Section 3: Animal wellbeing

Definitions that are particularly relevant to this section:

- animal
- animal wellbeing
- current best practice
- distress
- facility
- investigator
- pain
- program of veterinary care
- scientific purposes
- wildlife

This section applies to all species of animals used for scientific purposes, and to all activities and situations involving their care and use. It outlines the principles for supporting and safeguarding the wellbeing of animals used in terms of the animal’s lifetime experience. These principles underpin the National Health and Medical Research Council (NHMRC) Guidelines to promote the wellbeing of animals used for scientific purposes: the assessment and alleviation of pain and distress in research animals.

Information in this section is presented in four chapters:

- Chapter 3.1 outlines how to approach supporting and safeguarding the wellbeing of animals.
- Chapter 3.2 provides information on supporting the wellbeing of animals during their care and management.
- Chapter 3.3 provides information on safeguarding the wellbeing of animals during the conduct of specific procedures.
- Chapter 3.4 provides information on provisions for animals at the conclusion of their use.

Information provided in this section is based on the assumption that approval has been obtained from an animal ethics committee (AEC) before any activity, including projects, commences (see Clause 1.32). The necessity and requirements for AEC approval are addressed in other sections of this document.

Sources of additional information include:

- NHMRC Guidelines to promote the wellbeing of animals used for scientific purposes: the assessment and alleviation of pain and distress in research animals
- NHMRC Guidelines for the generation, breeding, care and use of genetically modified and cloned animals for scientific purposes

Governing principles

Each person involved in the care and use of animals for scientific purposes must consider the governing principles in Section 1 when applying the Code to their specific circumstance; in particular:

i. The wellbeing of animals used for scientific purposes must be considered in terms of the cumulative effects of the animal’s lifetime experience. At all stages of the care and use of an animal, measures should be taken to ensure that the animal’s environment and management are appropriate for the species and the individual animal, and support the animal’s wellbeing (see Clause 1.8).

ii. Animals have a capacity to experience pain and distress, even though they may perceive and respond to circumstances differently from humans. Pain and distress may be difficult to evaluate in animals. Unless there is evidence to the contrary, it must be assumed that procedures and conditions that would cause pain and distress in humans cause pain and distress in animals. Decisions regarding the possible impact of procedures or conditions on an animal’s wellbeing must be made in consideration of an animal’s capacity to experience
pain and distress (see Clause 1.10).

iii. Steps must be taken at all times to safeguard the wellbeing of animals by avoiding or minimising harm, including pain and distress, to the animals (see Clause 1.11).

iv. The development of strategies to support and safeguard animal wellbeing must include the application of high standards of scientific integrity (see Clauses 1.15–1.17), and the application of Replacement, Reduction and Refinement (the 3Rs) (see Clauses 1.18–1.30).

3.1: Strategies to support and safeguard animal wellbeing

3.1.1 The planning and conduct of activities involving the care and use of animals must support and safeguard animal wellbeing. Steps include:

i. identifying known and potential causes of adverse impact on animal wellbeing, taking into consideration both intended and unforeseen consequences

ii. taking steps to avoid or minimise adverse impacts, including setting intervention points and humane endpoints, and monitoring animals

iii. reviewing the effectiveness of strategies to support and safeguard animal wellbeing

iv. implementing changes to strategies to ensure the ongoing support and safeguarding of animal wellbeing

v. ensuring that all relevant people are aware of and accept their responsibilities regarding the wellbeing of the animals.

Identify known and potential causes of adverse impacts on animal wellbeing

3.1.2 Circumstances with the potential to have an adverse impact on the wellbeing of an animal must be identified. Experimental and non-experimental causes must be considered, including acquisition and breeding, capture, transport, housing and care, social and physical environment, handling, restraint, sample collection, non-surgical procedures, anaesthesia, surgical procedures, genetic modification, humane killing and provisions for the animal at the conclusion of their use.

3.1.3 In each instance, factors that might contribute to the level and duration of harm, including pain and distress, and the risk of such occurrences, must be considered and assessed, taking into account the predicted likelihood and consequences.

3.1.4 If the potential impact on the animal, or the validity and efficacy of criteria for intervention to minimise harm, including pain and distress, cannot be predicted on the basis of available evidence, the incorporation of a pilot study into the design of the project must be considered.

Take steps to avoid or minimise adverse impacts on animal wellbeing

Support the animals’ wellbeing

3.1.5 Animals must be cared for and managed so that species-specific or strain-specific physiological and behavioural needs are met.

3.1.6 Practices and procedures used for the care and management of animals must be appropriate for the situation, the species and strain of animal, and the activities to be undertaken, and must be based on current best practice. Where the requirements of a project or activity preclude or modify these conditions, special ethical consideration and specific AEC approval is required.

3.1.7 The living conditions in indoor facilities in which animals are bred, held and used must be checked daily (see Clause 3.2.17 [i]).

3.1.8 Procedures must be in place at all stages of animal supply, housing and care to ensure that a health status of the animals is maintained that safeguards animal wellbeing and meets the requirements of their proposed use (see Clause 3.2.1).

3.1.9 Animals that are sourced, bred or held for scientific purposes must be suitable for their proposed use, taking into account their biological characteristics, temperament, behavioural conditioning, microbiological and nutritional status, and general state of health (see Clause 1.17). Where appropriate, the suitability of animals should be assessed before they are selected.

3.1.10 Assessment of animals (e.g. wellbeing, suitability for purpose, health) must be undertaken by a competent person, or under the direct supervision of a competent person.

3.1.11 Animals should be acclimatised to the housing/holding conditions, experimental conditions and personnel, and any changes to such conditions, before they are used (see Clauses 3.2.10–3.2.11). Animals that do not adapt satisfactorily should not be used. Prompt provisions should be made for such animals, as appropriate.

3.1.12 For animals that normally live in social groups, social isolation or separation from a group must be avoided unless specific justification is provided to, and approval is obtained from, an AEC (see Clause 3.2.23).

3.1.13 Animals must be identified either individually or in groups.

Avoid or minimise harm, including pain and distress

3.1.14 Animals used must be suited to the purpose of the project or activity (see Clause 1.17), and their suitability must be assessed before they are used.
Scientific and educational methods used must accord with current best practice.

Procedures, husbandry and care must be performed competently, by people who are competent or by people under the direct supervision of a competent person.

Potential causes of pain and distress that are not part of the design of a project or activity should be eliminated or controlled to minimise the adverse impact on animal wellbeing and the risks to quality of data.

If pain and distress are predicted or unavoidable consequences of a project, methods for minimising such pain and distress must be incorporated into the design of the project, including:

i. establishing and implementing early intervention points and endpoints (see Clauses 3.1.26–3.1.28)
ii. monitoring animals to ensure that the planned endpoints are detected, and taking appropriate action (see Clauses 3.1.20–3.1.25)
iii. using pharmacological agents and non-pharmacological measures for avoiding and minimising pain and distress (see Clauses 3.3.8–3.3.15 and 3.3.17[iii]).

Where it is established that the aim(s) of the project involves animals experiencing pain and distress that will not be alleviated:

i. the planned endpoint of the project must be as early as feasible to avoid or minimise pain and distress to the animals
ii. the animals must be monitored and assessed so that the planned endpoints are detected, and actions must be taken in accordance with the AEC approval for the project.

Monitor animals and take appropriate action

Animals must be monitored and assessed:

i. by a competent person who is knowledgeable about the normal behaviour and signs of pain and distress for the species, or a person under the direct supervision of a competent person
ii. with sufficient frequency to ensure that any harm, including pain and distress, is promptly detected and managed
iii. in accordance with the AEC approval for the project or activity.

Methods for monitoring and assessment of animal wellbeing should include:

i. the criteria that will be used to assess wellbeing
ii. the level and frequency of monitoring to ensure that any changes in an animal's condition are detected early
iii. the criteria that will be used to determine when action is required
iv. actions that will be taken so that adverse impacts on animal wellbeing, including predicted effects and unforeseen complications, are addressed rapidly and effectively
v. the methods for recording observations, treatments and actions
vi. flexibility to ensure a rapid and effective response to changes during the course of the project or activity.

Records of the monitoring and assessment of animal wellbeing must be:

i. sufficient to enable the AEC to verify that the wellbeing of animals has been monitored as agreed, and allow review and critical investigation of the cause(s) of and responses to unexpected adverse events as a basis for future prevention strategies
ii. accessible to all people involved in the care of the animal
iii. available for audit by the institution, the AEC and authorised external reviewers.

Prompt action must be taken based on the monitoring and assessment of animals, in accordance with:

i. institutional and AEC policies and procedures (see Clause 2.1.5[v][c])
ii. the intervention points and humane endpoints approved by the AEC for a project, or actions documented in procedures for animal care approved by the AEC.

Prompt action must be taken in response to unexpected adverse events and emergencies, including alleviation of pain and distress, in accordance with institutional and AEC policies and procedures (see Clause 2.1.5[v][d]). Alleviation of pain and distress of a severity that was not anticipated in an approved project or activity must take precedence over an individual animal reaching the planned endpoint of the project or activity, or the continuation or completion of the project or activity. If necessary, animals must be killed humanely without delay.

When an animal dies unexpectedly, or is humanely killed due to unforeseen complications, a necropsy should be performed by a competent person (see Clause 2.1.5[v][d]).

Set intervention points and experimental humane endpoints

If pain and distress are predicted or unavoidable consequences of a project, validated criteria that are appropriate for the species and the nature and time course of the predicted effects must be established to identify:

i. the earliest time point at which data can be obtained and the study completed (experimental endpoint[s])
when intervention is necessary to minimise pain and distress (intervention point[s])

when the animal should be humanely killed, regardless of whether the aims of the study have been achieved (humane endpoint[s]).

3.1.27 Intervention points and endpoints must be applied as early as feasible and ensure that:

i. the duration and extent of pain and distress are minimised

ii. valid data are obtained at the earliest time point before or following the onset of pain and distress.

3.1.28 ‘Death as an endpoint’ must be replaced with early experimental and humane endpoints whenever possible. Where death as an endpoint is essential for the aim(s) of the project and cannot be avoided:

i. the project must be designed to minimise the number of animals that will die

ii. steps to avoid or minimise pain and distress, including early experimental and humane endpoints, must be considered, implemented and reviewed at all stages of the project.

Review the effectiveness of strategies to support and safeguard animal wellbeing

3.1.29 The effectiveness of strategies to support and safeguard animal wellbeing must be kept under review during the lifetime of a project or activity. Formal review must be conducted at least annually, but preferably more regularly, during the course of a project or activity, and in response to adverse outcomes.

Implement changes to the strategy to ensure its ongoing effectiveness

3.1.30 Where relevant and applicable, the outcomes from review of the effectiveness of strategies to avoid or minimise adverse impacts on animal wellbeing must be implemented in current projects or activities and taken into account in planning future activities. Any subsequent amendments to an approved project or activity must not proceed without prior approval from the AEC.

Accept responsibilities

3.1.31 The person responsible for the wellbeing of animals at any given time must be clearly identified (see Clauses 2.1.7 [i], 2.4.20 [ii] and 2.5.1).

3.1.32 When developing strategies for supporting and safeguarding animal wellbeing, investigators and animal carers should:

i. consult with all relevant people and/or groups responsible for the wellbeing of the animals

ii. clearly identify the person responsible for monitoring the animals

iii. ensure good communication and cooperation between all parties involved.

3.2: Animal care and management

This chapter outlines how to support and safeguard the wellbeing of animals during their care and management.

Animal health

3.2.1 Procedures for ensuring that a health status of the animals is maintained that safeguards animal wellbeing and meets the requirements of their proposed use (see Clause 3.1.8) must include:

i. monitoring and assessment of animals by a competent person with sufficient frequency to ensure that sick or injured animals are promptly detected and identified, and that appropriate action is taken

ii. provision of veterinary clinical care and advice

iii. prompt detection and effective management of disease outbreaks and emergencies such as fire, power failure and biosafety issues

iv. preventive protocols under veterinary direction or supervision, as appropriate, including animal biosecurity; quarantine; and the surveillance, diagnosis, treatment and control of diseases.

Acquisition and breeding

3.2.2 When animals are specifically bred for scientific purposes, the breeding program must be managed in accordance with current best practice to ensure the wellbeing of the colony, herd or flock, and all animals involved, including:

i. maintaining, monitoring and reviewing adequate records. To allow an assessment of reproductive performance, records should include data relevant to fertility, fecundity, morbidity and mortality

ii. ensuring that specified requirements for genetic constitution and health status are met and certified

iii. ensuring that breeding of excess animals is avoided or minimised (see Clause 1.27), including assessment of the details and reason for
culling of animals and, when relevant, accurate and timely genotyping.

Further information about breeding animals, including genetically modified animals, is provided in Clauses 2.4.26–2.4.27, 2.5.15 [i] and 3.3.24.

3.2.3 When animals are obtained from a breeding and holding facility outside the institution, the health status of the colony from which the animals are acquired must be assessed before animals are transported, to ensure that the animals will be suitable for the intended scientific purpose and compatible with the biosecurity status and requirements of the receiving facility.

3.2.4 Wildlife must not be taken from their natural habitats or otherwise disturbed unless it is essential for the work proposed and no alternative source of animals or data is available. Practices to minimise transmission of pathogens between animals and between sites must be implemented.

Transport of animals

3.2.5 Methods and arrangements for the transport of animals must support and safeguard the wellbeing of the animals before, during and after their transport, and take into account the health, temperament, age, sex and previous experiences of the animals; the number of animals travelling together and their social relationships; the period without food or water; the duration and mode of transport; environmental conditions (particularly extremes of temperature); and the care given during the journey.

3.2.6 Transport methods and arrangements must:

i. be appropriate for the species and the circumstances

ii. minimise harm, including pain and distress, arising from factors such as containment, movement, noise, disruption of social groups, and changes in the environment and personnel

iii. ensure that animals are:
   a. provided with appropriate food and water when necessary
   b. provided with the physical and social environment appropriate for the species
   c. protected from, and treated for, injury and disease.

3.2.7 Both suppliers and recipients of animals must ensure that satisfactory delivery procedures are in place, including receipt of the animals by a responsible person, accountability for animal numbers, and adherence to other regulatory codes, such as quarantine.

3.2.8 People responsible for monitoring animals during transport must be able to recognise and respond to animal needs during transport.

Admission of new animals to breeding and holding facilities

3.2.9 When new animals are admitted to breeding and holding facilities, their wellbeing must be supported and safeguarded by:

i. ensuring that the health and wellbeing of the animals is assessed by a competent person before their admission, and quarantine and preventive or other health treatment is provided, if appropriate (see Clauses 3.1.10 and 3.2.1)

ii. ensuring that appropriate accommodation is available and that animals are transferred to this accommodation without unnecessary delay

iii. assessing the suitability of the animals for their intended scientific purpose (see Clauses 1.17, 2.4.15 [i], 2.5.15 [xii] and 3.1.9).

Acclimatisation and conditioning

3.2.10 If there is any change in the housing/holding conditions at the time an animal is supplied or selected for use in a project, sufficient time should be allowed for the animal to acclimatise before the project commences.

3.2.11 Before a project commences, the animals should be conditioned to the handling, experimental conditions and people who will conduct the procedures.

3.2.12 Animals that do not adapt satisfactorily after acclimatisation and/or conditioning should not be used, and prompt provisions should be made for such animals, as appropriate.

Housing and care

3.2.13 Animals must be provided with accommodation, physical and social environmental conditions, food, water and care to meet species-specific or strain-specific physical and behavioural needs. If the requirements of a project or activity preclude or modify these conditions, special ethical consideration and specific AEC approval are required (see Clauses 1.9 and 3.1.5).

3.2.14 Facilities must be appropriately staffed, designed, constructed, equipped, maintained and managed to achieve a high standard of animal care. Facilities must be suitable for the type of animals kept and the aims of the activities undertaken.

3.2.15 Animals held outdoors must be protected from adverse environmental conditions and predation, and provided with access to adequate shelter, food and water.

3.2.16 The housing and care of animals that are administered infectious organisms must take into account risks to other animals and to humans, and appropriate procedures to minimise such risks must be implemented.
Indoor facilities

3.2.17 Indoor facilities should be designed and operated to:

1. control environmental factors such as air quality, temperature, humidity, light and noise within limits compatible with the health and wellbeing of the species held. Capacity for control of the microclimate by the caging systems or by the individual animals should be taken into account
2. enable appropriate segregation of species or activities that might affect other animals held in the same facility
3. exclude vermin
4. limit contamination associated with the keeping of animals, and the delivery of food, water and bedding
5. prevent the entry of unauthorised people and other animals.

3.2.18 Indoor facilities must be clean, tidy and in good repair. Walls and floors should be constructed of safe, durable materials that can be cleaned and disinfected readily. There must be adequate storage areas for food and equipment, a reticulated water supply and proper facilities for drainage, if appropriate.

3.2.19 Noxious odours, particularly ammonia, must not exceed a level compatible with the health and comfort of the animals and personnel.

3.2.20 Chemicals used in a facility, including detergents, disinfectants, deodorisers and pesticides must be appropriate for the purpose, and contamination of the animals’ environment must be avoided during their use. Chemicals should be used in consultation with the relevant investigators who use the facility.

Pens, cages and containers

3.2.21 Pens, cages and containers must be:

1. constructed of safe, durable materials
2. kept clean
3. maintained in good repair
4. secure and escape-proof
5. protective of animals against climatic extremes
6. designed to minimise injury to animals
7. large enough for the species and the number of animals held
8. compatible with the behavioural needs of the species.

3.2.22 The number of animals in, and placement of, cages, pens or containers should enable the social and environmental conditions for the species to be maintained.

3.2.23 If an animal of a species that normally lives in social groups must be housed in isolation or separated from a group, the duration of such housing conditions must be minimised (see Clause 3.1.12). The animal should be able to see, hear and smell animals of the same species unless such contact is precluded by the requirements of the activity.

Food and water

3.2.24 Animals must receive, and be able to access, appropriate, uncontaminated, nutritionally adequate food of a quantity and composition that maintain normal growth of immature animals and normal weight of adult animals, and meet the requirements of pregnancy, lactation or other conditions.

3.2.25 Clean, fresh drinking water must be available at all times, as suitable for the species.

3.3: Specific procedures

This chapter outlines how the wellbeing of animals may be supported and safeguarded during the conduct of specific procedures. This includes procedures used during the care and management of animals and procedures used during the conduct of approved projects.

General requirements that apply to all procedures

3.3.1 Procedures must:

1. be appropriate for the species and the circumstances
2. accord with current best practice
3. be compatible with the purpose and aims of the project or activity
4. cause the least harm, including pain and distress, to the animals
5. be performed competently, and by a person who is competent for the procedures, or under the direct supervision of a person who is competent to perform the procedures.
Handling and restraining animals

3.3.2 If handling or restraint is likely to cause harm, including pain and distress, to the animal, the use of chemical restraint (e.g. sedatives) should be considered.

3.3.3 When handling or restraint is required, the animal should be conditioned to the method used, whenever possible.

3.3.4 If prolonged restraint or confinement of an animal is required as part of a project:
   i. methods used must take into consideration the animal's physiological and behavioural needs, and ability to exercise
   ii. the animals must be assessed regularly by a person with veterinary, or other appropriate, qualifications who is independent of the project
   iii. if any adverse impact is detected, the animal must be released, or the method of restraint must be modified to minimise that impact.

Routine husbandry procedures

3.3.5 Routine husbandry procedures must be performed competently, and by a person who is competent for the procedures, or by a person under the direct supervision of a person who is competent to perform the procedures. Routine husbandry procedures are not part of a project and include, for example, clipping coats and nails, and vaccinations.

Identification of animals

3.3.6 Methods used to identify animals must:
   i. be appropriate for the species and the circumstances
   ii. be compatible with the purpose and aims of the project or activity
   iii. involve non-invasive methods whenever possible. The use of invasive methods must conform with Clause 3.3.1
   iv. cause the least harm, including pain and distress, to the animals.

Injections, blood sampling and non-surgical procedures

3.3.7 When performing injections, blood sampling and non-surgical procedures, procedures used must:
   i. minimise the risk of an animal developing complications (e.g. tissue damage, infection, haematoma, bleeding)
   ii. be performed under aseptic conditions if there is a potential risk of infection
   iii. if the procedure involves the transplantation of cells or tissues, include management of the effects of tissue rejection and immunosuppression.

Anaesthesia, analgesia and sedation, and management of pain and distress

3.3.8 The use of local and general anaesthetics, analgesics and sedatives must be considered as part of a plan to manage pain and distress, and such use should at least parallel their use in current veterinary or medical practice.

3.3.9 When anaesthetics, analgesics and sedatives are used, the choice of agent and its administration must:
   i. be appropriate for the species, age, developmental stage and physiological status of the animal
   ii. be compatible with the purpose and aims of the project or activity, and appropriate for the type of procedure.

3.3.10 Unless there is evidence to the contrary, it must be assumed that fetuses have comparable requirements for anaesthesia and analgesia as adult animals of the species. Approaches to avoid or minimise pain and distress in the fetus must be designed accordingly.

3.3.11 Regardless of their mechanism of action, the effectiveness of all anaesthetics must be monitored throughout anaesthesia.

3.3.12 When general anaesthesia is used, procedures must conform with current veterinary or medical practice and ensure that:
   i. induction is smooth, with minimum distress to the animal
   ii. the animal and the effectiveness of the anaesthetic are monitored to maintain an adequate plane of anaesthesia, minimise physiological disturbances, and monitor and manage potential complications (e.g. hypothermia, and cardiovascular and respiratory depression)
   iii. when an animal is to recover from an anaesthetic, the animal is monitored and cared for to avoid and manage complications during the post-anaesthetic period (e.g. airway obstruction, hypothermia, cardiovascular and respiratory compromise, injury from uncoordinated movements or other animals)
   iv. records are maintained of the use of anaesthetics and other drugs, monitoring of the animal, and the management of complications.

3.3.13 Animals that develop signs of pain and distress must be treated promptly, in accordance with the intervention points and humane endpoints approved by the animal ethics committee (AEC), and institutional and AEC policies and procedures (see Clauses 2.1.5 [v] [d] and
3.1.23–3.1.24.

3.1.14 Neuromuscular blocking agents must only be used in conjunction with adequate general anaesthesia or an appropriate surgical procedure that eliminates sensory awareness. The animal must be monitored to ensure that an adequate plane of anaesthesia is maintained or sensory awareness has been eliminated. Because the paralysis abolishes many criteria for assessing anaesthetic depth and pain perception (e.g. character of respiration, and corneal and flexor withdrawal reflexes), continuous or frequent monitoring of physiological variables (e.g. heart rate, blood pressure, pupil size, electroencephalogram), together with the effects on these of mild sensory stimuli, must be used.

3.1.15 Electroimmobilisation must not be used as an alternative to analgesia or anaesthesia.

**Surgical procedures**

3.3.16 The wellbeing of animals that have undergone surgical procedures must be supported and safeguarded by:

i. conducting surgical procedures under appropriate local and/or general anaesthesia. The requirement for anaesthesia of the fetus or embryo must be taken into account before conducting surgery on a pregnant female

ii. using aseptic procedures if the animal is expected to recover from surgery

iii. ensuring that all procedures conform to accepted standards in veterinary or medical practice, as appropriate for the procedure and circumstances

iv. ensuring that potential complications during and after the procedure are avoided or minimised, that animals are monitored for complications, and that any complications that do occur are effectively managed. Potential complications include hypothermia, dehydration, blood loss, tissue trauma, metabolic disturbances, poor tissue perfusion and cardiovascular and/or respiratory failure, infection, delayed wound healing and impaired function

v. ensuring that pain management that is appropriate for the species and the procedure is effective, and includes effective anaesthesia as well as avoiding and minimising postoperative pain and distress

vi. ensuring that, for non-recovery surgery, the animal remains unconscious throughout the procedure and death is confirmed at the end of the procedure

vii. ensuring that animals that undergo more than one surgical procedure have recovered to good general health before any subsequent procedure is performed, unless otherwise approved by an AEC.

**Postprocedure care**

3.3.17 After any procedure:

i. animals must be monitored and assessed with sufficient frequency to ensure that both predicted and unforeseen consequences are detected early (see Clauses 3.1.1 and 3.1.20-21). If an animal has undergone a surgical procedure, surgical wounds must be inspected regularly for evidence of infection and progress of healing

ii. prompt action must be taken so that predicted and unforeseen consequences, including pain and distress, are addressed rapidly and effectively (see Clauses 3.1.23–3.1.24)

iii. appropriate care and supportive treatment that will support and safeguard animal wellbeing must be provided, including nursing of the animal, pharmacological management of pain and distress, provision of fluid and nutritional support, and prevention or control of infection

iv. appropriate records must be maintained and made accessible to all people involved in the postprocedural care of the animal (see Clauses 2.4.30–2.4.33, 2.5.11 and 3.1.22).

3.3.18 If an animal must be housed in isolation or separated from a group after a procedure, the duration of such housing conditions should be minimised. The animal should be able to see, hear and smell animals of the same species unless such contact will interfere with data collection and interpretation (see Clause 3.1.12).

3.3.19 If an animal is to be isolated or restrained for a prolonged period after a procedure, the animal should be conditioned to the housing or restraint conditions before the procedure is undertaken (see Clauses 3.1.11 and 3.3.3).

3.3.20 Animals that have undergone surgery for transplantation of organs or tissues must be managed to avoid or minimise adverse impacts from potential rejection of the transplant and the effects of immunosuppression.

**Projects involving the fetus or embryo**

3.3.21 Where a project involves the fetus or embryo, the requirements for anaesthesia and analgesia of the fetus or embryo must be taken into account (see Clauses 3.3.8–3.3.15).

3.3.22 If a procedure conducted on a fetus or embryo would compromise the ability of the animal to survive after birth or causes untreatable pain and distress, the animal (neonate/fetus/embryo) must be killed humanely before or immediately after birth.
Induction of tumours

3.3.23 For animals in studies that involve the induction of tumours, methods used and endpoints chosen must ensure that valid results are obtained with minimal harm, including pain and distress, to the animal. Animal wellbeing must be supported and safeguarded by:

i. considering potential adverse impacts associated with the development and biology of the tumour (including growth rate, invasiveness, potential for ulceration, development of metastases and cachectic effects), effects of therapeutic agents, side effects of immunotherapy including irradiation, and consequences of surgery involved in transplantation of tumours

ii. choosing an appropriate implantation site or method of induction of the tumour that causes the least harm, including pain and distress, to the animal. The footpad, tail, brain or eye must not be used unless there is no valid alternative

iii. monitoring the growth or impact of the tumour and efficacy of therapy, and using early experimental endpoints, to obtain valid results as early as possible. Death from the tumour must not be an endpoint

iv. establishing and implementing early intervention points and humane endpoints (see Clauses 3.1.26–3.1.28)

v. wherever possible, using techniques that facilitate measurement of tumour growth and determination of early endpoints

vi. monitoring and assessing animals for signs of pain and distress, including changes in body condition and body weight; ulceration; adverse effects of procedures used for induction of the tumour; signs of growth, invasion and metastases of the tumour; and toxic effects of therapeutic agents.

Creation and breeding of new animal lines where the impact on animal wellbeing is unknown or uncertain

This clause should be read in conjunction with Clauses 2.4.26–2.4.27 and the NHMRC Guidelines for the generation, breeding, care and use of genetically modified and cloned animals for scientific purposes.

3.3.24 When creating and breeding new animal lines where the impact on animal wellbeing is unknown or uncertain, the wellbeing of the animals must be supported and safeguarded by:

i. considering the nature and extent of potential impact on animal wellbeing due to:
   a. genetic modification and the difficulty in predicting the potential impact
   b. the procedures used to create a new animal line

ii. using methods for the generation, monitoring and phenotypic description of a new animal line that accord with current best practice

iii. using the least invasive method for genotyping, and identifying the animal appropriately to allow the genotype result to be matched to the animal

iv. assessing the impact of genetic modification on the wellbeing and genetic stability of newly created genetically modified animals and their offspring across a number of generations.

Modification of behaviour and neurological function

3.3.25 Positive reinforcement should be used to motivate an animal to modify their behaviour or perform specific tasks.

3.3.26 Prolonged deprivation of water, food, social interaction or sensory stimuli must not be used to induce an animal to modify their behaviour.

3.3.27 If some form of biological stress is essential for the aims and purpose of the project, the duration and severity of the impact on the wellbeing of the animal must be as mild as possible.

3.3.28 Painful or noxious stimuli should be avoided. If their use is justified, the level and duration of the stimulus must be minimised, and provision must be made for the animal to be able to escape the stimulus.

3.3.29 Projects involving the withholding or restriction of food or water must be designed so that the animal experiences no continuing detrimental effect. Changes in fluid balance or body weight must be monitored, recorded and maintained within the limits approved by the AEC.

3.3.30 When a study involves neurological impairment that produces loss of function in the animal (e.g. impaired movement of the limbs or trunk; loss of sensibility to touch, sound, temperature or pain, or awareness of surroundings; or impairment of appetite or thirst), the special needs of the animal because of that loss of function must be met. Such animals should be provided with special care, caging and other facilities, as required.

Immunomodulation and production of antibodies

3.3.31 When agents or treatments are used to suppress the immune system (e.g. irradiation):

i. procedures to minimise the risk of infection must be followed

ii. animals must be appropriately monitored so that potential side effects are promptly identified and effectively managed.
When adjuvants are used to produce antibodies, the adverse impacts on animal wellbeing should be minimised by:

i. using an adjuvant that provides an adequate antibody titre while causing the least adverse impact on the wellbeing of the animal
ii. using a ratio of adjuvant to antigen that reduces the probability of adverse reactions
iii. choosing the volume, site and frequency of injection of adjuvant that together optimise the antibody response and minimise the risk of complications
iv. choosing a method and frequency of blood sampling that minimise the potential for harm, including pain and distress.

Wildlife and field techniques

See also clauses on acquisition (Clause 3.2.4), housing and care (Clauses 3.2.13–3.2.25), transport (Clauses 3.2.5–3.2.8) and identification (Clause 3.3.6).

General considerations

3.3.33 The wellbeing of wildlife must be supported and safeguarded by:

i. using methods, techniques and equipment that:
   a. are appropriate for the species and the situation, and the purpose and aims of the project or activity
   b. minimise the risk of transmission of disease, and direct and indirect disturbance to the habitat
ii. avoiding or minimising harm, including pain and distress:
   a. to target and non-target species
   b. to dependent young
   c. from indirect effects arising from impact on the habitat and environment.

Capture and handling

3.3.34 To minimise the risk of injury or stress-induced disease, procedures for the capture and handling of wildlife must include:

i. the involvement of a sufficient number of competent people to restrain animals in a quiet environment and prevent injury to animals and handlers
ii. chemical restraint (e.g. sedatives) where appropriate, if the period of handling is likely to cause harm, including pain and distress, to animals
iii. restraint and handling of animals for the minimum time needed to achieve the purpose and aims of the project or activity
iv. making provisions for captured animals that are ill or injured, including treatment of pain and distress.

Use of traps

3.3.35 If trapping is used to capture wildlife, the wellbeing of both target and non-target animals must be considered by:

i. selecting a trap that is suited to the species and the circumstances, and designed to ensure protection of trapped animals from injury, predators, parasites and environmental extremes
ii. monitoring traps to minimise the time animals will spend in traps, and to avoid or minimise adverse impacts on trapped animals
iii. minimising the number of days of continuous trapping within an area, and removing or deactivating traps that are not in use or are no longer required
iv. minimising the potential adverse impact caused by disrupting social structure, and adverse impacts on dependent young (e.g. by avoiding trapping in the breeding season)
v. minimising the numbers of non-target species that are trapped, and implementing a management plan for captured non-target species to ensure their wellbeing or ensure that they are humanely killed.

3.3.36 Wet pitfall traps must not be used to capture vertebrate animals. If wet pitfall traps are used to capture invertebrates, they must be managed and monitored to minimise the inadvertent capture of vertebrates, including by locating the trap where vertebrate entry is unlikely and using the smallest possible trap diameter.

Transport, holding and release

3.3.37 Transport of wildlife must be in accordance with Clauses 3.2.5–3.2.8.

3.3.38 If animals are to be held in captivity, the duration must be minimised and consistent with the purpose and aims of the project or activity. If animals are to be released, all possible steps must be taken to avoid their becoming habituated to human activity.

3.3.39 Procedures for any release of wildlife must ensure that:

i. release occurs at the site of capture, unless otherwise approved by the AEC (see also Clauses 3.4.4–5)
ii. the timing of release coincides with the period of usual activity for the species, unless safety of the animals is assured by other means, such as release into appropriate cover
animals are protected from injury and predation at the time of their release. During their recovery, animals should be held in an appropriate area where they can maintain normal body temperature and are protected from injury and predation (see Clause 3.3.12 [iii]).

Tracking the movement of wildlife

3.3.40 When devices are used to track the movement of wildlife, the weight, design and positioning of attached devices must minimise interference with the normal survival requirements of the animal.

Interference activities

3.3.41 Interference activities such as call playback, spotlighting, tiling, rock turning, investigating a nest box and disturbing nest sites must be conducted in a manner that minimises any risk to the wellbeing of the wildlife.

Voucher specimens

3.3.42 Alternatives to collecting animals as voucher specimens (e.g. tissue samples, digital photography) must be considered, where appropriate. When animals are collected as voucher specimens:

i. the number taken must be the minimum required for identification or to establish distribution
ii. the specimens must be appropriately documented and lodged with an institution that manages a publicly accessible reference collection.

Studies involving vertebrate pest animals

3.3.43 The principles of the Code must be applied equally to animals that are considered to be pests.

3.3.44 Captive feral and pest species must be killed humanely unless the aims of a project require their release, or the study involves death as an endpoint.

Humane killing

3.3.45 The method and procedures used for killing an animal must be humane and:

i. avoid pain or distress and produce rapid loss of consciousness until death occurs
ii. be compatible with the purpose and aims of the project or activity
iii. be appropriate to the species, age, developmental stage and health of the animal
iv. require minimum restraint of the animal
v. be reliable, reproducible and irreversible
vi. ensure that animals are killed in a quiet, clean environment away from other animals
vii. ensure that death is established before disposal of the carcass, fetuses, embryos and fertilised eggs.

3.3.46 Dependent offspring of animals to be killed must be cared for or humanely killed.

3.4: Provisions for animals at the conclusion of their use

3.4.1 Provisions for animals at the conclusion of their use must be made promptly and in accordance with the animal ethics committee (AEC) approval. Provisions may include:

i. rehousing (rehoming) (see Clauses 3.4.2–3.4.3)
ii. return to normal husbandry conditions or natural habitat (see Clauses 3.4.4–3.4.5)
iii. humane killing (see Clauses 3.3.45–3.3.46)
iv. reuse (see Clauses 1.22, 1.24 and 2.3.15)
v. tissue sharing (see Clauses 1.26, 2.4.24 and 2.5.10).

Rehousing (rehoming)

3.4.2 Opportunities to rehome animals should be considered wherever possible, especially when the impact of the project or activity on the wellbeing of the animal has been minimal and their physiological condition and behavioural attributes indicate that they can be introduced to a new environment with minimal, transient impact on their wellbeing.

3.4.3 An animal must not be released to a person at the conclusion of their use unless:

i. the AEC has approved such release
ii. safeguards are in place and approved by the AEC to ensure the ongoing wellbeing of the animal. In the case of primary and secondary level
students, safeguards must include a written commitment from a parent or guardian for the provision of adequate, ongoing and responsible
care of the animal, and demonstrating an awareness of relevant legislative requirements regarding the animal being rehomed
iii. transport of animals between sites is in accordance with Clauses 3.2.5–3.2.8.

Return to normal husbandry conditions or natural habitat

3.4.4 The return of animals to normal husbandry conditions and the release of wildlife to their natural habitat must be in accordance with
current best practice.

3.4.5 If release of wildlife animals is permitted, such release must comply with Clause 3.3.39.

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