEARCH FACILITIES

5.1 Staff

5.1.1 A very important factor ensuring high standards of animal care is sufficient number of well-trained, knowledgeable and committed Staff. Staff working with animals should be appropriately instructed in the care and maintenance of those animals. They should appreciate their role in facilitating the well-being of the animals and the successful outcome of Projects.

5.1.2 Staff should be instructed in how to recognise at an early stage, changes in animal behaviour, performance and appearance.

5.1.3 New Staff should be appropriately instructed in their duties immediately.

5.1.4 Institutions must encourage and promote formal training of all Staff in animal science or technology.

5.2 Staff-in-charge

5.2.1 The Staff with overall supervision over general animal care is the Staff-in-charge. The Staff-in-charge must have the appropriate veterinary or animal care qualifications or experience in handling of the species concerned.

5.2.2 The Staff-in-charge must:

(a) be responsible for the management of the day-to-day care of the animals, supervising the work of other Staff, and acting as liaison between Investigators and Staff;

(b) contribute to the development and maintenance of the Institution's animal care policies and procedures;

(c) ensure that there is reliable monitoring of the well-being of all animals by other Staff, and be knowledgeable regarding signs of pain, distress and illness specific to each species housed (Note: After animals are allocated to a Project, the Investigator has primary responsibility for ensuring adequate monitoring of the animals' well-being);

(d) ensure that ill or injured animals are treated promptly and any cause of death investigated if the animal dies unexpectedly;

(e) ensure that Staff are provided with appropriate protective clothing, maintain high standards of personal hygiene and do not eat, drink or smoke in animal areas;

(f) document procedures used in the management and care of animals. These procedures should take into account the requirements of the species and the experiments being conducted. The procedures include transport, quarantine and
disposal of animals, routine husbandry, prevention, diagnosis and treatment of disease, monitoring of health status and genetic constitution, and physical environmental factors. These procedures should be made known to all Staff involved in the care and use of the animals and should be reviewed regularly.

(g) maintain a regular schedule of pen, cage, equipment and sanitisation to ensure that potential pathogens are kept at minimum levels in the environment.

(h) ensure that adequate records are maintained of:

(i) the source, care, allocation, movement between locations, use and disposal of all animals, and development of any diseases;

(ii) the fertility, fecundity, morbidity and mortality in animal breeding groups, in order to monitor the management of the groups, and assist in the detection of the origin and spread of disease; and

(iii) the health status, genetic constitution and the physical environment of the animals, when definition of these is required.

(i) ensure that records maintained must be made available to Investigators and IACUCs.

(j) ensure that Investigators are informed of any changes to the conditions under which animals are held as these may affect their experiments.

5.3 Training for Staff

5.3.1 The minimum training requirements for Staff and other training that is recommended are set out in the Training Guidelines.
CHAPTER 6: VETERINARY CARE

6.1 Attending Veterinarian

6.1.1 Each Institution shall have an Attending Veterinarian for its Housing and Research Facility(ies). The Attending Veterinarian shall advise on the appropriate care and use of animals and provide adequate veterinary care.

6.1.2 The Attending Veterinarian must be engaged under formal arrangements. The Attending Veterinarian can however be engaged on a part-time or full-time basis.

6.1.3 The formal arrangements must include a written program of veterinary care to be provided. In the case of a part-time Attending Veterinarian, the formal arrangements must also set out regularly scheduled visits to the Housing and Research Facility(ies) of the Institution.

6.1.4 If the Attending Veterinarian is on leave or will be otherwise unavailable to provide any general or emergency veterinary care, interim arrangements must be made to ensure that there is always ready access to veterinary care.

6.1.5 The Attending Veterinarian or other veterinarians engaged on a full-time, part-time or ad-hoc basis must be persons with qualifications in veterinary science who are licensed by the AVA.

6.2 Components of veterinary care

6.2.1 The Staff-in-charge and his Staff managing the animals, as well as the Investigators, must have ready access to veterinary care for the animals at all times.

6.2.2 Institutions must establish and maintain adequate veterinary care, overseen by the Attending Veterinarian, that include:

(a) The availability of appropriate facilities, personnel, equipment, and services to comply with the Guiding Principles.

(b) The use of appropriate methods to prevent and control diseases (e.g. vaccination and other prophylaxis, disease monitoring and surveillance, quarantine and isolation), diagnose, and treatment of diseases and injuries.

(c) The availability of 24 hour emergency, weekend and holiday care.

(d) Daily observation of all animals to assess their health and well-being: The daily observation of animals may be accomplished by someone other than the Attending Veterinarian provided that there is a mechanism of direct and frequent communication between the Attending Veterinarian and the Staff concerned so that timely and accurate information on problems of animal health, behaviour, and well-being is conveyed to the Attending Veterinarian.
(e) Guidance to Investigators and other personnel involved in the care and use of animals regarding handling, immobilisation, anaesthesia, analgesia, tranquillisation, and euthanasia.

(f) Adequate pre-procedural, surgical, and post-procedural care in accordance with current established veterinary medical and nursing procedures.

6.2.3 The IACUC’s may direct that certain Manipulations or other tasks related to the care and use of animals shall be performed only by the Attending Veterinarian or a veterinarian.

6.3 Training for Veterinarians

6.3.1 The minimum training requirements for veterinarians and other training that is recommended are set out in the Training Guidelines.
CHAPTER 7: RESPONSIBILITIES OF INSTITUTIONS AND THE INSTITUTIONAL ANIMAL CARE AND USE COMMITTEES (IACUC)

7.1 Overview

7.1.1 The ultimate responsibility for ensuring compliance with the Guiding Principles and legislative mandates for the care and use of animals for Scientific Purposes rests with the CEO.

7.1.2 The CEO must establish one or more IACUCs to evaluate the care and use of animals. IACUCs are to report to the CEO, which is then responsible for acting on the IACUC’s recommendation.

7.2 Responsibilities

7.2.1 Each Institution shall, through the CEO,:

(a) establish one or more IACUCs

(b) ensure, through the IACUC, that the care and use of animals for Scientific Purposes comply with the Guiding Principles and relevant legislation.

(c) provide the IACUC with facilities, powers and resources to fulfil its terms of reference and responsibilities. Resources include the purchase of educational materials, access to training courses for IACUC members and access to administrative assistance.

(d) refer to the IACUC for comment on all matters which may affect animal welfare including the building and modification of Housing and Research Facilities;

(e) review annually the operation of the IACUC. This review includes an assessment of the annual report from the IACUC and a meeting with IACUC Chairman. This annual review of the IACUC is to help ensure that the IACUC is adjusting its operations in light of their experiences and circumstances, and according to continuing developments in care and use of animals for scientific purposes.

(f) respond effectively to recommendations from the IACUC to ensure that the facilities for the housing, care, use and disposal of animals are appropriate for the maintenance of the health and well being of the animals.

(g) respond promptly and effectively to recommendations from the IACUC to ensure that all care of the animals and use of animals for Scientific Purposes remains in accord with the Guiding Principles and relevant legislation.

(h) provide all relevant Staff with details of the Institution’s policy on the care and use of animals, and the relevant legal requirements.

(i) establish grievance procedures for IACUC members and Investigators who are dissatisfied with IACUC procedures or decisions.
(j) ensure that the IACUC develops guidelines for animal care and use within the research facility and that these are implemented, including those which ensure that emergencies are detected promptly and dealt with effectively.

(k) ensure that there are adequate numbers of Staff to care for the animals and that they are appropriately trained and instructed.

(l) ensure that appropriate veterinary care is available for the animals and that there is access to diagnostic services.

(m) ensure adequate record keeping and annual reporting to AVA.

(n) ensure that Investigators and personnel have appropriate qualifications or experience for conducting procedures on animals. Adequate arrangement shall be provided for in-service training, including the proper and humane care and use of the animals.

(o) ensure that appropriate corrective action is taken after the withdrawal of approval for a Project by the IACUC and, on request, to report on the corrective action taken with a full explanation to AVA and any funding agency of the Institution.

7.3 Membership of IACUC

7.3.1 An IACUC, shall be comprised of at least 5 persons, including 4 persons, each of which is appointed to represent one and only one of each of the following 4 categories:

(a) A veterinarian with training or experience in laboratory animal science and medicine and who has experience in the species of animals used. Where veterinarians do not have this experience, they must familiarise themselves with the biology and clinical characteristics of the species of animals used.

(b) A person with substantial recent and appropriate experience in the use of animals for scientific purposes.

(c) A person not affiliated in any way with the Institution and not a member of the immediate family of a person who is affiliated with the Institution; who represents the general community interests in the proper use and care of animals for scientific purposes and is not a user of animals for any scientific purposes. Payment of reimbursement to cover reasonable transport costs is permissible without jeopardising a member’s non-affiliated status.

(d) A person whose primary concerns or interests are in a nonscientific area (e.g. ethicist, lawyer, clergy).

7.3.2 The Attending Veterinarian engaged for the Institution shall be appointed a member of the IACUC.
7.3.3 The CEO is not to be appointed a member of the IACUC.

7.3.4 The Chairman of the IACUC shall be appointed by the CEO.

7.4 Functions of the IACUC

7.4.1 IACUCs are to:

(a) Review, at least once every 6 months, the care and use of animals for Scientific Purposes using the Guiding Principles as a basis for evaluation. The review must include the procurement, transportation, production, housing, care, use and disposal of animals.

(b) Inspect the Housing and Research Facility(ies), at least once every 6 months, using the Guiding Principles as a basis for evaluation. The inspection must also cover satellite facilities where animals are housed for more than 24 hours.

(c) Prepare reports of its evaluation and to submit the same directly to the CEO. The reports shall be maintained by the Institution and made available to AVA and any funding agency of the Institution upon request. The reports shall be reviewed and signed by a majority of the IACUC members and must include the following:

(i) minority views.

(ii) a description of the nature and extent of compliance with the Guiding Principles, identify specifically any departures from the Guiding Principles, and state reasons for each departure.

(iii) distinguish significant deficiencies from minor deficiencies. A significant deficiency is one that is or may be a threat to the health and safety of the animals. The reports shall contain a reasonable and specific plan and schedule for correcting each deficiency.

(d) Determine the best means of conducting an evaluation of the care and use of animals, provided no members wishing to participate in any evaluation is excluded.

(e) Inviting ad hoc consultants to assist in conducting the evaluation, but IACUC remains responsible for the evaluation and report.

(f) Review and approve, subject to modification, or reject proposals for Projects involving the use of animals for Scientific Purposes. This includes proposals to significantly change the care and use of animals involved in on-going Projects. IACUC should approve only those proposals for which animals are essential and which conform to the Guiding Principles, taking into consideration ethical and welfare aspects as well as scientific or educational value.

(g) Formally withdraw approval for any on-going Project or to suspend it if the IACUC determines that the Project is not being conducted in accordance with the description provided by the Investigator and approved by the IACUC.
(h) Make recommendations to the CEO regarding any aspects of the programmes, facilities, or personnel training at the Housing and Research Facility(ies).

(i) Review and investigate concerns involving the care and use of animals including public complaints or reports of noncompliance from Staff or Investigators.

(j) Authorise the treatment or humane killing of any animal.

(k) Maintain a register of Approved Projects.

(l) Approved Projects of long duration and the long-term continuing use of individual animals shall be reviewed at least annually by the IACUC.

(m) Perform all other duties required by the Guiding Principles.

7.5 IACUC considerations in reviewing Projects involving animals

7.5.1 In general, written proposals submitted to the IACUC on Proposed Projects or a significant change in an on-going Project involving animals must contain sufficient information to satisfy the IACUC that the proposed use of animals is justified and complies with the principles of Replacement, Reduction and Refinement.

7.5.2 The IACUC shall consider whether proposed Projects or significant changes in ongoing Projects meet the following requirements before granting approval for proposed Projects or significant changes to on-going Projects:

(a) Procedures involving animals will avoid or minimise discomfort, distress, and pain to the animals. The proposal must give a description of procedures designed to assure that discomfort, distress or pain to animals will be limited to that which is unavoidable for the conduct of scientifically valuable research.

(b) The Investigator has considered alternatives to procedures that may cause more than momentary or slight pain or distress to the animals, and has provided a written narrative description of the methods and sources used to determine that alternatives were not available.

(c) The Investigator has provided written assurance that the activities do not unnecessarily duplicate previous experiments.

(d) The investigator has provided a description and justification for the end-points of the experiments.

(e) Procedures that may cause more than momentary or slight pain or distress to the animals will:

(i) Be performed with appropriate sedatives, analgesics or anaesthetics, unless withholding such agents is justified for scientific reasons justified in writing, by the Investigator and will continue for only the necessary period of time;
(ii) Involve, in their planning, consultation with the Attending Veterinarian;

(iii) Not include the use of paralytics without anaesthesia;

(f) Animals that would otherwise experience severe or chronic pain or distress that cannot be relieved will be humanely killed as soon as possible.

(g) Personnel conducting procedures on the species being maintained or studied will be appropriately qualified and trained in those procedures.

(h) Projects that involve surgery include appropriate provision for pre-operative and post-operative care of the animals in accordance with established veterinary medical and nursing practices, including all survival surgery will be performed using aseptic procedures and aseptic techniques.

(i) No animal will be used in more than one major operative procedure unless justified for scientific reasons by the Investigator, in writing.

(j) Identification of the species and the approximate number of animals to be used;

(k) The rationale for involving animals and the appropriateness of the species and numbers of animals to be used.

(l) A complete description of the proposed use of the animals.

(m) A description of any euthanasia method to be used.

7.6 IACUC Approval Process

7.6.1 Each member of the IACUC shall be provided with a full copy of the any proposal submitted by Investigators.

7.6.2 Any member of the IACUC may call for a full Committee review of a proposal.

(a) If full Committee review is not requested for a proposal, at least one member of the IACUC, designated by the Chairman and qualified to conduct the review, shall review the proposal, and shall have the authority to approve, require modifications to, or request full Committee review of any part of the proposal.

(b) If full Committee review is requested for a proposal, approval may be granted only after a review, at a convened meeting of a quorum of the IACUC. A quorum consists of at least 50% of the members of the IACUC and decisions made by the quorum shall be by a majority vote.

7.6.3 No member may participate in the IACUC review or approval of a proposal in which that member has a conflict if interest such as where the member a competing Project.
7.6.4 The IACUC may invite consultants to assist in the review of complex issues arising out of its review of proposals. Consultants may not approve or withhold approval of a proposal, and may not vote with the IACUC.

7.6.5 The IACUC shall notify Investigators and the Institution in writing of its decision to approve or withhold approval of the proposed Project involving the use of animals, or of modifications required to secure IACUC approval. If the IACUC decides to withhold approval of an activity, it shall include in its written notification a statement of the reasons for its decision and give the Investigator an opportunity to respond in person or in writing. The IACUC may reconsider its decision in light of further information provided by the Investigator.

7.7 IACUC Records

7.7.1 The CEO shall maintain the following IACUC records:

(a) Minutes of IACUC meetings, including records of attendance, activities of the Committee, and Committee deliberations.

(b) Records of proposals involving animals, including proposals for significant changes in on-going activities involving animals, and whether IACUC approval was given or withheld.

(c) Records of all IACUC reports and recommendations (including minority views).

7.7.2 All records and reports shall be maintained for at least three years. Records that relate directly to a Project, including proposals for significant changes in ongoing activities, reviewed and approved by the IACUC shall be maintained for the duration of the Project and for an additional three years after completion of the Project.

7.7.3 All records shall be available for inspection and copying by AVA and funding agency representatives.

7.8 Annual report by the CEO

7.8.1 The CEO shall prepare and sign an annual report covering the period 1 January to 31 December of each year. The information in the annual report shall include the following:

(a) Assurance

(i) Assure that professionally acceptable standards governing the care, treatment, and use of animals, including appropriate use of anaesthetics, analgesic, and tranquillising drugs were maintained or used at the Housing and Research Facility(ies).

(ii) Assure that each Investigator has considered alternatives to procedures which cause pain or distress to animals.
(iii) Assure that the Guiding Principles are being complied with by Investigators and Staff, and that it has required that exceptions to the Guiding Principles be specified and explained by the Investigators and approved by the IACUC. A summary of all such exceptions must be attached to the annual report. In addition to identifying the IACUC-approved exceptions, this summary must include a brief explanation of the exceptions, as well as the species and number of animals affected.

(b) Background information and statistics

(i) State the composition of the IACUC.

(ii) State the name(s) of attending veterinarian(s) and whether they are engaged on a full-time or part-time basis.

(iii) State the location of all facilities where animals are housed, used or held for scientific activities.

(iv) State the common names and the numbers of animals used for scientific activities at each facility involving no pain, distress, or use of pain-relieving drugs. Routine procedures (e.g., injections, tattooing, blood sampling) should be reported with this group.

(v) State the common names and the numbers of animals used for scientific activities at each facility involving accompanying pain or distress to the animals and for which appropriate anaesthetics, analgesic, or tranquillising drugs were used.

(vi) State the common names and the numbers of animals used for scientific activities at each facility involving accompanying pain or distress to the animals and for which the use of appropriate anaesthetics, analgesic, or tranquillising drugs would have adversely affected the procedures, results, or interpretation of the research, experiments, surgery, or tests. An explanation of the procedures producing pain or distress in these animals and the reasons such drugs were not used shall be attached to the annual report.

(vii) State the common names and the numbers of animals being bred, conditioned, or held for scientific activities at each facility but not yet used for such purposes.

(viii) Indicate the dates of reviews and inspections by IACUC.

(ix) State the significant deficiencies identified in the 6-monthly reviews and inspections by the IACUC, and whether the actions taken to correct these deficiencies were as planned and scheduled in the IACUC reports. A significant deficiency is one that is or may be a threat to the health and safety of the animals and which is classified as such by the IACUC in its reports.
7.9 **Training for IACUC Members**

7.9.1 The minimum training requirements for IACUC members and other training that is recommended are set out in the Training Guidelines.

7.10 **Detailed Guidelines for IACUCs**

7.10.1 Further and detailed guidelines on the operation of the IACUC and the standards that the IACUC should set are outlined in the Guidelines for Institutional Animal Care and Use Committee.
CHAPTER 8: RESPONSIBILITIES OF INVESTIGATORS

8.1 General

8.1.1 Investigators who use animals for Scientific Purposes have a moral and professional obligation to treat the animals humanely and consider their welfare when planning Projects and conducting experiments.

8.1.2 Investigators have direct and primary responsibility for all matters related to the welfare of the animals under their control, including the general husbandry and housing of those animals as well as the specific experimental Manipulations. They must act in accordance with the Guiding Principles. The responsibility of Investigators extends over all facets of the care and use of animals in Projects approved by the IACUC, beginning from the time the animal is allocated to the Approved Project to the end and disposal of the animal. Investigators are responsible for the standard of animal care and use by all other persons involved in the Approved Project. They should ensure that the extent of supervision is compatible with the level of competence of each person and the responsibilities they are given.

8.1.3 It is recognised however that in many Research Facilities, the responsibility of managing routine animal husbandry is delegated to Staff on a daily basis. Protocols must be in place for the Staff-in-charge to effectively communicate with the Investigator regarding animal welfare and research concerns.

8.1.4 Investigators have a legal and ethical responsibility to ensure that animals on study are Manipulated using medical and surgical techniques, which are consistent with the principles of good practice and scientific knowledge in laboratory animal veterinary medicine. Investigators should consult with veterinarians whenever adverse effects occur, in order that standard veterinary care and treatment regimes are promptly implemented. This responsibility parallels the public’s duty of care to seek veterinary management of any sick animals in their charge.

8.2 IACUC approval

8.2.1 Before any Project begins, Investigators must submit a proposal to the IACUC to demonstrate that the Project will comply with the Guiding Principles. Moreover, the Investigators must satisfy the IACUC of their competence to conduct the techniques described in the experiment.

8.2.2 Investigators must not begin experiments before written IACUC approval is obtained and must adhere to any requirements of the IACUC.

8.2.3 Investigators may obtain and hold for acclimatisation or adaptation species which are not normally readily available, prior to formal IACUC approval, provided that their use for Scientific Purposes does not commence until approval is given. However, species which can only be procured with special permission from AVA must not be procured before IACUC approval of the Project is granted.

8.2.4 Investigators must inform the IACUC when each Project is completed or discontinued; and the outcome of each Project.
8.3 Planning projects

8.3.1 Choice of Animal

(a) Investigators must ensure that the choice of species is appropriate for the purpose of the Project.

(b) Requirements for known genetic constitution, freedom from specific diseases, documented health, nutritional and environmental histories, and other relevant factors should be taken into account.

(c) When the definition of the biological status of animals is necessary, Investigators must ensure that the supplier can provide adequate proof that all requirements can be met.

(d) Where relevant, species and individual animals should be chosen on the basis that the proposed experiments will result in the least pain and distress. In making this decision, all aspects of the biological nature of the animals, including their behavioural characteristics and cognitive development, should be taken into account.

8.3.2 Monitoring

(a) Investigators should ensure that all intensively managed animals are observed daily (or more frequently if circumstances require it) to assess their health and welfare.

(b) Investigators should ensure that satisfactory arrangements are made for contacting them and other responsible persons in the event of emergencies.

8.3.3 Record-keeping

(a) Investigators should ensure that their experimental research records include details of animal husbandry routine, environmental conditions, and other non-experimental variables which may potentially affect the study. Records must meet the statistical reporting requirements.

8.3.4 Consultation

(a) Investigators should consult other experienced scientists, veterinarians, or laboratory animal, livestock or wildlife specialists when necessary.

(b) The Attending Veterinarian must be consulted on the following in the planning of any practice or procedure which can cause pain to animals:

(i) the use of tranquillisers, analgesics, and anaesthetics

(ii) pre-surgical and post-surgical care by laboratory workers, in accordance with established veterinary medical and nursing procedures

(iii) the use of paralytics without anaesthesia
(iv) the withholding of tranquillisers, anaesthesia, analgesia, or euthanasia when scientifically necessary.

(c) The Attending Veterinarian must be consulted on the use of appropriate euthanasia.

8.3.5 Checklist

(a) When planning is completed, the investigator should re-check the protocol to ensure that the following points have been adequately addressed:

(i) Is the Project justified ethically and scientifically?

(ii) Can the aims be achieved without using animals?

(iii) Are there any additional experiments that could be included which would reduce the number of animals used?

(iv) Are suitable holding facilities and competent Staff available?

(v) Have all Staff been informed of the planned experimental and other procedures?

(vi) Has the most appropriate species of animal been selected?

(vii) Is the biological status (genetic, nutritional, microbiological, general health) of the animals appropriate?

(viii) the environmental conditions (including caging or pen type, noise, photoperiod, temperature, humidity, ventilation, density of housing and social structures) appropriate?

(ix) Are the experiments designed so that statistically valid results can be obtained or the educational objectives achieved using the minimum necessary number of animals?

(x) If the scientific activity could cause the animals any pain or distress, what will be done to minimise or avoid this?

(xi) What arrangements will be made to monitor the animals adequately, in terms of their general health and welfare and response to manipulation?

(xii) If any of the experiments have been performed previously, why should they be repeated?

(xiii) If any animals are to be used repeatedly, what will be done to minimise the cumulative effects of such use?

(xiv) Are there any permits that must be obtained for the importation, capture, use, destruction or release of the animals?
8.4 Conduct of experiments

8.4.1 Limiting pain and distress

(a) Pain and distress cannot always be adequately evaluated in animals and investigators must therefore assume that animals experience pain in a manner similar to humans. Decisions regarding their welfare in experiments must be based on this assumption unless there is evidence to the contrary.

(b) The Investigator should anticipate any potentially adverse effects of a manipulation and take all possible steps to avoid or minimise pain and distress. These steps should include:

(i) choosing the most appropriate and humane method for the conduct of the experiment;

(ii) ensuring the technical skills and competence of all persons involved in animal care and use;

(iii) use of pre-emptive analgesia when pain is anticipated;

(iv) ensuring that animals are adequately monitored for evidence of pain and distress;

(v) developing a plan to manage any adverse effects of a manipulation;

(vi) acting promptly to alleviate pain and distress;

(vii) using anaesthetic, analgesic and tranquillising agents appropriate to the species and the experimental purposes;

(viii) developing study endpoints that minimise pain and distress;

(ix) conducting projects over the shortest time practicable; and

(x) using appropriate methods of euthanasia.

(c) The use of local or general anaesthetics, analgesics or tranquillisers must be appropriate to the species, and should meet the criteria generally accepted in current medical, veterinary or laboratory animal practice.

(d) Experiments which are liable to cause pain of a kind and to a degree for which anaesthesia would normally be used in medical or veterinary practice must be carried out under anaesthesia.

(e) Distress can sometimes be avoided or minimised by non-pharmacological means. For example, before an experiment begins, animals should be appropriately conditioned to the experimental environment and procedures and familiarised with the animal care staff.
(f) The monitoring of animals during and after experiments must at all times be adequate to prevent the occurrence of pain or distress, or allow prompt alleviation. Appropriate nursing procedures to minimise pain and distress and promote the well being of the animals should be provided.

(g) If animals develop signs of severe pain or distress despite the precautions outlined above, they should have the pain or distress alleviated promptly or be killed humanely and without delay if the pain cannot be alleviated. Veterinary consultants involved in the animal care programme should be informed immediately. Alleviation of such pain or distress takes precedence over continuing or finishing the experiment. If in doubt, investigators must always seek a professional veterinary opinion before continuing an experiment.

(h) Unexpected deaths occurring during a project must be properly investigated by a veterinarian or other qualified person who will determine the cause and initiate remedial action. If the deaths are due to manipulations, these must cease. The IACUC must be notified of all unexpected deaths and the project protocol resubmitted with appropriate modification.

8.4.2 Animal welfare monitoring of pain or distress

(a) Investigators should be familiar with the normal behaviour patterns of the animal species chosen, be knowledgeable of signs of pain or distress specific to that species, and must monitor their animals for these signs.

(b) Deviations from normal behaviour patterns are often the first indications that animals are experiencing pain or distress. Any changes in patterns of sleeping, feeding, drinking, grooming, exploratory behaviour, performance in learning or discriminatory tasks, reproduction or social behaviour should be noted, assessed and acted on if appropriate.

(c) Animals must be monitored appropriately for clinical signs of acute pain or distress. These may include one or more of the following:

(i) aggressive and/or abnormal behaviour (some species may become unduly submissive);
(ii) abnormal stance or movements;
(iii) abnormal sounds;
(iv) altered cardiovascular and/or respiratory function;
(v) abnormal appetite;
(vi) rapid decline in body weight;
(vii) altered body temperature; vomiting and
(viii) abnormal defecation or urination.

(d) Indicators of sustained pain or distress may include:

(i) loss of body weight or failure to gain weight;
(ii) failure to display normal grooming behaviour;
(iii) failure to thrive;
(iv) impaired reproductive ability; and
(v) reduced resistance to disease.

(e) Animal welfare monitoring score sheets can be useful for documenting the observations and collection of data listed above. General observations for signs of pain or suffering in the animal should be conducted daily or more often as needed during the immediate post-operative period for surgical manipulations. Sample monitoring sheets are set out at Appendix IV.

8.4.3 Study endpoints

(a) The Investigator should develop humane study endpoints when preparing a project application.

(b) Death as an endpoint is generally ethically unacceptable and should be fully justified. When death as an endpoint cannot be avoided, the experiments must be designed to result in the deaths of as few animals as possible.

(c) Best practice indicates that endpoints earlier than the moribund condition should always be used. For the purpose of the Guiding Principles, animals can generally be considered to be in a moribund state when:

(i) they have lost more than 20% of their pre-study body weight; or
(ii) have lost more than 10% in 24hrs; or
(iii) when a tumour grows to more than 10% of the animal’s weight; or
(iv) abscesses develop; or
(v) when body temperature falls below a pre-set level (as determined by pilot studies which indicate that the level set is predictive of death); or
(vi) when animals self-mutilate limbs and feet; or
(vii) when animals become obviously incapacitated and are not able to eat, rest or perform normal activity.
(d) All animals found in a moribund state must be euthanised unless there is specific justification to do otherwise.

8.4.4 Repeated use of animals in experiments

(a) Individual animals should not be used in more than one experiment, either in the same or different projects, without the express approval of the IACUC. However, it is noted that appropriate re-use of animals may reduce the total number of animals used in a project, result in better design of experiments, and reduce stress or avoid pain to other animals.

(b) When approving experiments involving the re-use of animals, the IACUC should be satisfied of the following:

(i) none of the procedures cause the animals pain or distress; or
(ii) the second and subsequent studies produce little or no pain or biological stress to the animals (e.g. modifying diet, taking a succession of blood samples, repeated non-invasive recording procedures).

(c) Animals that are used in more than one experiment should be permitted to recover fully from the first experiment before the subsequent experiment is performed.

8.4.5 Duration of experiments

(a) Experimental duration should be limited to that just sufficient to achieve the objective of the experiment.

(b) Experiments, particularly those which involve any pain or distress, should be as brief as practicable. IACUC approval must be sought for the continued long-term use of individual animals. The decision to continue must be based on the well being of the animal and the absence of aversion to the experimental situation.

8.4.6 Handling and restraining animals

(a) Animals should be handled by competent individuals trained in methods that cause minimal distress and injury.

(b) The use of restraint devices is sometimes essential for the welfare of the animal and safety of the handler. Restraint devices should be used to the minimum extent, for the minimum period required to accomplish the purpose of the experiment, and be appropriate for the animal.

(c) Tranquilisers or anaesthetics may aid restraint but may prolong recovery from the procedure. When these agents have been used, recovery of the animals should be monitored.
(d) Periods of prolonged restraint should be avoided. Where animals are in prolonged restraint, consideration should be given to their biological needs, including their behavioural requirements and the need for appropriate exercise. They should be monitored regularly by a veterinarian or other qualified person not participating in the Project. If any ill effects are apparent, the animal should be removed from the restraint or the method modified.

8.4.7 Completion of Projects

(a) Upon completion of the Project, animals should be returned promptly to either normal husbandry conditions or, if appropriate and permitted, to their natural habitat, or be euthanised (if appropriate under the Guiding Principles).

(b) Where practicable, Investigators should share with other Investigators tissue from animals being euthanised.

8.4.8 Euthanasia

(a) When it is necessary to kill an animal, humane procedures must be used. These procedures must avoid distress, be reliable and produce rapid loss of consciousness without pain until death occurs.

(b) The appropriate means must be readily at hand.

(c) The procedures should be performed only by persons who have demonstrated to a veterinarian or designated by a veterinarian that they are competent in the methods to be used.

(d) Animals should be killed in a quiet, clean environment, and preferably away from other animals.

(e) There must be no disposal of the carcass until death is established.

(f) Dependent neonates of animals being killed must also be killed or provision made for their care.

(g) When fertilised eggs are used, the method of disposal must ensure the death of the embryo.

8.4.9 Post-Mortem Examination

(a) A post-mortem examination should be performed when animals die unexpectedly. Investigators should consider the value of a post-mortem examination for such animals. Post-mortem evaluation may identify one or more non-experimental variables which could compromise the remaining research subjects.

(b) Records of post-mortem examination should be kept. Records of digital images of post-mortem findings are encouraged.
8.4.10 Pre-operative planning

(a) Surgical success can be improved by careful attention to the following.

(i) The use of healthy, disease-free animals will ensure more reliable research data. Investigators should consult the institutional veterinarian or other qualified person to assist in obtaining such animals.

(ii) Pre-operative physical examination can often identify potential problems, such as increased anaesthetic risk, which may compromise the surgical procedure. Sick animals should be rejected.

(iii) Pre-surgical fasting should be considered where appropriate for the species to minimise complications of anaesthetic administration.

(iv) Pre-operative antibiotic administration should be considered. This can ensure maximal blood levels of drug during the surgical procedure. Additional post-operative antibiotic treatment may be required.

(v) Surgical time can frequently be reduced by practice on cadavers. This enables investigators to familiarise themselves with anatomical landmarks and streamline the experimental surgical procedures, thereby reducing the quantity of anaesthetic required. This will reduce the duration of post-operative recovery and promote animal well being.

(vi) Pre-operative analgesia should be routinely used. Such pre-emptive use of analgesics can reduce the quantities of general anaesthetic agents required and prevent the induction of sensitisation of the central nervous system.

(vii) Post-operative pain is best managed by pre-operative analgesic administration, followed by additional analgesics after surgery.

8.4.11 Surgery

(a) Surgical procedures should be carried out under appropriate local or general anaesthesia. There should be adequate monitoring of the depth of anaesthesia and effects such as hypothermia, and cardiovascular and respiratory depression.

(b) The choice and administration of anaesthetic, analgesic and tranquillising agents should be suitable for the species and appropriate for the purpose of the experiment. The use of such agents should conform to current medical, veterinary or laboratory animal practice.

(c) Investigators should consider the value of a limited anaesthetic trial to familiarise themselves with new anaesthetic or analgesic drug combinations. Species and strain variation in drug metabolism can result in unexpected morbidity and mortality when dosages are extrapolated from published data. A limited trial,
when combined with a non-survival surgical practice session, can provide invaluable information and promote surgical success and animal well being in subsequent study animals.

(d) Anaesthesia and surgery should be performed by competent staff with appropriate training and experience. All tissues should be handled with care and particular attention should be given to haemostasis. Instruction in surgical or anaesthetic techniques should be under the direct and constant supervision of such persons.

(e) When more than one surgical procedure is to be performed the animal must have recovered to good general health before the next procedure. Every effort should be made to reduce the total number of procedures and the IACUC should be informed specifically of the need for more than one procedure.

(f) When the animal is not to recover from the surgery, it must be unconscious for the whole procedure, either by continuing the administration of the general anaesthetic or by inducing brain death.

(g) When the animal is to recover from the anaesthetic, surgical procedures must conform to accepted standards in veterinary and laboratory animal practice. Aseptic technique should be used for all major survival surgery. Such surgery is defined as any surgical intervention that penetrates a body cavity or has the potential for producing a permanent handicap in an animal that is expected to recover. Aseptic technique includes aseptic preparation of the surgical field, use of sterilised instruments, wearing of sterile surgical gloves, gowns, caps, and face masks. The use of post-operative antibiotics should not be a substitute for correct aseptic technique.

8.4.12 Post-operative care

(a) Consideration of and attention to pain relief is paramount in post-operative care.

(b) Investigators should ensure that adequate monitoring, treatment and care of post-operative animals is provided. They should ensure that they, or other experienced personnel, are fully informed of the animals' condition. The duties of all staff must be clearly defined and ways of dealing with emergencies established.

(c) The comfort of animals must be promoted throughout the post-operative period. Attention should be given to warmth, hygiene, fluid and food intake, and control of infection. The use of analgesics and tranquillisers may be needed to minimise post-operative pain or distress. Care should be taken that animals recovering from anaesthesia are housed to prevent injury and that conditions are such that they are not disturbed, attacked or killed by other animals in the same enclosure.

(d) Regular observation of surgical wounds is essential to check the progress of healing. Any problems must be attended to promptly.
Any post-operative animal observed to be in a state of severe pain or distress which cannot be alleviated quickly must be killed humanely without delay and a veterinarian informed immediately.

8.4.13 Implanted devices

(a) Investigators should be aware of the need for strict attention to aseptic technique when foreign bodies are surgically implanted. Contamination of prosthetic devices frequently requires their removal after antibiotic therapy has failed.

(b) Skilled and specialised attention is required in the care of animals following an operation in which monitoring or sampling devices have been implanted, or a fistula created. Regular observation is essential to determine signs of distress, pain or infection, which must be treated promptly.

8.4.14 Neuromuscular paralysis

(a) Neuromuscular blocking agents must not be used without adequate general anaesthesia or an appropriate surgical procedure which eliminates sensory awareness.

(b) Immobilisation of an animal solely with a neuromuscular blocking agent is not acceptable. When these agents are used with an anaesthetic, special care must be taken to ensure the maintenance of an adequate plane of anaesthesia. Since criteria such as character of respiration and corneal and flexor withdrawal reflexes cannot be used, continuous or frequent intermittent monitoring of physiological variables such as heart rate, blood pressure, oxygen saturation, pupil size and electroencephalogram is necessary, together with the effects on these of mild sensory stimuli. Care is required to ensure that drugs used in the experiments do not interfere with this monitoring.

8.4.15 Electroimmobilisation

(a) Electroimmobilisation must not be used as an alternative to analgesia or anaesthesia.

8.4.16 Animal models of disease

(a) The scientific validity of an animal model of human diseases rests in part on how closely it resembles a particular human disease. An animal should be used only if the disease in the animal can serve as a reliable model for investigation into the human disease.

(b) It must be assumed, unless there is contrary evidence, that the attendant pain and distress of the human disease will also occur in the animal. The investigator must therefore take special care to ensure that any pain or distress is minimised and the IACUC is informed of the potential effects of the disease on the animals.
(c) Investigators must not allow the experiments to proceed to the painful or distressful or lingering death of animals unless no other experimental endpoint is feasible and the goals of the experiments are the prevention, alleviation, treatment or care of a life-threatening disease or situation in human beings or animals.

(d) Investigators must avoid using death as an experimental endpoint whenever possible. When death as an endpoint cannot be avoided, the experiments must be designed to result in the deaths of as few animals as possible.

8.4.17 Modifying animal behaviour

(a) Procedures used to modify an animal's behaviour or to induce it to perform specific tasks depend on motivating the animal. The preferred inducement is positive reinforcement.

(b) If the inducement by necessity has to be some form of biological stress, it should be as mild as possible. Severe water, food, social or sensory deprivation should not be used. Painful or noxious stimuli should be limited to those which do not distress human beings and must be used for the minimum time necessary.

(c) Behaviour can usually be modified using procedures that involve no more of a stressor than that normally experienced by the species.

(d) When noxious stimuli are used to modify behaviour, the animal must be able to escape from the stimuli.

8.4.18 Toxicological experiments

(a) Investigation into the safety of agents intended for use in human beings, animals, the household or the environment, or investigation of naturally occurring toxins, should be performed by persons with appropriate training. If suitable non-animal tests are available, they must be used. In particular, in vitro methods should be used as an initial screening test wherever possible.

(b) The endpoint of such experiments must be as early as is compatible with reliable assessment of toxicity, and must minimise the extent of any pain and distress.

(c) When death as an endpoint cannot be avoided, the experiments must be designed to result in the deaths of as few animals as possible.

8.4.19 Experiments involving hazards to humans or animals

(a) Hazards may arise from sources that include:

(i) viruses;
(ii) bacteria;
(iii) fungi;
(iv) parasites;
(v) radiation;
(vi) radioactivity;
(vii) corrosive substances;
(viii) toxins;
(ix) allergens;
(x) carcinogens;
(xi) recombinant DNA;
(xii) anaesthetic gases; and
(xiii) physical injuries.

(b) Experiment involving hazards to humans or animals shall be in accordance to the guidelines and requirements of the National Biosafety Committee, Ministry of Health and the Ministry of Manpower.

(c) Protocols submitted to the IACUC should include a description of any intended use of hazardous compounds or organisms. They should describe specific safety measures and disposal protocols used to prevent contamination of caging, other animals, research personnel and students.

(d) Animals being administered infectious organisms should be isolated as appropriate, taking into account risks to other animals and to people.

(e) Investigators must not allow the experiments to proceed to the painful or distressful or lingering death of animals unless no other experimental endpoint is feasible and the goals of the experiments are the prevention, alleviation, treatment or care of a life-threatening disease or situation in human beings or animals. When death as an endpoint cannot be avoided, the experiments must be designed to result in the deaths of as few animals as possible. The investigator must also ensure that the animal's suffering or pain is minimised and use appropriate sedation, analgesia, or anaesthesia to relieve the animal's suffering or pain.

(f) Precautions, security and emergency plans to contain hazardous agents should be appropriate to a “worst-case” situation.

8.4.20 Experimental manipulation of animals' genetic material

(a) Such experiments shall be in accordance with the guidelines of the Genetic Modification Advisory Committee.

(b) All proposals to manipulate the genetic material of animals, their germ cells or embryos must be submitted to the IACUC for approval.

(c) The manipulation of the genetic material of animals has the potential to affect the welfare of the animals and their offspring adversely. Investigators must inform the IACUC of the known potential adverse effects to the well being of the animals.

(d) The clinical status of animals in which the genetic material has been manipulated experimentally must be monitored for unusual or unexpected adverse effects, and such effects reported to the IACUC.
(e) There are examples of strains in which pathological conditions can be generated by normal breeding procedures. Expert care should be available to look after the welfare of such animals.

8.4.21 Experimental induction of neoplasia

(a) The site for induction of tumours must be chosen carefully. Subcutaneous, intradermal and flank sites should be chosen wherever possible. Prior to the use of footpad, brain and eye sites, specific justification as to the lack of any other alternative should be made to the IACUC.

(b) Investigators should monitor their animals regularly for signs of pain or distress, especially sudden changes in body weight.

(c) Animals with experimentally induced tumours should be euthanised whenever possible before predictable death occurs, cachexia becomes advanced, or the tumour becomes large enough to cause ulceration or severe limiting of normal behaviour.

(d) With ascitic tumours, including hybridomas, investigators should ensure that the volume of ascitic fluid does not cause gross abdominal distension, and the volumes of solid tumours and cachexia do not become distressful to the animals.

(e) In tumour therapy experiments, the endpoints chosen should be as early as possible and be compatible with reliable assessment of the therapy. Weight changes should be monitored closely. Death from the tumour should not be chosen as an experimental endpoint unless no other experimental endpoint is feasible and the goals of the study are the alleviation, treatment or cure of life-threatening disease situations in human beings or animals. When death as an endpoint cannot be avoided, the experiments must be designed to result in the deaths of as few animals as possible.

8.4.22 Lesions of the central nervous system

(a) Anatomical or chemical lesions of the central nervous system have been widely used to study its structure and function in health and disease. These experiments demand special consideration when the lesion produces loss or impairment of limb or trunk movements, loss of sensibility to touch, temperature or pain, impairment of the animal's awareness of its surroundings or impairment of appetite or injury mechanisms.

(b) Special animal care, caging and other facilities may be needed and the condition of the animals must be closely monitored.
8.4.23 Withholding food or water

(a) Experiments involving the withholding or severe restriction of food or water should produce no continuing detrimental effect on the animals. In these experiments, the fluid balance and/or body weight must be monitored, recorded and maintained within the limits approved by the IACUC.

8.4.24 Foetal experimentation

(a) When foetal experimentation or surgery compromises the ability of the neonate to survive and not experience pain or distress, it must be euthanised before or immediately following birth unless such pain or distress can be relieved.

(b) Unless there is specific evidence to the contrary, investigators must assume foetuses have the same requirements for anaesthesia and analgesia as adult animals of the species.

(c) During surgery of the mother, consideration must be given to any special requirements for anaesthesia of the foetus.

(d) Eggs must be destroyed before hatching, unless hatching is a requirement of the experiment. The IACUC must approve the arrangements made for hatchlings.

8.4.25 Research on pain mechanisms and the relief of pain

(a) For experiments in which unanaesthetised animals are to be subjected to stimuli designed to produce pain or when pain is to be inflicted on animals as part of normal management, investigators must satisfy the IACUC that their choice of the measurement of pain is appropriate.

(b) Investigators should:

(i) ensure that the pain stimuli limit pain at all times to levels comparable to those which do not distress human beings;

(ii) ensure that the animals are exposed to the minimum pain necessary for the purpose of the experiment; and

(iii) provide treatment for the relief of pain, or allow self-administration of analgesics, or escape from repetitive, painful stimuli whenever possible.

8.4.26 Animal welfare and animal health research

(a) When studying ways of improving the health and welfare of animals, investigators may need to design experiments that replicate conditions such as injury, trauma, nutritional disorder, physical exertion, disease or environmental stress. Thus the attendant pain and distress may also be replicated. When such experiments are necessary, the investigator must ensure that:
(i) the principal aim of the Project is to improve animal health or welfare;
(ii) alternative methods, such as the use of animals naturally inflicted with the condition, are not possible;
(iii) all possible steps are taken to minimise any pain or distress; and
(iv) the experiments do not proceed to the painful or distressful or lingering death of animals unless no other experimental endpoint is feasible and the goals of the experiments are the prevention, alleviation, treatment or care of a life-threatening disease or situation in human or animals. When death as an endpoint cannot be avoided, the experiments must be designed to result in the deaths of as few animals as possible.

8.5 Training for Investigators

8.5.1 The minimum training requirements for Investigators and other training that is recommended are set out in the Training Guidelines.
CHAPTER 9: RESPONSIBILITIES OF TEACHERS

9.1 Teaching at tertiary-levels

9.1.1 When animals are being used to achieve educational objectives the person in charge of the class must:

(a) accept responsibility for ensuring that the care and use of the animals is in accordance with all relevant legislation and these Guiding Principles;

(b) have relevant training and qualifications;

(c) consider whether alternative teaching methods can be used;

(d) obtain prior IACUC approval for use of all animals for the entire course;

(e) instruct students appropriately in the care and use of animals before the students participate in experiments with live animals;

(f) ensure that there is close, competent supervision of all students;

(g) allow students to anaesthetise animals or carry out surgery only if it is essential for their training; and

(h) be responsible for the humane killing of the animals, if required, bearing in mind that it is good practice to segregate manipulated animals from animals held under normal living conditions.

9.1.2 Persons supervising students who are training in research must ensure that the students are appropriately instructed prior to using animals and must be responsible for the welfare of animals used by students.

9.1.3 No student should be forced to use an animal against his will.

9.2 Teaching at non-tertiary levels

9.2.1 Non-tertiary schools using animals for teaching are encouraged to refer to the Guiding Principles.

9.2.2 No student should be forced to use an animal against his will.

9.2.3 It should be noted that students in primary schools are more impressionable and at an age that makes them more prone to suffering the long-term effects of mental and emotional traumatic experiences. As the use of animals for teaching could have such negative impact on these students, animals should preferably not be used for teaching at this level of education.
APPENDIX I: REFERENCE MATERIALS

GENERAL


PAIN & DISTRESS

Appendix I of the New Zealand “Good Practice Guide for the Use of Animals in Research, Testing and Teaching” entitled “Pain: Some Concepts and Definitions”.


Recognising and Assessing Pain, Suffering and Distress in Laboratory Animals – A Survey of Current Practice in the UK with Recommendations by Penny Hawkins, Research Animals Department, RSPCA.

EUTHANASIA

Monograph entitled “Euthanasia of Animals used for Scientific Purposes” by the Australian and New Zealand Council for the Care of Animals in Research and Teaching (ANZCCART), 1993.


NON-HUMAN PRIMATES


Policy on the Care and Use of Non-Humane Primates for Scientific Purposes, Animal Welfare Committee, National Health & Medical Research Council, Australia
## APPENDIX II: STANDARDS FOR HOUSING AND ENVIRONMENTAL CONDITIONS

### A. MOUSE, RAT, HAMSTER, GUINEA PIG, GERBIL

<table>
<thead>
<tr>
<th>ANIMAL</th>
<th>WEIGHT / gm</th>
<th>FLOOR AREA / cm²</th>
<th>HEIGHT / cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOUSE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 10</td>
<td>38</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Up to 15</td>
<td>51</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Up to 25</td>
<td>77</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>&gt;25</td>
<td>&gt;96</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>RAT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;100</td>
<td>109</td>
<td></td>
<td>17</td>
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<tr>
<td>Up to 200</td>
<td>148</td>
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<td>17</td>
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<tr>
<td>Up to 300</td>
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<tr>
<td>Up to 400</td>
<td>258</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>Up to 500</td>
<td>387</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>&gt;500</td>
<td>&gt;451</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>HAMSTER</td>
<td>&lt;60</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Up to 80</td>
<td>83</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Up to 100</td>
<td>103</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>&gt;100</td>
<td>&gt;122</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>GUINEA PIG</td>
<td>≤350</td>
<td>387</td>
<td>17</td>
</tr>
<tr>
<td>&gt;350</td>
<td>&gt;651</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>GERBIL</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Larger animals might require more space to meet performance standards.

### B. RABBIT, CAT, DOG, PIGEON, QUAIL, CHICKEN, NON-HUMAN PRIMATE

<table>
<thead>
<tr>
<th>ANIMAL</th>
<th>WEIGHT / kg</th>
<th>FLOOR AREA / m²</th>
<th>HEIGHT / cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>RABBIT</td>
<td>&lt;2</td>
<td>0.135</td>
<td>35</td>
</tr>
<tr>
<td>Up to 4</td>
<td>0.27</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>Up to 5.4</td>
<td>0.36</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>&gt;5.4</td>
<td>&gt;0.45</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>CAT</td>
<td>≤4</td>
<td>0.27</td>
<td>60</td>
</tr>
<tr>
<td>&gt;4</td>
<td>≥0.36</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>DOG</td>
<td>&lt;15</td>
<td>0.72</td>
<td>-</td>
</tr>
<tr>
<td>Up to 30</td>
<td>1.08</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>&gt;30</td>
<td>≥2.16</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>PIGEON</td>
<td>-</td>
<td>0.072</td>
<td>-</td>
</tr>
<tr>
<td>QUAIL</td>
<td>-</td>
<td>0.0225</td>
<td>-</td>
</tr>
<tr>
<td>CHICKEN</td>
<td>&lt;0.25</td>
<td>0.225</td>
<td>-</td>
</tr>
<tr>
<td>Up to 0.5</td>
<td>0.045</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Up to 1.5</td>
<td>0.09</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Up to 3.0</td>
<td>0.18</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>&gt;3.0</td>
<td>≥0.27</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>MONKEY</td>
<td>Up to 1</td>
<td>0.144</td>
<td>50</td>
</tr>
<tr>
<td>(including</td>
<td>Up to 3</td>
<td>0.27</td>
<td>76</td>
</tr>
<tr>
<td>the baboon)</td>
<td>Up to 10</td>
<td>0.387</td>
<td>76</td>
</tr>
<tr>
<td>Up to 15</td>
<td>0.54</td>
<td></td>
<td>81</td>
</tr>
<tr>
<td>Up to 25</td>
<td>0.72</td>
<td></td>
<td>91</td>
</tr>
<tr>
<td>ANIMAL</td>
<td>WEIGHT / kg</td>
<td>FLOOR AREA / m²</td>
<td>HEIGHT / cm</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
<td>-----------------</td>
<td>------------</td>
</tr>
<tr>
<td>Up to 30</td>
<td>0.9</td>
<td>116</td>
<td></td>
</tr>
<tr>
<td>&gt;30</td>
<td>1.35</td>
<td>116</td>
<td></td>
</tr>
<tr>
<td>APE&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Up to 20</td>
<td>0.9</td>
<td>139</td>
</tr>
<tr>
<td>Up to 35</td>
<td>1.35</td>
<td>152</td>
<td></td>
</tr>
<tr>
<td>&gt;35&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.25</td>
<td>213</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Larger animals might require more space to meet performance standards.

<sup>b</sup> These recommendations might require modification according to body conformation of individual animals and breeds.

<sup>c</sup> Cage height should be sufficient for the animal to stand erect and stretch its wings.

<sup>d</sup> Callitrichidae, Cebidae, Cercopithecidae, and <i>Papio</i>. Baboons might require more height than other monkeys.

<sup>e</sup> For some species (e.g. <i>Brachyteles</i>, <i>Hylobates</i>, <i>Symphalangus</i>, <i>Pongo</i> and <i>Pan</i>), cage height should be such that an animal can, when fully extended, swing from the cage ceiling without having its feet touch the floor. Cage-ceiling design should enhance brachiating movement.

C. GOAT, SHEEP, SWINE, CATTLE, HORSE, PONY

<table>
<thead>
<tr>
<th>ANIMAL</th>
<th>WEIGHT / kg</th>
<th>FLOOR AREA&lt;sup&gt;a&lt;/sup&gt; / m²</th>
<th>HEIGHT / cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOAT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;25</td>
<td>0.9 / 0.765 / 0.675</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Up to 50</td>
<td>1.35 / 1.125 / 1.017</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;50&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.8 / 1.53 / 1.35</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>SHEEP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As for goat</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>SWINE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;15</td>
<td>0.72 / - / -</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Up to 25</td>
<td>1.08 / 0.54 / 0.54</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Up to 50</td>
<td>1.35 / 0.9 / 0.81</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Up to 100</td>
<td>2.16 / 1.8 / 1.62</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Up to 200</td>
<td>4.32 / 3.6 / 3.24</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;200&lt;sup&gt;b&lt;/sup&gt;</td>
<td>≥5.4 / ≥4.68 / ≥4.32</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CATTLE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;75</td>
<td>2.16 / 1.8 / 1.62</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Up to 200</td>
<td>4.32 / 3.6 / 3.24</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Up to 350</td>
<td>6.48 / 5.4 / 4.86</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Up to 500</td>
<td>8.64 / 7.2 / 6.48</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Up to 650</td>
<td>11.16 / 9.45 / 8.37</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;650&lt;sup&gt;b&lt;/sup&gt;</td>
<td>≥12.96 / ≥10.8 / ≥9.72</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>HORSE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>12.96</td>
</tr>
<tr>
<td>PONY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- (1 – 4 / pen)</td>
<td>72</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>≤200 (&gt; 4 / pen)</td>
<td>60</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;200&lt;sup&gt;b&lt;/sup&gt; (&gt; 4 / pen)</td>
<td>≥72</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Floor area per animal is given according to grouping sizes of 1, 2 to 5 and >5.

<sup>b</sup> Larger animals might require more space to meet performance standards.
D. TEMPERATURE, HUMIDITY, VENTILATION AND LIGHTING

The recommended temperature ranges for the different animals are as provided in the table below.

<table>
<thead>
<tr>
<th>ANIMAL</th>
<th>DRY-BULB TEMPERATURE °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mouse, rat, hamster, gerbil, guinea pig</td>
<td>18 - 26</td>
</tr>
<tr>
<td>Rabbit</td>
<td>16 – 22</td>
</tr>
<tr>
<td>Cat, dog, non-human primate</td>
<td>18 – 29</td>
</tr>
<tr>
<td>Farm animals &amp; poultry</td>
<td>16 – 27</td>
</tr>
</tbody>
</table>

The relative humidity should be 30 – 70%.

The ventilation should be 10 – 15 fresh air changes per hour. In some situations, the use of such a broad ventilation guideline might over-ventilate an enclosure that contains few animals or under-ventilate an enclosure that contains many animals. To determine more accurately the ventilation required, the minimal ventilation rate required to accommodate heat loads generated by animals can be calculated with the assistance of mechanical engineers. The minimal required ventilation is then determined by calculating the amount of cooling required to control the heat load expected to be generated by the largest number of animals to be housed in the enclosure plus any heat generated by non-animal sources and heat transfer through room surfaces.

Lighting of 325 lux (30 foot candles) about 1.0 metre (3.3 feet) above the floor should be provided.
APPENDIX III: ADDITIONAL INFORMATION ON NON-HUMAN PRIMATE HOLDING CARE AND USE

1. Non-human primates (NHP) are recognised as having highly developed mental and emotional capacities, more so than most other animals. In many ways, they are similar to humans and exhibit many similar external manifestations of emotions such as facial expressions, vocalisations, postures, gestures, and reactions. They have been known to react in ways similar to humans under comparable situations, e.g. compare captive NHP and institutionalised humans.

2. Given the greater complexity of the NHP, when managing and caring for them, besides providing a physical environment conducive to their well-being, emphasis should therefore be placed on enhancing their social and behavioural well-being through enrichment of their environment.

3. Researchers should acquaint themselves with the animal's distinctive characteristics and needs. They should be able to recognise abnormal behaviour patterns such as stereotypes, appetite disorders, abnormal social behaviours, etc and take necessary steps to treat or ameliorate them. They should be familiar with the literature on animal cognition and perception and conduct frequent routine observation of every animal in order to be in a position to provide optimal care and handling of the animals. NHP that are housed improperly or treated inhumanely are likely to yield unreliable data due to the effects of behavioural stress. This can introduce unwanted variables.

4. Most primate species, including the majority of those used in laboratories, are highly social, live in complex social groups and establish long-term bonds, although such bonds may not necessarily be permanent. Because of the bonding, social isolation is likely to adversely affect individual animals. Animals raised in total social isolation could suffer from social deprivation and become withdrawn and develop aberrant social, sexual and exploratory behaviour. It is therefore important to provide the company of compatible conspecifics or other NHP species, and if this is not possible, increased human company.

5. Group or paired housing is preferred but the potential for problems such as wounding, disease transmission, dominance hierarchies, social distress, and undernourishment of a lower-ranking partner should be kept in mind. When groups are being formed, observers must adjust group composition so the units show minimal aggression. Where single housing is necessary, the role of the animal care technician takes on added importance. Familiarity with the handler, surrounding and procedure can significantly reduce anxiety. NHP should never be housed in a restraint chair but the restraint chair may be used to the extent necessitated by the nature of an experiment.

6. NHP form coalitions through which they establish their dominance ranks and compete for food and sexual partners. Removing a monkey from its group may disrupt the existing network of alliances and induce rank changes, which may be associated with vicious fighting resulting in injuries. Animals that are to be reintroduced should be kept away from the group for as short a time period as possible.

7. While enclosure size is an important variable, the primary emphasis should be on providing the animal with the option for species-appropriate activities. Besides providing social peers, an animal's environment can also be enriched by providing food gathering activities, devices such as perches, shelves and swings and artificial appliances, such as audiovisual
devices (radio, video, television). These latter appear to be useful in enhancing the well being of NHP, especially if the NHP can turn the equipment on and off at will. It has been reported anecdotally that monkeys are particularly fascinated by visuals depicting their natural environment, animals that are found in their natural habitat or videos of themselves.

8. Most primates show vertical flight reactions. This should be taken into account when arranging their housing. Attempts should be made to cater to their preferred vertical limits in the wild. Because of the importance of vision to the NHP, particularly *M. nemestrina*, cages should be positioned so that the monkeys can see animals of like species. Solid-sided caging prevents visual contact. If physical contact is possible, there must be assurance that the animals are compatible.

9. Interaction between the NHP and the researcher or technician is encouraged but it should not be forced. The interaction, however, must not involve handling other than what is necessary for the maintenance of the animal or for investigational procedures. Direct physical contact between humans and NHP should be evaluated from facility to facility. In many instances it should be kept to a minimum to avoid problems that may arise, for example from breaking of the human / animal bond when staff changes occur or when an animal must be euthanised, as well as the hazards posed by zoonotic diseases. Some of the most significant diseases associated with NHP are *Cercopithecine herpesvirus 1* (formerly *Herpesvirus simiae*) infection and infectious haemorrhagic fever viruses.

10. Many NHP have extreme physical strength in relationship to body size and can inflict serious injury on personnel. Humans can also transmit infectious diseases to primates, e.g. measles, tuberculosis. It is recommended therefore that personnel exposed to NHP be provided with such protective items as gloves, arm protectors, masks and face shields. They should be routinely screened for tuberculosis and a procedure established for ensuring medical care for bites and scratches.
APPENDIX IV: SAMPLE ANIMAL WELFARE SCORE SHEET

(Acknowledgement: This score sheet is adapted from the one used by Professor David B. Morton, Centre for Biomedical Ethics, University of Birmingham UK as contained in Appendix III of the New Zealand “Good Practice Guide for the Use of Animals in Research, Testing and Teaching”.)

Animal Species: ________________ Date of Procedure: ______________
IACUC Ref: ___________________
Starting Body Weight: ____________ Investigator: __________________________
Wt. Of Water Bottle: _____

<table>
<thead>
<tr>
<th>DATE</th>
<th>DAY</th>
<th>TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**VISUAL INSPECTION**
- Inactive
- Hunched posture
- Coat rough
- Breathing rate
- Breathing pattern

**HANDS-ON INSPECTION**
- Bodyweight /gm
- % bodyweight change
- Alert & Inquisitive
- Diarrhoea
- Dehydration
- Vocalisation
- Seizures / convulsions

**FOOD & WATER**
- Food intake
- Wt of full water bottle
- Wt of water bottle today

**SITE OF INVASIVE PROCEDURE**
- Wound
- Bleeding
- Other discharges
- Sutures / clip

**POST-PROCEDURAL SUPPORT**
- Pain medication used
- Dose
- Subcut. fluids / ml.

Staff’s initials
Scoring details:

\[ ^a \text{Breathing pattern: } R = \text{rapid}, \ S = \text{shallow}, \ L = \text{laboured}, \ N = \text{normal} \]
\[ ^b \text{Write in “OK” if normal} \]
\[ ^c \text{Other discharges: } C = \text{clear discharge}, \ P = \text{pus} \]

How to use the Animal Welfare Score Sheet:

Key points:

One score sheet per animal
The 12 boxes across the page can be used for 12 different time points on different days
For critical post-op cases, animals should be checked every 4 hrs (i.e. three times a day)
A pre-procedural examination of the animal should be made before anaesthesia. This is time zero in the first box
Look for evidence of red discharge from nose or eyes. This is a non-specific sign of stress
Look at the coat. It should be smooth and shiny. A rough coat has fur standing on end and indicates that the animal is too sick to groom itself
Look for dehydration. If the skin can be gently pulled away from the body and remains that way, the animal is significantly dehydrated
Look at the breathing and note if it is rapid, laboured or shallow
Listen to the breathing and note any respiratory noises
Look at the colour of the ears and feet. They should be pink
Look at the behaviour of the animal when handled. It should be alert and inquisitive
Record the weight of the water bottle before the procedure

Use this form to score and record:
Physical observations of clinical condition. This can be done in 2 ways (for example for nose discharge):
example 1: Score presence (+) or absence (-) of nose discharge or dehydration
example 2: Graded score from 0 to 5 (0 = no discharge, 5 = max discharge)
Changes in physical condition with time after the procedure. When several animals are used simultaneously, it is difficult to remember how any individual animal looked the previous day
Administration of pain medication. The volume of water consumed is a good indicator of animal well being. If the animal is not drinking up to 10% of body wt per 24 hrs, it is probably in pain. Pain medication should be increased and additional fluid administered by subcutaneous injection. Seek veterinary advice on this
Administration of subcutaneous fluids
Condition of the sites of invasive procedures. Look for blood or other discharges
Body weight of the animal. Body weight should be maintained. Significant weight loss is used as a humane endpoint

Humane End-points:

1. Weight loss of 10% or more over 24 hrs
2. Weight loss of 20% or more plus one other clinical sign compared with control group
3. Weight loss of 25% compared with control group