National Code of Practice for the **Humane Shooting of Kangaroos and Wallabies for Commercial Purposes**

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AgriFutures Australia is the new trading name for Rural Industries Research & Development Corporation (RIRDC), a statutory authority of the Federal Government established by the Primary Industries Research and Development Act 1989.

Foreword

We are pleased to release the revised *National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes* (the National Code).

The Australian Government supports the sustainable harvest and commercial export of kangaroo products under EPBC Act–approved state management plans, which must be conducted according to the highest possible animal welfare standards.

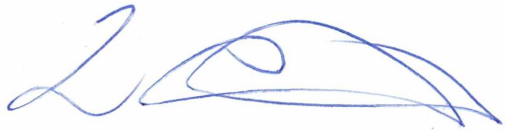
The first edition of the National Code was released by the Australian Government in 2008 after extensive consultation with stakeholders including state agencies, landowners and animal welfare groups. Since its publication the National Code has provided a rigorous framework that ensures a uniformly humane approach to the commercial harvest of kangaroos. Compliance with the National Code is a requirement of all state kangaroo management plans approved under the EPBC Act.

The revised National Code incorporates new research into the humane treatment of kangaroos and wallabies, and recognises the latest community expectations regarding animal welfare. Once again, its release follows extensive collaboration and consultation among stakeholders – with state governments, pastoralists, the scientific community and animal welfare groups.

The revised *National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes* remains a cornerstone of our commitment to sustainable kangaroo harvesting. Australians can be confident that the kangaroo harvest will continue to be managed sustainably both for economic benefit and to ensure the long-term health of the broader ecosystem. Strict compliance with the National Code will continue to be a requirement for EPBC Act approval of management plans for commercial kangaroo harvesting and export.

The Hon Sussan Ley MP

Minister for the Environment



The Hon David Littleproud MP

Minister for Agriculture, Drought and Emergency Management

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Preface

The 2020 *National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes* sets an achievable standard of humane conduct and is the minimum required of persons shooting kangaroos and wallabies for commercial purposes. The Code is implemented through education and training and by relevant government authority legislation.

This Code replaces the 2008 edition of the commercial code, which was developed, along with the accompanying non-commercial code, by a working group that included representatives from government authorities, the kangaroo industry and animal welfare organisations, and was endorsed by the Natural Resource Management Ministerial Council (NRMMC).

Research published in 2014, by the then Rural Industries Research and Development Corporation (RIRDC, now AgriFutures Australia), included recommendations for improving the humaneness of harvesting and it was important that this and other new information on macropod biology, public perceptions about kangaroo management and changes to the kangaroo industry be included in an updated code. In 2017, following discussion with the Australian Government, AgriFutures Australia agreed to undertake a review of the 2008 *Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes*, subject to the agreement of relevant states and territories involved in the commercial harvest of kangaroos.

A project reference group for the code review was established with representatives from Australian, state and territory government authorities responsible for kangaroo management, the kangaroo and pastoral industries, the Australian Veterinary Association, RSPCA Australia and AgriFutures Australia. Research scientists with expertise in kangaroo welfare were appointed to conduct the review and prepare a revised version of the code. Kangaroo harvesters provided input at several forums held in NSW and Queensland. Public comment on the revised Code was also sought through submissions and opinion surveys. Details of the project reference group and research scientists are provided in Appendix 9.

The 2020 version of the *National Code of Practice for the Humane Shooting of Kangaroo and Wallabies for Commercial Purposes* has taken an evidence-based approach, applying the best available scientific knowledge on kangaroo welfare. This edition of the Code will be reviewed five years after its adoption. However, if new research or other significant information becomes available, requirements and recommended procedures may change.

Introduction

Commercial harvesting of macropods involves the shooting of certain wild, abundant and free-ranging kangaroos or wallabies to gain an economic return from the sale of their meat and/or skins. Commercial harvesting has a dual purpose; it makes use of a valuable and sustainable resource but also provides a management option for landholders wanting to reduce the damage caused by overabundant kangaroos and wallabies.

Kangaroos and wallabies are protected native fauna and can only be shot under the appropriate licence or permit, adhering to the requirements of this Code when they are harvested commercially, or the *National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Non-Commercial Purposes* when they are shot for damage mitigation (or other non-commercial) purposes.

Purpose

This Code sets criteria for the humane shooting of kangaroos and wallabies for commercial purposes, specifies the most appropriate euthanasia methods for pouch young and provides guidelines for minimising the negative welfare impacts on young-at-foot. The Code (and its associated standard operating procedures) provides direction and guidance for kangaroo harvesters.

Scope

The scope of this Code is to ensure that the shooting of kangaroos and wallabies for commercial purposes is carried out in a manner to minimise, to the fullest extent possible, pain, distress and suffering.

The Code is not intended to cover all practices related to the commercial harvesting of kangaroos and wallabies. Harvesters also need to be familiar with other requirements relating to the use of firearms, food safety and hygiene, workplace health and safety, specific industry requirements etc. Individuals requiring further details on aspects of harvesting that are not included in this Code should contact state kangaroo management agencies, refer to industry guidelines and other resources (see *Appendix 7: Resources for further information*).

Requirements

The ***requirements*** highlighted throughout the Code represent the minimum standards that must be met to achieve an acceptable level of animal welfare during commercial harvesting. *Requirements* must be met for animal welfare purposes.

The requirements are intended to be clear, essential and verifiable statements; however, not all issues addressed in the requirements are able to be fully defined by scientific research or are able to be quantified. Requirements use the word ‘must’. A summary of Code requirements can be found in Appendix 10.

Structure

The Code is divided into three sections:

Section 1: Harvester responsibility and competency

Section 2: Shooting of kangaroos and wallabies for commercial purposes

Section 3: Euthanasia of dependent young and wounded or injured kangaroos and wallabies

These sections provide a summary of the requirements of the Code. The Code also has nine Appendices that provide more detailed information on how to achieve the requirements of the Code.

The Appendices are:

Appendix 1: Assessment requirements for shooting accuracy testing

Appendix 2: Developmental stages of kangaroo young

Appendix 3: Firearm and ammunition specifications

Appendix 4: Standard operating procedure for shooting kangaroos and wallabies

Appendix 5: Standard operating procedure for euthanasia of pouch young

Appendix 6: Standard operating procedure for dealing with dependent young-at-foot

Appendix 7: Resources for further information

Appendix 8: Relevant legislation

Appendix 9: Participants

Appendix 10: Summary of Code requirements

Legislation

All shooting of kangaroos and wallabies, whether on public or private land, is subject to law. As the laws may differ between states and territories, harvesters must contact the relevant government authority in the state or territory in which the shooting will occur for appropriate advice. Except where specifically exempted by law, states and territories will require the harvester to have a licence or permit issued by a relevant government authority. The licence, permit or statutory instrument will specify that commercial harvesting of kangaroos and wallabies must be done in accordance with this Code (or any subsequent relevant nationally-endorsed codes that replace it) and will also stipulate any other conditions or restrictions that may apply. The requirements of this Code work in conjunction with relevant state or territory legislation. A lack of knowledge of the state or territory animal welfare legislation is no defence against prosecution for animal welfare offences. Refer to *Appendix 8: Relevant legislation*.

Definitions

Animal welfare – means the physical and mental state of an animal in relation to the conditions in which it lives and dies [1].

Cervical dislocation – a method of euthanasia that involves stretching of the neck to separate the cervical vertebrae from the skull, which damages the spinal cord, and ruptures cervical and cranial blood vessels. Insensibility and death are due to direct damage to the brain stem or lack of blood to the brain.

Commercial purposes – where the kangaroo or wallaby is shot to be used as a product (carcass or skin) to be sold within Australia or overseas.

Consciousness (or sensibility) – a state whereby an individual is aware of internal and external sensations (e.g. pain).

Decapitation – a method of euthanasia that involves severing the head from the body, which causes damage to the brain stem and spinal cord that leads to respiratory arrest and death.

Dependent young – kangaroo and wallaby young that are reliant on their mother for survival. Includes all pouch young and young-at-foot that still require milk to meet their nutritional needs.

Duty of care - the obligation for people to take reasonable measures to protect the welfare of animals that their activities may impact upon; in the case of harvesting it is the level of responsibility for kangaroo and wallaby welfare that is expected from harvesters.

Euthanasia – means the act of inducing death using a method that causes a rapid and irreversible loss of consciousness with minimum pain and distress to the animal to relieve current or potential suffering (derived from OIE, 2018) [1].

Exsanguination (bleeding out) - a secondary step in euthanasia that is used when necessary to ensure death after stunning, or in otherwise unconscious animals. Involves cutting the throat or neck transecting skin, muscle, trachea, oesophagus, carotid arteries, jugular veins, and a multitude of sensory and motor nerves and other vessels. Exsanguination is not used as a sole euthanasia method as it may take several minutes to die and causes anxiety, pain and distress in conscious animals [7].

Harvester (or trapper, or shooter) – appropriately licenced personnel that conduct the shooting of kangaroos and wallabies for commercial purposes. Note that ‘trapper’ is a term used in NSW.

Humane – refers to an absence of (or minimal) pain, suffering and distress; in the case of killing or euthanasia, humane methods are those which minimise pain, suffering and distress.

Kangaroo – refers to the species of large kangaroo that are harvested from the *Macropus* genus i.e. eastern grey and western grey from the sub genus *Macropus (Macropus)* and red kangaroo, and euro-wallaroo complex of species from the sub genus *Macropus (Osphranter)* [2–4].

Kangaroo harvesting – a form of kangaroo population management where the aim is to provide a sustained yield of a product that is of benefit to the harvester (i.e. a yield that can be taken year after year without affecting the viability of the population) (derived from Caughley 1977) [8].

Killing – any procedure that causes the death of an animal [1].

Non-commercial purposes – where the kangaroo or wallaby is shot for reasons other than commercial utilisation of kangaroo or wallaby products (carcass or skin).

Pouch young – kangaroo and wallaby young that are found *within* the pouch of the female. Includes young that are still in the pouch all of the time and young that spend short periods out of the pouch (i.e. at the 'in-out' stage of development). Pouch young can be furless, partially furred or completely covered in fur [5, 6]. Young that have stood on the ground may have dirt on the pads or nails of their hind feet and the pad skin may not be soft (sometimes referred to as 'hard feet').

Young-at-foot – kangaroo and wallaby young that are found *outside* the pouch but are not yet independent [5, 6]. Includes young that have permanently emerged from the pouch and young that spend short periods out of the pouch (i.e. at the 'in-out' stage of development).

Sentient – the capacity to perceive sensations originating from sensory inputs, which is present from a certain developmental stage onwards [9].

Unconsciousness (or insensibility) – a state whereby an individual is unaware of internal or external sensations (e.g. pain) that occurs when the brain's ability to integrate information is blocked or disrupted. An unconscious animal is unable to perceive pain.

Wallaby – refers to the species of wallaby that are harvested, from the genus *Notomacropus* i.e. Bennett's wallaby (a sub species of red-necked wallaby) (*Notomacropus rufogriseus rufogriseus*), Tammar wallaby (*Notomacropus eugenii*) and from the genus Thylogale i.e. Tasmanian pademelon (or rufous-bellied pademelon) (*Thylogale billardierii*). [2].

SECTION 1: Harvester responsibility and competency

Objective: Harvesters understand their responsibilities for the humane treatment of kangaroos and wallabies and are able to perform their tasks competently.

Responsibilities

Harvesters have a duty of care to ensure that kangaroos and wallabies are killed in a manner that minimises pain, suffering and distress. Harvester commitment is vital to ensure that established standards are implemented.

REQUIREMENTS

1.1 A person conducting commercial harvesting must exercise a duty of care to ensure that kangaroos and wallabies are harvested humanely and they understand and comply with the requirements of this Code.

Competency

Harvesters need to have the knowledge, skills, attitude and behaviour to undertake the requirements of this Code.

Elements of competency that contribute to the humane harvesting of kangaroos include:

- Understanding animal welfare principles and responsibilities
- Accurate shooting of kangaroos and wallabies
- Euthanasia of wounded or injured animals
- Use of acceptable methods for euthanasing pouch young
- Taking appropriate action to minimise the suffering of orphaned dependent young-at-foot
- Maintaining accurate harvesting records.

Supporting evidence of competency should include any of the following:

- Records of on-the job training
- Relevant experience
- Recognised training (e.g. TAFE courses) and staff training registers
- Approved shooting accuracy tests (see below)
- Induction training
- Supervisor sign-off for specific tasks.

Shooting accuracy testing

Harvesters are required to pass a shooting accuracy test before they are permitted to shoot kangaroos and/or wallabies. The purpose of testing is to ensure that each person is capable of shooting with sufficient accuracy to meet the requirements set out in this Code.

Testing is best conducted under field conditions normally encountered during harvesting.

REQUIREMENTS

1.2 Harvesters must be competent to perform their required tasks and can be supervised by a competent person.

1.3 Harvesters must pass a recognised (or approved) shooting accuracy test at least every 5 years.

1.4 Harvesters and test supervisors (assessors) must adhere to the minimum test conditions and requirements as specified in Appendix 1: Assessment requirements for shooting accuracy testing (or as specifically required by state or territory jurisdictions), for the shooting accuracy assessment to be valid.

SECTION 2: Shooting kangaroos and wallabies for commercial purposes

Objective: The shooting of kangaroos and wallabies for commercial purposes is conducted in a humane and effective manner that minimises animal pain, suffering and distress.

When shooting kangaroos and wallabies, the objective is to achieve instantaneous loss of consciousness and rapid death without regaining consciousness.

Detailed shooting procedures are provided in *Appendix 4: Standard operating procedure for shooting kangaroos and wallabies*.

Firearms and ammunition

Harvesters must only use combinations of firearm and ammunition that complies with or exceeds the minimum specifications and within the maximum distance (or range) as outlined in *Appendix 3: Firearm and Ammunition specifications.*

Centre-fire rifles must be used for the shooting of kangaroo species, except in special circumstances where it may not be safe or practical to do so (e.g. in semi-urban areas or for the euthanasia of wounded or injured animals, or young-a-foot).

Rim-fire rifles have lower power and are therefore only suitable for shooting smaller wallabies and for the euthanasia of wounded or injured kangaroos/wallabies or dependent young-at-foot.

Only bolt-action (repeating or single shot) rifles are permitted for the shooting of kangaroos and wallabies. Self-loading or semi-automatic rifles must not be used.

Rifles must be fitted with a telescopic sight and be sighted-in against an inanimate target before commencing each day or night's shooting. The telescopic sight should be re-adjusted on an inanimate target as often as required during each shooting session.

Hollow-point, soft-point and polymer/ballistic tip ammunition is permitted. However, sub-sonic, full metal jacket, and match ammunition must not be used.

REQUIREMENTS

2.1 Targeted kangaroos and wallabies must only be shot within the stated maximum range and using a combination of firearm and ammunition that complies with or exceeds the minimum specifications in Appendix 3: Firearm and ammunition specifications (Table 1).

Targeting and shooting animals

Targeted animals must be killed with a **head shot** (unless they are wounded or injured, refer to *Section 3* of the Code). An accurately placed head shot will result in immediate unconsciousness and rapid death [7, 10, 11]. To minimise the risk of wounding and to improve shooting accuracy, target animals must be clearly visible, stationary (except when shooting wounded or injured animals) and standing upright. Shooting from a moving vehicle is not permitted as this also affects shooting accuracy.

REQUIREMENTS

2.2 Harvesters must aim to shoot target kangaroos and wallabies in the head (so as to destroy the vital areas of the brain) as described in Appendix 4: Standard operating procedure for the shooting of kangaroos and wallabies. Shot placement for targeted kangaroos and wallabies is shown in Figure 1 (Appendix 4).

2.3 Target animals must be clearly visible, stationary (wounded or injured animals excepted) and standing upright.

2.4 When target animals are shot from a vehicle, the vehicle must be stationary.

2.5 If there is any concern that the shot animal has only been wounded and not killed, then no further animals can be shot until all reasonable efforts have been made to locate and euthanase the wounded animal.

2.6 No more than 3 target kangaroos or wallabies in a group can be shot before the carcasses are checked and retrieved by the harvester.

Shooting female kangaroos and wallabies

If female kangaroos or wallabies are shot, then any dependent young must be euthanased to prevent suffering. Even if there is no obvious large pouch young, the female could have a small pouch young or a young-at-foot.

For further details and specific requirements refer to *Section 3* of the Code.

Procedures for the humane euthanasia of unfurred and furred pouch young can be found in *Appendix 5: Procedures for euthanasia of pouch young*.

In addition, *Appendix 6: Standard operating procedure for dealing with dependent young-at-foot* provides information on the welfare impact of orphaning and guidance for recognising and managing dependent young-at-foot.

REQUIREMENTS

2.7 If female kangaroos or wallabies are shot, the pouch must be checked thoroughly for pouch young (and any young found must be euthanased promptly, see Requirement 3.4).

Confirmation of death

Confirmation of death is an important aspect of humane shooting. A combination of the following criteria provides the most practical and reliable evidence of death [7]:

- No heartbeat
- No breathing
- No corneal reflex (no blinking when the eyeball is touched)
- No response to a toe pinch (a firm squeeze of the pad on the large toe).

REQUIREMENTS

2.8 Harvesters must confirm that shot kangaroos and wallabies are dead before processing the carcass.

2.9 If an animal shows signs of consciousness after shooting then a second shot must be taken immediately or an acceptable alternative (or secondary) method applied.

Follow-up of wounded animals

Wounded kangaroos and wallabies must be euthanased quickly and humanely to alleviate pain, suffering and distress. For further details and specific requirements refer to *Section 3* of the Code and *Appendix 4: Standard operating procedure for shooting kangaroos and wallabies.*

SECTION 3: Euthanasia of dependent young and wounded or injured kangaroos and wallabies

Objective: Dependent young of shot female kangaroos/wallabies and wounded or injured kangaroos/wallabies are euthanased promptly and humanely using methods that minimise animal pain, suffering and distress.

Euthanasia principles

Euthanasia involves ending the life of an individual animal in a way that minimises or eliminates pain and distress [7]. A good euthanasia method should result in rapid loss of consciousness (insensibility), followed by cardiac or respiratory arrest and the subsequent loss of brain function.

Euthanasia is an important aspect of commercial harvesting. Any dependent young (pouch young or young-at-foot) that are orphaned after their mother has been killed will need to be euthanased to prevent future suffering due to lack of maternal care. In addition, adult animals that are shot but not killed (or are injured in another way during harvesting e.g. hit by a vehicle, fence entanglement) should be found and promptly euthanased. If left, wounded animals can escape and suffer from pain, distress and the disabling effects of the injury.

Methods of euthanasia

Any euthanasia method used during commercial harvesting must result in a rapid loss of consciousness followed by death without the animal regaining consciousness.

Different methods are required depending on the animal's stage of development (*Appendix 2: Developmental stages of kangaroo young*).

For details on acceptable euthanasia methods see relevant sections below and the following appendices:

- Pouch young (*Appendix 5: Standard operating procedure for euthanasia of pouch young*)
- Young-at-foot (*Appendix 6: Standard operating procedure for dealing with dependent young-at-foot*)
- Wounded or injured kangaroos and wallabies (*Appendix 4: Standard operating procedure for shooting kangaroos and wallabies*).

Confirmation of death

Proper euthanasia technique includes a follow-up examination to confirm death. A combination of the following criteria provides the most practical and reliable evidence of death [7]:

- No heartbeat
- No breathing
- No corneal reflex (no blinking when the eyeball is touched)
- No response to a toe pinch (a firm squeeze of the pad on the large toe).

Secondary euthanasia methods

When a euthanasia method causes unconsciousness but does not cause death, a second step may be necessary to quickly and efficiently ensure death.

Signs of consciousness include [12]:

- Natural spontaneous blinking of the eyes
- Eyelid closure in response to lightly touching the eyeball
- Rhythmic breathing (ribs moving in an out)
- Lifting the head or trying to stand up
- Vocalising.

Secondary euthanasia methods such as decapitation, cervical dislocation and bleeding out (exsanguination) are usually not appropriate as single methods of euthanasia in conscious animals but can be used in conjunction with other methods (in already unconscious or dying animals) to cause death [7].

REQUIREMENTS

3.1 Animals must be checked for signs of unconsciousness immediately after the euthanasia method has been applied and until death is confirmed.

3.2 If an animal shows signs of consciousness after the application of a euthanasia method then it must be repeated and/or an acceptable secondary euthanasia method applied to ensure a quick death.

3.3 Death must be confirmed before leaving or disposing of the carcass.

Euthanasia of pouch young

Pouch young are dependent on maternal care for survival, therefore as soon as possible after a female kangaroo or wallaby has been shot it is important to check the pouch and euthanase any pouch young without delay. Refer to *Appendix 5: Standard operating procedure for euthanasia of pouch young.*

To experience pain, suffering or distress an animal must be both sentient and conscious. This means that they must have the required neural system in place and the brain must be developed enough to process sensory nerve impulses into sensations. They must also be in a state where they are aware of these sensations [9]. Research examining the brain responses to harmful stimuli provides strong evidence that marsupial young—which are neurologically extremely immature at birth—may not have the capacity to experience the sensation of pain until they start to develop fur and open their eyes [13, 14], therefore methods used to kill *unfurred* pouch young are not likely to cause suffering. However, pouch young that have started to develop fur are considered sentient and conscious, therefore it is important to use the most humane euthanasia methods (i.e. those that cause instantaneous unconsciousness and rapid death without regaining consciousness).

The most suitable method of euthanasia for small (<5cm in length) *unfurred* pouch young is decapitation and/or cervical dislocation. For larger (>5cm in length) unfurred pouch young, decapitation should be used.

Euthanasia of *partially furred* and *fully furred* pouch young should be performed using a concussive blow to the head. A firm and accurate blow to the head induces death by physical disruption of the brain. When performed by skilled operators, this is an effective method for euthanasia of neonatal and small animals with thin skulls [7, 15–17]. Although it may be perceived as inhumane by observers and it can be unpleasant for operators to perform, from the animal's perspective, the duration and extent of suffering is less than other currently available methods [18].

If there is uncertainty about the stage of development of the pouch young and whether they have started to develop fur (and are therefore capable of experiencing pain), then harvesters should apply the 'benefit of the doubt' and use a concussive blow to the head.

REQUIREMENTS

3.4 Pouch young must be euthanased using an acceptable method (as described in Appendix 5: Standard operating procedure for euthanasia of pouch young) as soon as their mother has been confirmed dead. These are:

Unfurred pouch young <5cm length (including tail) - decapitation or cervical dislocation

Unfurred pouch young >5cm (including tail) – decapitation

Partially furred to fully furred pouch young - concussive blow to the head.

Euthanasia of dependent young-at-foot

Young-at-foot can vary in their level of dependence on maternal care depending on their age and environmental conditions (especially food availability). Orphaned dependent young-at-foot that are likely to experience severe suffering and have a poor chance of survival, should be euthanased wherever possible [19].

Guidance on determining the level of dependence on maternal care and when to euthanase to prevent suffering is provided in *Appendix 6: Standard operating procedure for dealing with dependent young-at-foot*.

Euthanasing young-at-foot can be problematic as they are usually mobile and will often flee after the female has been shot. However, harvesters must make every reasonable effort to euthanase dependent young-at-foot. This could include shooting the young-at-foot first or waiting until they return to the location where the female was shot. The judgement of the harvester is important in determining which strategies are practicable in each particular situation.

REQUIREMENTS

3.5 Harvesters must make every reasonable effort to euthanase dependent young-at-foot whenever practically possible, as described in Appendix 6: Standard operating procedure for dealing with dependent young-at-foot.

When young-at-foot are euthanased it is important to use the most humane and acceptable methods.

REQUIREMENTS

3.6 For euthanasia of smaller young-at-foot (approx. ≤5kg bodyweight) that have been caught by hand, the harvester must use a concussive blow to the head as described in Appendix 5: Standard operating procedure for euthanasia of pouch young.

3.7 For euthanasia of larger, mobile young-at-foot, the harvester must shoot the animal using a combination of firearm and ammunition that complies with or exceeds the minimum specifications and within the maximum range specified in Appendix 3: Firearm and Ammunition specifications (Table 2). Harvesters must aim to hit the target animal in either:

the head (so as to destroy the vital areas of the brain); or

the chest (so as to destroy the heart, lungs and great blood vessels),

as shown in Figure 3 (Appendix 6).

Euthanasia of wounded or injured kangaroos and wallabies

All reasonable efforts must be made to locate animals that are wounded during shooting or otherwise injured during harvesting operations (e.g. hit by vehicle, fence entanglement etc.). If left, wounded or injured animals can escape and suffer from pain and the disabling effects of the injury.

Once located, wounded or injured animals must be killed as quickly and humanely as possible. When it is safe to do so, the wounded or injured animal should be euthanased with a shot to the head or chest. In circumstances where use of a firearm for the euthanasia of a wounded or injured animal is unsafe (or impractical), a heavy blow to the back of the skull with sufficient force to destroy the brain is permissible.

REQUIREMENTS

3.8 All reasonable efforts must be made to locate and euthanase kangaroos and wallabies that are wounded during shooting or otherwise injured as part of harvesting operations.

3.9 For the euthanasia of wounded or injured kangaroos or wallabies, when it is safe and practical to use a firearm, the harvester must shoot the animal using a combination of firearm and ammunition that complies with or exceeds the minimum specifications and within the maximum range specified in Appendix 3: Firearm and Ammunition specifications (Table 2).

Harvesters must aim to hit the target animal in either:

- ***the head (so as to destroy the vital areas of the brain); or***
- ***the chest (so as to destroy the heart, lungs and great blood vessels),***

as described in Appendix 4. Shot placements for euthanasia of wounded or injured kangaroos and wallabies are shown in Figure 2 (Appendix 4).

3.10 For the euthanasia of wounded or injured kangaroos or wallabies, when it is not safe (or practical) to use a firearm, the harvester must euthanase the animal using a concussive blow to the head delivered with sufficient force to crush the skull and destroy the brain.

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16. EFSA (2004). Opinion of the Scientific Panel on Animal Health and Welfare on a request from the Commission related to welfare aspects of the main systems of stunning and killing the main commercial species of animals. *EFSA Journal* 45, 1–29.

17. Woods, J., Shearer, J.K. & Hill, J. (2010). Recommended On-farm Euthanasia Practices. In: Grandin T (ed) *Improving Animal Welfare: A Practical Approach*. CABI, Wallingford, Oxfordshire, U.K.

18. Sharp, T.M. (2015). *Commercial kangaroo harvesting: the animal welfare implications for dependent young*. (Unpublished PhD thesis). Sydney, NSW: University of New South Wales.

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List of appendices

APPENDIX 1: Assessment requirements for shooting accuracy testing

Harvesters and test supervisors (assessors) must adhere to the following minimum test conditions and requirements for the shooting accuracy assessment to be valid.

Note that these are minimum criteria only and further specific conditions and requirements may apply.

Note that some conditions (i.e. shooting distance to target, shooting position, shooting platform and firearm) for the assessment of harvesters shooting wallabies (in Tasmania) may be different.

Harvesters must therefore contact the relevant government authority in the state or territory in which testing is conducted for appropriate advice.

Test conditions

- *Target*: Target with 75 millimetre (mm) diameter circle for 100 metres or (70mm circle for 100 yards). This is referred to as the National Humane Shooting Test Target
- *Shooting distance to target*: 100 metres (or 100 yards)
- *Shooting position*: Seated, and with a suitable gun rest as desired by the shooter
- *Shooting platform*: Vehicle or simulated vehicle
- *Firearms*: A centre-fire rifle fitted with a telescopic sight. Nominal bore size of at least 0.204 calibre
- *Weather*: Testing must not be conducted when it is windy (> approx. 25km/h) or when visibility is poor (i.e. during rain, hail/snow, fog/mist, dust storms).

Test requirements

Objective: To shoot a five-round grouping to achieve a 75mm group or smaller within the relevant circle in the National Humane Shooting Test Target.

Procedures:

- A shooter should use their own rifle and ammunition during testing. The shooter is to ensure the firearm is in a safe operating order and must be used and handled safely during the test.
- The supervisor should give the shooter the opportunity for a practice session immediately before the test, however a clean (unused) target must be used for the test.
- The supervisor must inform the shooter when the test has started. The shooter is permitted to shoot only five rounds at the target during the test.
- If the shooter does not meet the objective of the test, the shooter will be permitted a second try at the test on the same day. A shooter is permitted to do the test as many times as desired, but a maximum of two attempts at the test is permitted on any one day.
- The test supervisor who is assessing the shooter for the firearms accuracy testing must hold the necessary licences, approvals and training as appropriate for the state or territory in which testing is conducted.
- The shooter will be assessed as being competent if the test conditions and test requirements (including the test objective of all five rounds placed within the designated area of the target) are met.

APPENDIX 2: Developmental stages of kangaroo young

A summary of the developmental stages of kangaroo young, from Russell (1989) and (1973)

In pouch		**In and out of the pouch**	**Young-at-foot**	
Birth to start of developing fur	*Developing fur to fully furred and head occasionally out of pouch*	*First emergence from the pouch to permanent emergence*	*Permanently emerged from the pouch to weaning*	*Post-weaning*
Young entirely within the pouch all of the time. The body is furless and the eyes are closed. The young is continuously attached to the nipple for the first 17-19 weeks.	The eyes are opened and the head is occasionally out of the pouch. Fur is starting to spread over the body Activity of young gradually increases as it grows. Time with head outside pouch increases.	The body is completely covered with hair Dirt on the pads and nails of the hind feet (indicating the joey has stood on the ground). The first excursions from pouch are usually accidental during pouch cleaning by the mother. When out of the pouch, the young maintains proximity to its mother. The distance between mother and young gradually increases as time spent out of the pouch increases. Young re-establishes contact with mother using loud, harsh coughing vocalisations. Initially spends a lot of time crouched with its head in its mother's pouch, sometimes suckling but may also be seeking contact with mother. Play behaviour with mother begins to occur, this is generally play-fighting or sparring with fast running where the joey dashes away from the mother and then back to her.	The young is much more independent and leaves its mother for longer periods. The joey maintains proximity to its mother – it will approach her more often than she approaches it. The joey returns to mother when alarmed and to suckle. Younger young-at-foot follow mother and rest and forage with her. Older young-at-foot still rest with mother during periods of inactivity during day but often forage a distance away from her at night.	Sub-adult males disperse from mother's home range 1-2 years after weaning. Sub-adult females remain in their mother's home range areas until sexual maturity and beyond. They rarely disperse very far, giving rise to kin groups of females.

Russell, E. (1989). Maternal behaviour in the Macropodoidea. *Kangaroos, Wallabies and Rat-Kangaroos* (eds G. Grigg, P. Jarman & I. Hume), pp. 549–569. Chipping Norton, NSW: Surrey Beatty & Sons Pty Ltd.
Russell, E. (1973). Mother-young relations and early behavioural development in the marsupials *Macropus eugenii* and *Megaleia rufa*. *Zeitschrift für Tierpsychologie*, *33*, 163–203.

APPENDIX 3: Firearm and ammunition specifications

Table 1: Minimum specifications for firearms and ammunition for kangaroos and wallabies shot for commercial purposes

Species	Calibre of firearm (inches)	Cartridge size	Projectile	Maximum Range (metres)	Comments
Kangaroos: Red kangaroo Eastern grey kangaroo Western grey kangaroo Euro or wallaroo	.224 (5.69mm)	.222 Remington .223 .22/250 (or larger)	50 grain (or heavier)	200	Centre-fire
	.204 (5.18mm)	.204 Ruger	40 grain	200	Centre-fire
Wallabies: Bennett's wallaby Tasmanian pademelon Tammar wallaby	.172 (4.37mm)	.17 Remington	20 or 25 grain	100	Centre-fire
	.172 (4.37mm)	.17HMR[a]	20 grain	70	Rim-fire
	.224 (5.69mm)	.22 Hornet	45 grain	80	Centre-fire
	.224 (5.69mm)	.22LR	40 grain (or heavier)	20	Rim-fire. Hollow-point ammunition only. Sub-sonic ammunition must not be used.
	.224 (5.69mm)	.222 Remington .223 .22/250 (or larger)	50 grain (or heavier)	200	Centre-fire
	.224 (5.69mm)	.22 Magnum	32 grain (or heavier)	80	Rim-fire. Hollow-point or polymer/ballistic tip ammunition only

[a] The .17 HMR (with 20 grain projectile, at a maximum range of 70 metres) may be also be used on kangaroos in special circumstances (e.g. in sensitive or high-profile areas such as golf courses, caravan parks etc.) after gaining approval from the relevant state or territory kangaroo management agency.

Table 2: Minimum specifications for firearms and ammunition for shooting of wounded or injured kangaroos and wallabies and dependent young-at-foot

Species	Calibre of firearm (inches)	Cartridge size	Projectile	Maximum Range (metres)	Comments
All kangaroos and wallabies	.224 (5.69mm)	.222 Remington .223 .22/250 (or larger)	50 grain (or heavier)	200	Centre-fire
	.204 (5.18mm)	.204 Ruger	40 grain	200	Centre-fire
	.172 (4.37mm)	.17 Remington	20 or 25 grain	100	Centre-fire
	.172 (4.37mm)	.17HMR	20 grain	70	Rim-fire
	.224 (5.69mm)	.22 Hornet	45 grain	80	Centre-fire
	.224 (5.69mm)	.222 Remington .223 .22/250 (or larger)	50 grain (or heavier)	200	Centre-fire
	.224 (5.69mm)	.22 Magnum	32 grain (or heavier)	80	Rim-fire Hollow-point or polymer/ballistic tip ammunition only.
	.224 (5.69mm)	.22LR	40 grain (or heavier)	20	Rim-fire Solid-point ammunition may only be used at point-blank range. Sub-sonic ammunition must not be used.

APPENDIX 4: Standard operating procedure for shooting kangaroos and wallabies

Background

- When free-ranging kangaroos and wallabies are shot for commercial purposes they must be killed in a manner that minimises pain and suffering.
- An accurately placed head shot, using an appropriate firearm/ammunition combination and from a suitable range, will result in immediate loss of sensibility and rapid death without regaining consciousness.

Application

- This procedure provides guidelines for the humane shooting of kangaroos and wallabies.
- The aim is to shoot and kill the targeted animal with a single shot to the head and to take every effort to minimise the chances of wounding which would cause significant distress, pain and suffering.

Methods

Shooting environment

- Most commercial harvesting of kangaroos and wallabies is done at night with the aid of a spotlight. Harvesters shoot from a seated position within the cabin of a vehicle.
- Comfort and stability of the firing position is strongly associated with an accurate shot, therefore harvesters should ensure they are in a comfortable shooting position and use a suitable gun rest that supports the rifle[a].
- Avoid shooting during adverse weather that would affect the accuracy of shooting i.e. when it is windy (>25km/h) or when visibility is poor (i.e. during rain, hail/snow, fog/mist, dust).

[a] Aebischer, N. J., Wheatley, C. J., & Rose, H. R. (2014). Factors associated with shooting accuracy and wounding rate of four managed wild deer species in the UK, based on anonymous field records from deer stalkers. *PLoS One*, *9*(10), e109698

Firearms and ammunition

- Centre-fire rifles must be used for the shooting of kangaroos, with the exception of special circumstances where it might not be safe or practical to do so (e.g. in semi-urban areas, euthanasia of wounded or injured animals) (see Table 1: Minimum specifications for firearms and ammunition for kangaroos and wallabies shot for commercial purposes in *Appendix 3: Firearm and ammunition specifications*).
- Rim-fire rifles are lower powered and do not have as long a range as centre-fire rifles, therefore they are only suitable for shooting smaller wallabies and for the euthanasia of wounded or injured kangaroos/wallabies or dependent young-at-foot.
- Only bolt-action repeating or single shot rifles are permitted. Self-loading or semi-automatic rifles must not be used since they can be less accurate than a bolt-action and are less safe to use during harvesting.
- Sub-sonic ammunition, which fires a projectile below the speed of sound, must not be used. Most types of sub-sonic ammunition do not carry enough energy to effectively and humanely kill a kangaroo or wallaby at a distance of 100m.
- Rifles must be fitted with a telescopic sight and be sighted-in against an inanimate target before commencing a shooting session. The telescopic sight should also be adjusted on an inanimate target as often as required to maintain accuracy during a shooting session.
- Specifications for firearms and ammunition used for shooting kangaroos and wallabies are listed in Table 1: Minimum specifications for firearms and ammunition for kangaroos and wallabies shot for commercial purposes in *Appendix 3: Firearm and ammunition specifications*.

Targeting and shooting animals

- The harvester must aim to hit the target kangaroo or wallaby in the head (so as to destroy the vital areas of the brain). See *Figure 1* for shot placement for target animals.
- Kangaroos or wallabies must not be shot from a moving vehicle or other moving platform.
- Only shoot stationary animals. Kangaroos or wallabies that are moving should not be shot at since the shots will be less accurate and there will be a greater risk of wounding. Do not make hurried shots, but instead take the time to get the best shot possible.
- Only shoot kangaroos or wallabies that are clearly visible (not obscured by vegetation) and are within a range that permits the accurate placement of a head shot. (see Table 1: Minimum specifications for firearms and ammunition for kangaroos and wallabies shot for commercial purposes in *Appendix 3: Firearm and ammunition specifications* for maximum ranges for firearm/ammunition combinations).
- Kangaroos or wallabies should only be shot when they are standing upright. Shots are more likely to be on target when the animal is alert, suspicious or looking at the shooter[b]. In addition, projectile fragments can potentially lodge in the neck or back of the animal if it is crouching when shot. Animals that are unaware of the shooter (e.g. when grazing) can also move unexpectedly.
- After the shot has been taken, watch for the signs of an effective head shot through the telescopic sight (i.e. the animal appears to jump up and then immediately collapses followed by jerky or twitching body movements) and be prepared to take a second shot if necessary.
- No more than *three* target kangaroos or wallabies should be shot in a group before the carcasses are retrieved by the harvester. If there is any concern that the shot animal has only been wounded and not killed, then no further animals can be shot until all reasonable efforts have been made to locate and euthanase the wounded animal.
- If female kangaroos or wallabies are shot, any pouch young must be euthanased promptly using an acceptable method (see *Appendix 5: Standard operating procedure for euthanasia of pouch young*).
- If female kangaroos or wallabies are shot, any dependent young-at-foot should be euthanased whenever possible using an acceptable method (see *Appendix 6: Standard operating procedure for dealing with dependent young-at-foot*).

[b] Aebischer, N. J., Wheatley, C. J., & Rose, H. R. (2014). Factors associated with shooting accuracy and wounding rate of four managed wild deer species in the UK, based on anonymous field records from deer stalkers. PLoS One, 9(10), e109698

Confirmation of death

- Immediately after shooting, animals must be checked to ensure they are dead. A combination of all of the following criteria is the most reliable for confirming death[c]:
    - No heartbeat
    - No breathing
    - No corneal reflex (no blinking when the eyeball is touched)
    - No response to a toe pinch (a firm squeeze of the pad on the large toe).
- If death cannot be confirmed, a second shot (if safe to do so) or secondary method of euthanasia should be applied (usually a concussive blow to the head is the most appropriate). Bleeding out (by cutting the carotid arteries and jugular veins in the neck) should only be done if the animal is already stunned (or unconscious).
- Death must be confirmed before processing the carcass.

Follow-up of wounded animals

- If an animal is not killed outright by the first shot then it will suffer until it can be killed. A misplaced head shot can result in a shattered jaw and if the animal escapes it is likely to experience a prolonged period of significant pain and distress.
- Observe the behavioural reaction of the shot animal to determine if it has only been wounded. Do not assume that an animal that has been shot at but hops away has been missed.
- When an animal has been wounded, then every reasonable effort must be made to find it and euthanase it with a second shot, if safe to do so. Specifications for firearms and ammunition used for euthanasia of wounded kangaroos and wallabies are listed in Table 2: Minimum specifications for firearms and ammunition for shooting of **wounded or injured** kangaroos and wallabies and dependent young-at-foot (in *Appendix 3: Firearm and ammunition specifications*).
- To prevent suffering and to ensure a quick death it may be necessary to shoot wounded animals when they are a moving. The harvester must aim to hit the wounded animal in either the head (so as to destroy the vital areas of the brain), or the chest (so as to destroy the heart, lungs and great blood vessels). See *Figure 2* for shot placement for euthanasia of wounded or injured kangaroos and wallabies.
- If it is not safe to use a firearm, then another euthanasia method must be used on wounded animals (usually a concussive blow to the head or, if the animal is unconscious, bleeding out by cutting the arteries and veins in the neck).

[c] AVMA Panel on Euthanasia. (2013). AVMA Guidelines for the Euthanasia of Animals: 2013 Edition (Version 2013.0.1). Schaumburg, IL: American Veterinary Medical Association

*Figure 1: Shot placement for **targeted** kangaroos and wallabies. Only head shots taken to destroy the vital areas of the brain are permitted.*

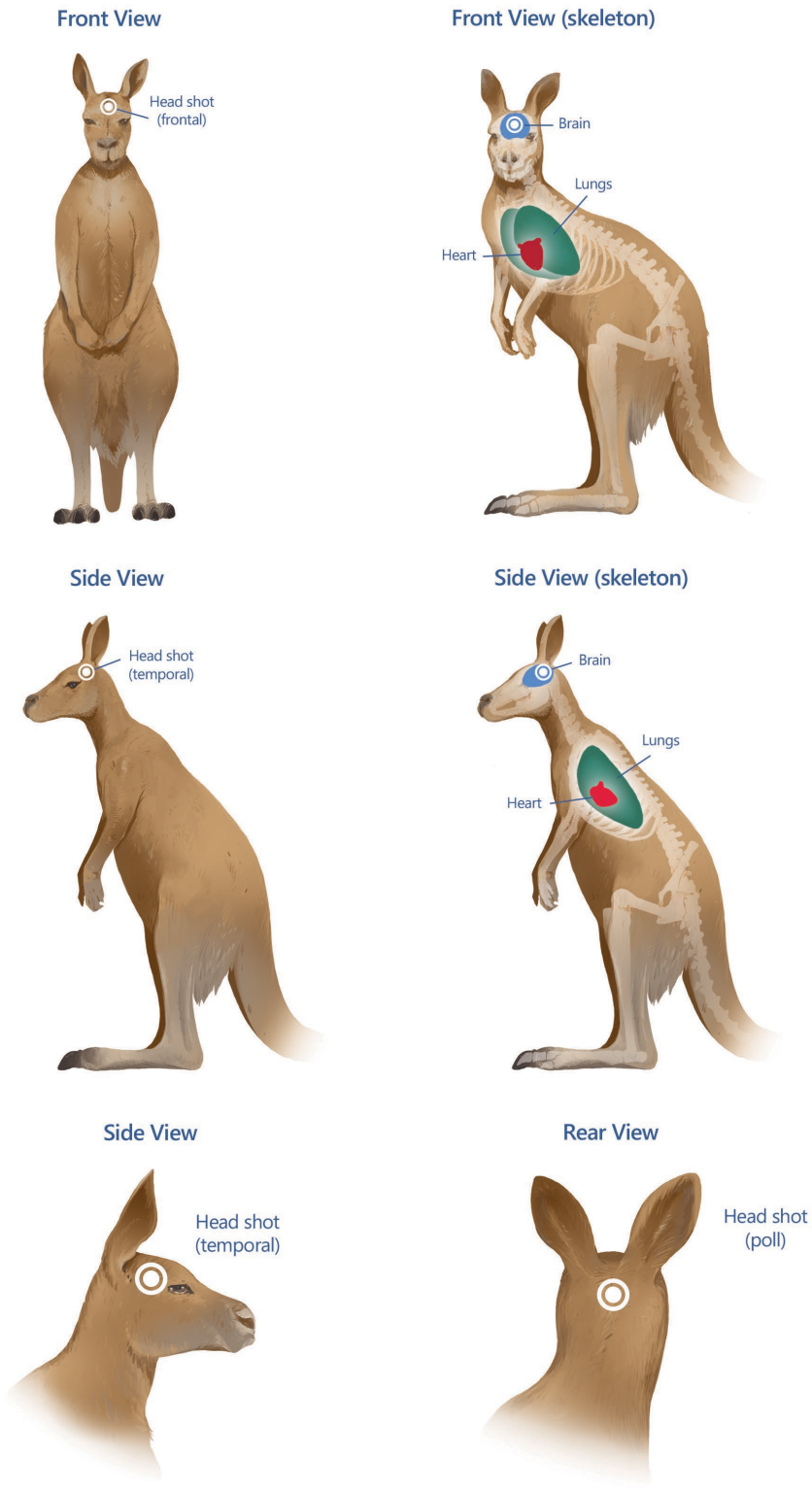
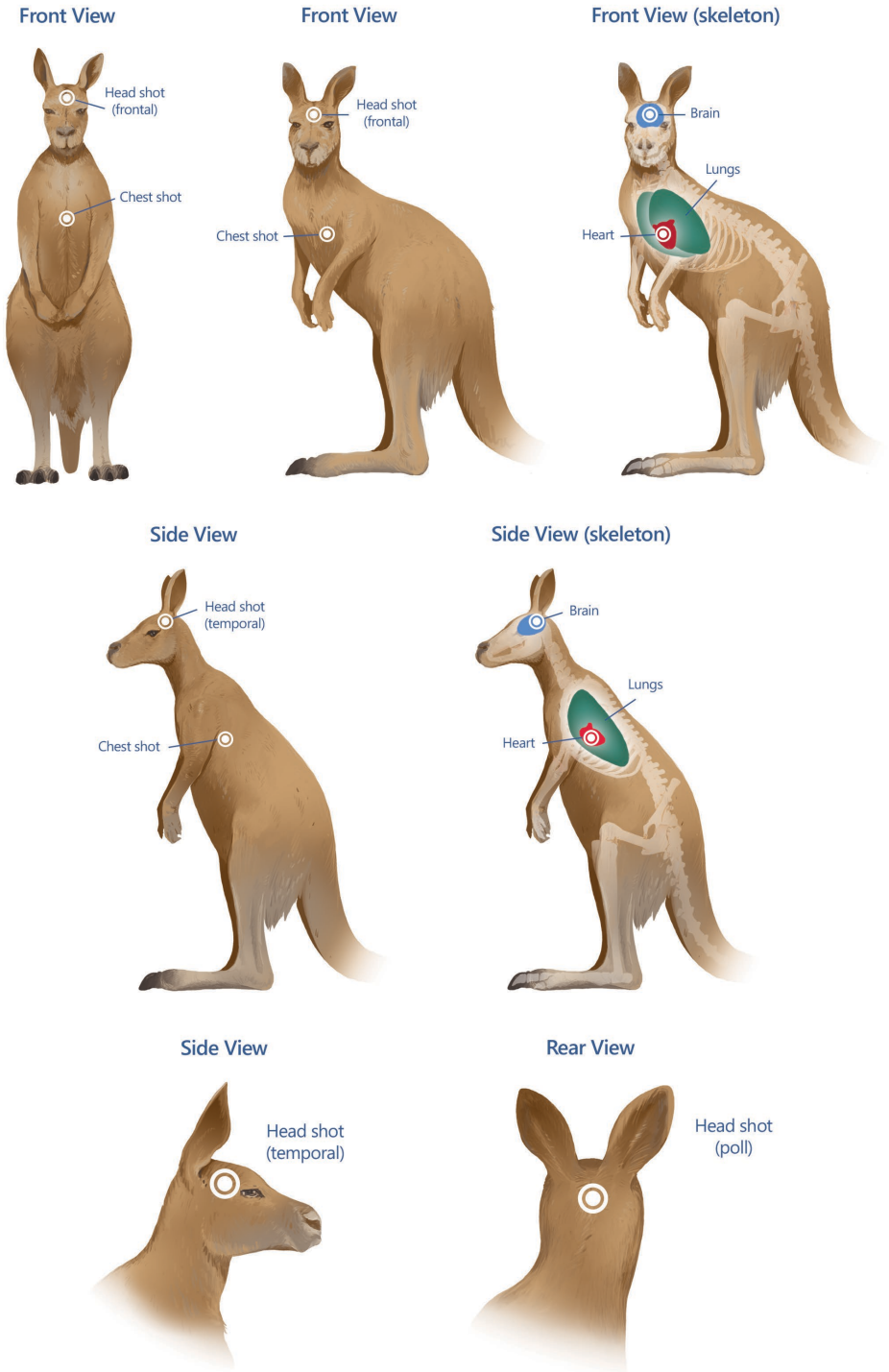


*Figure 2: Shot placement for euthanasia of **wounded and injured** kangaroos and wallabies Only head shots taken to destroy the vital areas of the brain and chest shots taken to destroy the heart, lungs and great blood vessels are permitted.*



APPENDIX 5: Standard operating procedure for euthanasia of pouch young

Background

- When adult females are shot during harvesting, they are likely to have dependent young at some stage of development (see *Appendix 2: Developmental stages of kangaroo young*).
- To prevent the unnecessary suffering, it is important that dependent young are euthanased using an acceptable method.
- Young that are found within the pouch must be euthanased promptly as they are dependent on the mother and will not survive without maternal care. They will usually remain in the pouch after the female has been shot and therefore can be euthanased without difficulty.

Application

- This procedure provides guidelines for the effective and humane euthanasia of pouch young.
- Euthanasia (or killing) methods considered to be effective and humane are those that induce rapid unconsciousness (stun) and result in brain death leading to irreversible respiratory and cardiac arrest (death)[a].
- When determining the most effective and humane method of euthanasia it is important to consider the age or stage of development of the kangaroo/wallaby young. There is evidence to suggest that *unfurred* pouch young that still have closed eyelids are not yet able to consciously perceive pain due to the immaturity of their neurological system[b]. Young that are starting to develop fur and open their eyes are considered to be sentient, which means they can experience a range of different sensations including physical pain.
- If there is uncertainty about the stage of development of the pouch young (and thus their level of consciousness), then harvesters should apply the 'benefit of the doubt' and use a concussive blow to the head.
- A captive bolt device may also potentially be acceptable for the euthanasia of furred pouch young, however until evaluations are conducted to determine the most suitable type of bolt device; efficacy at causing immediate unconsciousness and death; and optimum placement of the captive bolt muzzle on the head, this method is not included in this version of the Code.

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[a] AVMA Panel on Euthanasia. (2013). AVMA Guidelines for the Euthanasia of Animals: 2013 Edition (Version 2013.0.1). Schaumburg, IL: American Veterinary Medical Association

[b] Diesch, T.J.; Mellor, D.J.; Johnson, C.B.; Lentle, R.G. (2008) Responsiveness to painful stimuli in anaesthetised newborn and young animals of varying neurological maturity (wallaby joeys, rat pups and lambs). *AATEX*, 14, 549–552

Methods

Euthanasia of unfurred pouch young

The two methods suitable for the euthanasia of unfurred pouch young are *cervical dislocation* and *decapitation*. Since unfurred young (with closed eyes) are considered to be still in a state of unconsciousness (and therefore not capable of experiencing pain)[c], these methods are unlikely to cause suffering and are therefore considered acceptable.

The reason why cervical dislocation and decapitation should *not* be used on *furred* (and therefore conscious) young is that they are likely to experience pain and distress prior to death. With decapitation, current knowledge indicates that although decapitation can lead to rapid insensibility, animals are likely to experience pain prior to becoming unconscious[d]. For example, a study on rats demonstrated that pain could be experienced for a period of 15 seconds following decapitation[e]. A number of studies in a range of species have demonstrated that electrical activity in the brain can persist for anywhere up to 29 seconds in disembodied heads[f].

Similarly, with cervical dislocation some studies show that rapid unconsciousness can be achieved (e.g. 5-10 seconds in mice[g]) but with other research, electrical activity in the brain persisted for longer (e.g. 43 seconds in turkeys[h]). In addition, it is not yet known how cervical dislocation actually kills animals. The trauma high on the spinal cord leads to respiratory arrest, but there is no significant brain injury[d]. Correct application of cervical dislocation is also important; when poorly performed it can lead to significant pain and distress. There have been no studies to specifically assess the responses of conscious kangaroo pouch young to decapitation or cervical dislocation.

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[c] Diesch, T.J.; Mellor, D.J.; Johnson, C.B.; Lentle, R.G. (2008) Responsiveness to painful stimuli in anaesthetised newborn and young animals of varying neurological maturity (wallaby joeys, rat pups and lambs). *AATEX*, 14, 549–552.

[d] Hawkins, P., Prescott, M.J., Carbone, L., Dennison, N., Johnson, C., Makowska, I.J., Marquardt, N., Readman, G., Weary, D.M. and Golledge, H.D., (2016). A good death? Report of the second Newcastle meeting on laboratory animal euthanasia. *Animals*, 6, p.50.

[e] Kongara, K.; McIhone, A.; Kells, N.; Johnson, C.B. (2014) Electroencephalographic evaluation of decapitation of the anaesthetized rat. *Laboratory Animals* 48, 15–19.

[f] Bates, G. (2010). Humane issues surrounding decapitation reconsidered. *Journal of the American Veterinary Medical Association*, 237, 1024–1026.

[g] Cartner, S.C., Barlow, S.C. & Ness, T.J. (2007). Loss of cortical function in mice after decapitation, cervical dislocation, potassium chloride injection, and CO_2 inhalation. *Comparative Medicine*, 57, 570–573.

[h] Erasmus, M.A., Lawlis, P., Duncan, I.J.H. & Widowski, T.M. (2010). Using time to insensibility and estimated time of death to evaluate a nonpenetrating captive bolt, cervical dislocation, and blunt trauma for on-farm killing of turkeys. *Poultry Science*, 89, 1345–1354.

Cervical dislocation

- This method is suitable for small unfurred 'jellybean' size pouch young (<5cm length head to tip of tail).
- Because there is a potential to cause pain and/or distress in conscious animals, this method should only be used on unfurred pouch young that have closed eyes.
- DO NOT use on pouch young that have any fur or open eyes.
- Cervical dislocation involves separating the skull from the spinal column, which causes damage to the brain stem and spinal cord that leads to respiratory arrest and death.
- To perform cervical dislocation, use the thumb and finger to pinch and disrupt the spinal cord in the high neck region. Young at this stage of development will still be permanently attached to the teat, so the method can be conducted without removing them from the teat or the pouch.
- If carried out with force, it will (inadvertently) lead to decapitation
- Verification of death using the usual criteria (no heartbeat or breathing and no response to eye touch and toe pinch) is not accurate with small unfurred pouch young and is therefore not necessary.

Decapitation

- This method is suitable for both small unfurred pouch young (<5cm length head to tip of tail) and larger unfurred pouch young (>5cm length head to tip of tail).
- Because there is a potential to cause pain and/or distress in conscious animals, this method should only be used on unfurred pouch young that have closed eyes.
- DO NOT use on pouch young that have any fur or open eyes.
- Decapitation involves severing the head from the body, which causes damage to the brain stem and spinal cord that leads to respiratory arrest and death.
- To perform decapitation, use a sharp blade to sever the head from the body. Place the blade high on the neck, ideally at the level of the first vertebra.
- Blades used for decapitation must be maintained to be kept sharp and able to sever the entire head without need for more than one cut.
- Verification of death using the usual criteria (no heartbeat or breathing and no response to eye touch and toe pinch) is not accurate with small unfurred pouch young and is therefore not necessary.

Euthanasia of partially-furred to fully-furred pouch young

Concussive blow to the head

- The most suitable method that is currently available for the euthanasia of partially-furred to fully-furred young is a *concussive blow to the head* (also called blunt force trauma)[i,j]. This method is considered acceptable as the skulls of pouch young are small, soft and thin. When it is applied correctly, unconsciousness and death will occur rapidly.
- A single sharp blow to the central skull bones induces death by physical (or mechanical) damage to the central nervous system and disruption of brain activity. Death then occurs as a result of respiratory and cardiac failure.
- The efficiency and humaneness of this method depends on the operator's skill and determination. The concussive blow must be delivered with sufficient force and be precisely on target to ensure that adequate damage occurs to vital structures of the brain to cause immediate and sustained unconsciousness and death.
- If this procedure is not performed correctly there will be varying degrees of consciousness and it is likely that the animal will suffer prior to death. If the first blow does not hit the skull but hits, for example, the jaw or a limb, or if the brain is not sufficiently destroyed, then the animal will experience pain and distress.
- To deliver the concussive blow, carefully remove the young from the pouch (note they are not permanently attached to the teat at this stage of development but could still be suckling), hold the young firmly by the hindquarters (around the top of the back legs and base of tail) and then swing firmly and quickly in an arc so that the rear of the joey's head is hit against a large solid surface that will not move or compress during the impact (e.g. the tray of a utility vehicle).
- DO NOT hit the joeys' head against the railing of the utility rack, as this can result in decapitation rather than the intended concussive blow to the head.
- DO NOT suspend joeys upside down by the hindquarters or tail and then try to hit the head with an iron bar (or similar). Holding them in this manner allows the joey to move around and makes it difficult to make contact with the correct location on the head. In addition, the force of the blow may not be sufficient to render the joey unconscious with only one strike.
- Confirmation of the onset of death should occur immediately after the procedure and death must be confirmed within 3 minutes. A combination of all of the following criteria is the most reliable for confirming death[k]:
    - No heartbeat
    - No breathing
    - No corneal reflex (no blinking when the eyeball is touched)
    - No response to a toe pinch (a firm squeeze of the pad on the large toe).

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[i] McLeod S, Sharp T (2014) Improving the Humaneness of Commercial Kangaroo Harvesting (Project No. PRJ-004103). Canberra, ACT: Rural Industries Research and Development Corporation.

[j] Sharp, T.M. (2015). Commercial kangaroo harvesting: the animal welfare implications for dependent young. (Unpublished PhD thesis). Sydney, NSW: University of New South Wales.

[k] AVMA Panel on Euthanasia. (2013). AVMA Guidelines for the Euthanasia of Animals: 2013 Edition (Version 2013.0.1). Schaumburg, IL: American Veterinary Medical Association

- An animal is still conscious (sensible) and may be suffering if it is vocalising, attempts to get up, lifts its head or is blinking[l].
- If onset of death or death cannot be confirmed, the procedure must be repeated (i.e. apply another blow) or a secondary method of euthanasia (i.e. bleeding out by cutting the carotid arteries and jugular veins in the neck, or decapitation) applied if the animal is stunned (or unconscious).
- Death must be confirmed before leaving the carcass.

Table 1: Summary of acceptable euthanasia methods for kangaroo and wallaby pouch young

Stage of development	***Acceptable Method***	***Notes***
In pouch – unfurred <5cm length (including tail)	Decapitation or cervical dislocation	Using thumb and finger or sharp blade
In pouch – unfurred >5cm (including tail)	Decapitation	Using a sharp blade
In pouch – partially furred In pouch – furred Out of pouch – can be caught by harvester	Manually applied concussive blow to the head	The concussive blow must be conducted so that the joey's head is hit against a large solid surface that will not move or compress during the impact (e.g., the *tray* of a utility vehicle). Animals must not be hit against the utility *rack* or held upside down by the hindquarters or tail and hit.

Methods that should not be used in conscious animals

Decapitation in partially-furred to furred pouch young
Decapitation may lead to rapid unconsciousness; however, there may be a period of conscious pain perception prior to loss of sensation[m]. Not to be used unless the animal is already unconscious.

Exsanguination in partially-furred to furred pouch young
Exsanguination (or bleeding-out) causes death, but it may take several minutes for the animal to die. During this time the animal is still conscious and will experience pain, anxiety and distress. Not to be used unless the animal is already unconscious.

[l] Woods J, Shearer JK, Hill J Recommended On-farm Euthanasia Practices. In: Grandin T (ed) *Improving Animal Welfare: A Practical Approach*. CABI, Wallingford, Oxfordshire, U.K.

[m] Hawkins, P., Prescott, M.J., Carbone, L., Dennison, N., Johnson, C., Makowska, I.J., Marquardt, N., Readman, G., Weary, D.M. and Golledge, H.D., (2016). A good death? Report of the second Newcastle meeting on laboratory animal euthanasia. *Animals*, 6(9), p.50

APPENDIX 6: Standard operating procedure for dealing with dependent young-at-foot

Background

- When adult females are shot during harvesting, they are likely to have dependent young at some stage of development (see *Appendix 2: Developmental stages of kangaroo young*).
- To prevent the unnecessary suffering of dependent young, they should be euthanased using an acceptable method.
- Young that are found within the pouch must be euthanased promptly as they are dependent on the mother and will not survive without maternal care. They will usually remain in the pouch after the female has been shot and therefore can be euthanased without difficulty (see *Appendix 5: Standard operating procedure for euthanasia of pouch young*).
- Young-at-foot (YAF) can vary in their level of dependence on maternal care depending on their age and environmental conditions, especially food availability. If they are likely to suffer and have a poor chance of survival, they should be euthanased wherever possible (see Table 1 for guidance). Older YAF are usually mobile and often flee after the female has been shot, therefore they can be difficult to euthanase.

Application

- This procedure outlines the welfare impacts of orphaning on kangaroo young at different stages of development and provides guidance to harvesters on:
    - determining the level of dependence in YAF
    - when to euthanase YAF to prevent significant suffering (and when to leave them so that they have a chance of survival)
    - methods for humane euthanasia of YAF.
- The relationship between kangaroo mothers, their offspring and the environment is complex and is there is still much to learn. The advice provided in this procedure reflects our current knowledge and is based on the small number of studies that have examined a range of factors that can potentially affect the welfare and survival of orphaned kangaroo young. As new information becomes available the recommended practices may change.
- When environmental conditions are unfavourable (e.g. during prolonged dry periods, severe drought), maternal nutrition and care becomes more important. Thus, the outcomes for YAF that are orphaned (but not euthanased) during these times, when high quality forage is not available, are poor.

- Young-at-foot that lose their mother prior to or around the time of weaning will experience considerable suffering[a] and will have a lower likelihood of survival. There are a range of factors that determine the extent of welfare impact and whether YAF survive or die. These include:
    - *Age at orphaning* - younger animals (i.e. at the in-and-out stage) are more likely to experience more severe welfare impacts and are more likely to die when still dependent on milk to meet nutritional requirements.
    - *Food availability* – YAF have a high daily energy requirement to maintain rapid growth. To illustrate, a 6kg red kangaroo YAF needs around 70% of the digestible energy required by that of a 27kg non-lactating adult female, and at weaning an 11kg juvenile red kangaroo requires as much as 95% of the energy requirements of an adult female[b]. If they are to survive without milk, YAF therefore require adequate amounts of high-quality forage to meet their nutritional requirements.
    - *Predation* – mortality of YAF will be higher where predators such as foxes[c] or wild dogs are abundant.
    - *Inclement weather* – extremes of temperature, dust storms, heavy rainfall and flooding will also increase mortality.
- Guidance on determining the level of independence in kangaroo young, an overview of welfare impacts resulting from orphaning, and measures to prevent suffering are presented in Table 1.

Methods

Euthanasia of YAF

- If small YAF (approx. ≤5kg bodyweight) are caught by hand, they must be euthanased using a concussive blow to the head[d] as described for large pouch young in *Appendix 5: Procedures for euthanasia of pouch young*.
- Most YAF are highly mobile and are difficult to catch by hand, therefore shooting is the least stressful and most appropriate method for their euthanasia during harvesting. More details on shooting procedures can be found in *Appendix 4: Standard operating procedure for shooting kangaroos and wallabies*.
- Firearms and ammunition suitable for euthanasia of YAF are listed in *Appendix 3: Firearms and ammunition specifications* (Table 2).
- Risk of wounding is minimised when harvesters only shoot stationary animals that are clearly visible and within a range that permits the accurate placement of a shot. YAF that are fleeing should not be shot at since the shots will be less accurate and there will be a greater risk of wounding.

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[a] Sharp, T.M. (2015). Commercial kangaroo harvesting: the animal welfare implications for dependent young. (Unpublished PhD thesis). Sydney, NSW: University of New South Wales.

[b] Munn, A.J. & Dawson, T.J. (2003). Energy requirements of the red kangaroo (*Macropus rufus*): impacts of age, growth and body size in a large desert-dwelling herbivore. *Journal of Comparative Physiology* B *173*, 575–582.

[c] Banks, P. B., Newsome, A. E., & Dickman, C. R. (2000). Predation by red foxes limits recruitment in populations of eastern grey kangaroos. *Austral Ecology*, *25*, 283–291.

[d] Lambooij B, Algers B (2016) Mechanical stunning and killing methods. In: Verlade A, Raj M (eds) *Animal Welfare at Slaughter*. 5M Publishing, Sheffield, U.K.

- The harvester must aim to hit the target animal in either the head (so as to destroy the vital areas of the brain), or the chest (so as to destroy the heart, lungs and great blood vessels). See *Figure 3* for shot placement for euthanasia of YAF.
- A shot to the head is preferable to a shot to the chest as it is more likely to cause instantaneous loss of consciousness. However, the judgement of the harvester is important in determining the optimum shot placement to achieve a quick, humane death for each animal. In some situations when conditions may be less than ideal, it may be more appropriate to use a chest shot.
- Individual YAF can react differently after the female has been shot[e]. Some will flee and some will remain stationary and calm. To avoid the escape of YAF, harvesters could potentially shoot them *before* the female is shot, however the judgement of the shooter is important in determining if this is a feasible option in each particular situation.
- Immediately after euthanasia (by concussive blow or shooting), animals must be checked to ensure they are dead. A combination of all of the following criteria is the most reliable for confirming death[f]:
    - No heartbeat
    - No breathing
    - No corneal reflex (no blinking when the eyeball is touched)
    - No response to a toe pinch (a firm squeeze of the pad on the large toe).
- If death cannot be confirmed, a second shot (if safe to do so) or secondary method of euthanasia should be applied (usually a concussive blow to the head is the most appropriate). Bleeding out (by cutting the carotid arteries and jugular veins in the neck) should only be done if the animal is already stunned (or unconscious).
- Death must be confirmed before leaving or disposing of the carcass.

[e] Sharp, T.M. (2015). Commercial kangaroo harvesting: the animal welfare implications for dependent young. (Unpublished PhD thesis). Sydney, NSW: University of New South Wales.

[f] AVMA Panel on Euthanasia. (2013). AVMA Guidelines for the Euthanasia of Animals: 2013 Edition (Version 2013.0.1). Schaumburg, IL: American Veterinary Medical Association

*Figure 3 Shot placement for euthanasia of **young-at-foot** (YAF). Only head shots taken to destroy the vital areas of the brain and chest shots taken to destroy the heart, lungs and great blood vessels are permitted.*

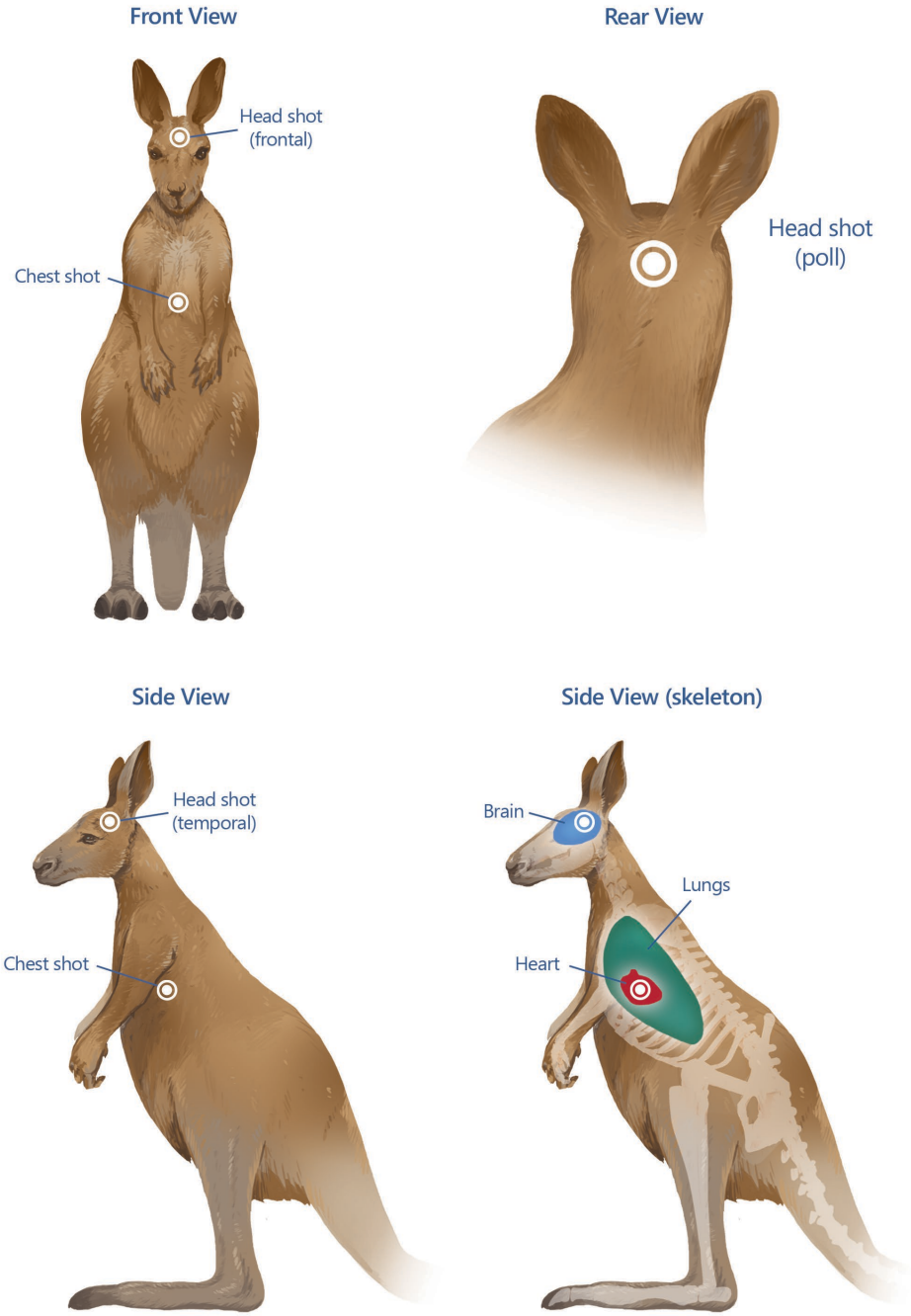
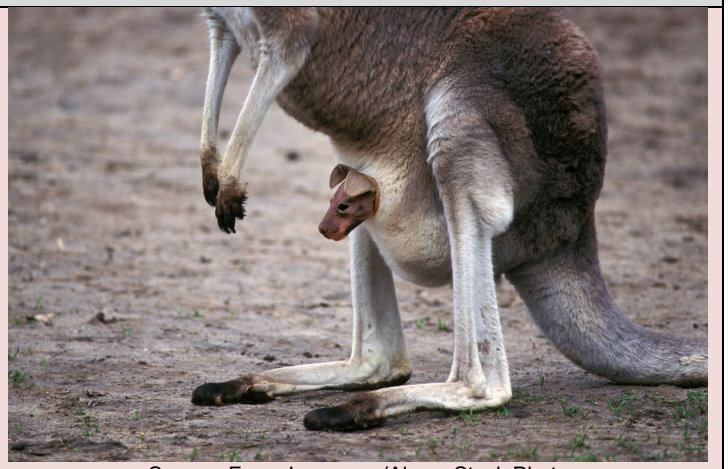


Table 1: Welfare impacts on dependent young that are orphaned during harvesting and measures to prevent suffering

Green stage (1) – no welfare impact
Red stages (2, 3, 4) – severe welfare impacts – every reasonable effort should be made to alleviate suffering in *all* conditions
Blue stages (5, 6) – mild to moderate welfare impacts – every reasonable effort should be made to alleviate suffering during unfavourable conditions (low food availability, inclement weather)

	Stage at orphaning	***Welfare impacts from orphaning***	***Preventative measure***	***Comments***	***Example photo***
IN POUCH	**1.** Unfurred pouch young (eyes still closed) Dependent on pouch environment and milk for survival	Certain death, though unlikely to suffer prior to death	Euthanase using acceptable method (See *Appendix 5: Standard operating procedure for euthanasia of pouch young*)	Females may be associating with other adult females Young usually attached to a teat Available evidence indicates that unfurred young are not capable of experiencing pain and suffering until they start to develop fur and have opened their eyes[a]	 Source: Trudy Sharp

[a] Diesch, T.J., Mellor, D., Johnson, C.B. & Lentle, R.G. (2010). Developmental changes in the electroencephalogram and responses to a noxious stimulus in anaesthetized tammar wallaby joeys (*Macropus eugenii eugenii*). *Laboratory Animals*, *44*, 79–87

	Stage at orphaning	***Welfare impacts from orphaning***	***Preventative measure***	***Comments***	***Example photo***
IN POUCH	**2.** Partially to fully furred pouch young (eyes might be open) Dependent on pouch environment and milk for survival	Severe suffering and certain death due to starvation, dehydration, hyper- or hypothermia, predation etc.	Euthanase using acceptable method (See *Appendix 5: Standard operating procedure for euthanasia of pouch young*)	Females have a visible large pouch and are usually isolated form other adult females[bc] Presence of fur or opened eyes indicates sentience (i.e. potential for suffering) Young can have fur but eyes might still be closed May or may not be attached to teat	 Source: Frans Lemmens/Alamy Stock Photo

[b] Croft DB (1980) Behaviour of red kangaroos, *Macropus rufus* (Desmarest, 1822) in northwestern New South Wales, Australia. *Australian Mammalogy* 4, 5–58
[c] King WJ, Festa-Bianchet M, Coulson G, Goldizen AW (2017) Long-term consequences of mother-offspring associations in eastern grey kangaroos. *Behavioral Ecology and Sociobiolgy* 71:77

	Stage at orphaning	***Welfare impacts from orphaning***	***Preventative measure***	***Comments***	***Example photo***
IN-AND- OUT OF POUCH	**3.** Furred young at '*in-out*' stage Dependent on milk for survival	Severe suffering and high likelihood of death due to starvation, dehydration, hyper- or hypothermia, predation etc.	Euthanase using acceptable method (See *Appendix 5: Standard operating procedure for euthanasia of pouch young*)	When young are in the pouch, the female's pouch is large, feet and/or tail may be sticking out Young at this stage can have 'hard feet' i.e. the pads on the hind feet are no longer smooth and soft and might be dirty (indicating the joey has stood on the ground) but they still spend time in the pouch When out of pouch the young usually stays in close proximity to female but will make quick dashes away from her and back Females are usually isolated from other adult females but juvenile young or males could be present (if she is approaching oestrus) Older young will spend more time out of pouch than in it	 Source: Trudy Sharp

	Stage at orphaning	***Welfare impacts from orphaning***	***Preventative measure***	***Comments***	***Example photo***
AT-FOOT	**4.** Young-at-foot permanently out of the pouch but still suckling frequently The importance of milk varies with the quality of the forage available	Severe suffering, high likelihood of death when conditions are unfavourable (i.e. poor quantity and quality of forage available) Severe suffering, lower likelihood of death when conditions are favourable (i.e. adequate amounts of high-quality forage available)[d]	Euthanase by shot to head or chest wherever possible	May need to shoot YAF first If not possible then wait until YAF returns to the site where the female was shot Young-at-foot require good quality forage to meet the high daily energy requirements for supporting growth during this period[e]	 Source: Stephanie Jackson-Australia Wildlife Collection/Alamy Stock Photo

[d] Sharp, T.M. (2015). Commercial kangaroo harvesting: the animal welfare implications for dependent young. (Unpublished PhD thesis). Sydney, NSW: University of New South Wales.

[e] Munn, A.J. & Dawson, T.J. (2004). The ecophysiology of survival in juvenile red kangaroos *Macropus rufus*: greater demands and higher costs. *Australian Mammalogy 26*, 161–168.

	Stage at orphaning	***Welfare impacts from orphaning***	***Preventative measure***	***Comments***	***Example photo***
AT-FOOT	**5.** Young-at-foot permanently out of the pouch but suckling only occasionally The importance of milk varies with the quality of the forage available	Moderate suffering and negative effects on growth and survival Increased likelihood of death during unfavourable conditions	Euthanase by shot to head or chest wherever possible when conditions are unfavourable (i.e. poor quantity and quality of forage available)	The mother still provides non-nutritional care that is beneficial for juvenile growth and survival[c] Negative impact may be greater for female young as they have a closer social bond to their mother compared with male offspring	 Source: Trudy Sharp
AT-FOOT	**6.** Young-at-foot that has been weaned Not dependent on milk for survival but requires high quality forage to support growth	Mild suffering and potential for negative effects on growth and survival Increased likelihood of death during unfavourable conditions	Euthanase by shot to head or chest wherever possible when conditions are unfavourable (i.e. poor quantity and quality of forage available)	The mother still provides non-nutritional care that is beneficial for juvenile growth and survival[c] Negative impact may be greater for female young as they have a closer social bond to their mother compared with male offspring	 Source: Arco Images GmbH/Alamy Stock Photo

APPENDIX 7: Resources for further information

Contact details for relevant government authorities:

Commonwealth	Department of the Environment and Energy GPO Box 787 Canberra ACT 2601 Phone: 1800 803 772 Website: http://www.environment.gov.au/ *Wildlife Trade and Biosecurity Branch* http://www.environment.gov.au/biodiversity/wildlife-trade
Australian Capital Territory	Environment, Planning and Sustainable Development Directorate GPO Box 158 Canberra ACT 2601 Phone: 13 22 81 Website: https://www.environment.act.gov.au/
New South Wales	Office of Environment and Heritage PO Box A290 Sydney South, NSW 1232 Phone: 02 9995 5000 Email: info@environment.nsw.gov.au Website : https://www.environment.nsw.gov.au/ *Kangaroo Management program* https://www.environment.nsw.gov.au/topics/animals-and-plants/wildlife-management/kangaroo-management
Northern Territory	Parks and Wildlife Commission PO Box 1448 Darwin NT 0801 Phone: 08 8999 4555 Email: parkmanagement.pwcnt@nt.gov.au Website: https://nt.gov.au/leisure/parks-reserves
Queensland	Department of Environment and Science GPO Box 2454 Brisbane Queensland 4001 Phone: 13 74 68 Email: info@des.qld.gov.au Website: https://www.des.qld.gov.au/ *Macropod Management Program* https://www.qld.gov.au/environment/plants-animals/wildlife-permits/macropods

South Australia	Department for Environment and Water Natural Resources Centre Ground Floor, 81-95 Waymouth Street Adelaide, SA, 5000 Phone: 08 8204 1910 Website: https://www.environment.sa.gov.au/Home *Kangaroo Conservation and Management Program* https://www.environment.sa.gov.au/topics/plants-and-animals/Abundant_species/kangaroo-conservation-and-management
Tasmania	Department of Primary Industries, Parks, Water and Environment GPO Box 44 Hobart Tasmania 7001 Phone: 1300 368 550 Website: https://dpipwe.tas.gov.au/ *Wildlife Management Branch* https://dpipwe.tas.gov.au/wildlife-management
Victoria	Environment, Land, Water and Planning PO Box 500 East Melbourne VIC 8002 Phone: 136186 Website: https://www2.delwp.vic.gov.au/ *Wildlife management* https://www.wildlife.vic.gov.au/managing-wildlife/wildlife-management-and-control-authorisations
Western Australia	Department of Biodiversity, Conservation and Attractions Parks and Wildlife Service Locked Bag 104 BENTLEY DELIVERY CENTRE Western Australia 6983 Email: enquiries@dbca.wa.gov.au Website: https://www.dpaw.wa.gov.au/ Kangaroo Management Program https://www.dpaw.wa.gov.au/plants-and-animals/animals/kangaroo-management-in-western-australia

Contact details for the kangaroo industry:

Kangaroo Industry Association of Australia
Address: PO Box 963, Warwick QLD 4370
Phone: 07 4661 9911
Website: http://www.kangarooindustry.com/

Reporting of unusual signs of disease or deaths in wildlife

Contact Wildlife Health Australia for further information, or you can also contact:

- the 24 hour national Emergency Animal Disease Watch Hotline on 1800 675 888
- your local veterinarian
- the relevant state Department of Primary Industries or Agriculture.

Other useful references:

Books

Coulson, G. & Eldridge, M. D. B. (Eds.), Macropods: The Biology of Kangaroos, Wallabies, and Rat-kangaroos. Collingwood, Victoria: CSIRO Publishing.

Dawson TJ (2012) *Kangaroos, 2nd edition*. Collingwood, Victoria: CSIRO Publishing.

Hacker, R., & McLeod, S. (2003). Living with kangaroos: a guide to kangaroos and their management in the Murray-Darling Basin. NSW Agriculture.

Jackson, S. M. & Vernes, K. (2010). *Kangaroo: portrait of an extraordinary marsupial*. Crows Nest, NSW: Allen & Unwin.

Richardson, K. (2012). Australia's Amazing Kangaroos: Their Conservation, Unique Biology and Coexistence with Humans. Collingwood, Victoria: CSIRO Publishing.

Reports

McLeod, S. R. & Sharp, T. M. (2014). Improving the humaneness of commercial kangaroo harvesting. Final report for RIRDC Project No PRJ-004103. Canberra ACT: Rural Industries Research and Development Corporation. Available from: https://www.agrifutures.com.au/wp-content/uploads/publications/13-116.pdf

RSPCA Australia. (2002). Kangaroo Shooting Code Compliance: A survey of the extent of compliance with the requirements of the Code of Practice. Available from: http://155.187.2.69/biodiversity/wildlife-trade/publications/kangaroo-report/introduction.html

Other articles

Lunney, D. (2010) A history of the debate (1948-2009) on the commercial harvesting of kangaroos, with particular reference to New South Wales and the role of Gordon Grigg. *Australian Zoologist* Vol. 35, No. 2, pp. 383-430. Available at: http://publications.rzsnsw.org.au/doi/pdf/10.7882/AZ.2010.027

Pople, A. R., & Grigg, G. (1999). Commercial harvesting of kangaroos in Australia. Canberra ACT: Environment Australia. http://www.environment.gov.au/resource/commercial-harvesting-kangaroos-australia

APPENDIX 8: Relevant legislation

All those involved in the shooting of kangaroos and wallabies for commercial purposes should familiarise themselves with relevant aspects of the appropriate federal and state legislation. The table below lists key relevant legislation. This list is by no means exhaustive and is current at November 2018.

Commonwealth	*Environment Protection and Biodiversity Conservation Act 1999*
New South Wales	*Biosecurity Act 2015* *Biodiversity Conservation Act 2016* *Local Land Services Act 2013* *Prevention of Cruelty to Animals Act 1979* *National Parks and Wildlife Act 1974* *Firearms Act 1996*
Queensland	*Nature Conservation Act 1992* *Animal Care and Protection Act 2001* *Weapons Act 1990*
South Australia	*National Parks and Wildlife Act 1972* *Native Title (South Australia) Act 1994* *Natural Resources Management Act 2004* *Pastoral Land Management and Conservation Act 1989* *Animal Welfare Act 1985* *Firearms Act 2015*
Victoria	*Wildlife Act 1975* *Prevention of Cruelty to Animals Act 1986* *Firearms Act 1996*
Western Australia	*Biodiversity Conservation Act 2016* *Biosecurity and Agriculture Management Act 2007* *Conservation and Land Management Act 1984* *Animal Welfare Act 2002* *Firearms Act 1973*
Tasmania	*Nature Conservation Act 2002* *Animal Welfare Act 1993* *Firearms Act 1996*
Other relevant legislation	Work health and safety (WHS) Food safety

Note: copies of the above legislation and relevant regulations may be obtained from Commonwealth and state or territory government publishing services.

APPENDIX 9: Participants

Project Reference Group

Role/Representative	Organisation	Name
Independent Chair		Paul Donnelly *(Mar 2018 onwards)*
Research Manager	AgriFutures Australia	Duncan Farquhar *(Mar 2018 – Mar 2019)*
		John Smith *(Jul 2019 – Feb 2020)*
		Mila Bristow *(Feb – Jul 2020)*
Animal welfare	Australian Veterinary Association	Tanya Stephens *(Mar 2018 onwards)*
Animal welfare	RSPCA Australia	Bidda Jones *(Mar 2018 onwards)*
Pastoral industry	National Farmers Federation	Mark Harvey-Sutton (proxy: Michael Allpass) *(Mar 2018 – Dec 2019)*
		Adrienne Ryan *(May- Jul 2020)*
Kangaroo industry	Macro Group Australia	Douglas Jobson *(Mar 2018 onwards)*
State harvest regulation	NSW Department of Planning, Industry and Environment	Stephen Wolter *(Mar 2018 – Nov 2019)*
		Brad Purcell *(Dec 2019 – Jul 2020)*
State harvest regulation	QLD Department of Environment & Science	Ashley Seiler *(Mar 2018 onwards)*
Wildlife trade	Commonwealth Department of the Environment & Energy	Nathan Sibley *(Mar 2018 – Mar 2020)*
Wildlife trade	Commonwealth Department of Agriculture, Water and the Environment	Billy Quinn *(Apr 2020 – Jul 2020)*

Code Review Research Scientists

Role	Organisation	Name
Research Scientist and Project Lead	NSW Department of Primary Industries	Trudy Sharp *(Mar 2018 onwards)*
Senior Research Scientist assisting Project Lead	NSW Department of Primary Industries	Steven McLeod *(Mar 2018 onwards)*

The Code Review research scientists and Project Reference Group appreciate the valuable input from kangaroo harvesters during forums held in NSW and Queensland. Thank you also to the public for their comments during the consultation period and to all those who provided comments and advice during the code writing process.

APPENDIX 10: Summary of Code requirements

The following is a list of the Requirements within the *Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes*.

Refer to the cited Code section for further context about the Requirements.

SECTION 1: Harvester responsibility and competency

1.1 A person conducting commercial harvesting must exercise a duty of care to ensure that kangaroos and wallabies are harvested humanely, and they understand and comply with the requirements of this Code.

1.2 Harvesters must be competent to perform their required tasks and can be supervised by a competent person.

1.3 Harvesters must pass a recognised (or approved) shooting accuracy test at least every 5 years.

1.4 Harvesters and test supervisors (assessors) must adhere to the minimum test conditions and requirements as specified in *Appendix 1: Assessment requirements for shooting accuracy testing* (or as specifically required by state or territory jurisdictions), for the shooting accuracy assessment to be valid.

SECTION 2: Shooting kangaroos and wallabies for commercial purposes

2.1 Targeted kangaroos and wallabies must only be shot within the stated maximum range and using a combination of firearm and ammunition that complies with or exceeds the minimum specifications in *Appendix 3: Firearm and ammunition specifications* (Table 1).

2.2 Harvesters must aim to shoot target kangaroos and wallabies in the head (so as to destroy the vital areas of the brain) as described in *Appendix 4: Standard operating procedure for the shooting of kangaroos and wallabies*. Shot placement for targeted kangaroos and wallabies is shown in Figure 1 (Appendix 4).

2.3 Target animals must be clearly visible, stationary (wounded or injured animals excepted) and standing upright.

2.4 When target animals are shot from a vehicle, the vehicle must be stationary.

2.5 If there is any concern that the shot animal has only been wounded and not killed, then no further animals can be shot until all reasonable efforts have been made to locate and euthanase the wounded animal.

2.6 No more than 3 target kangaroos or wallabies in a group can be shot before the carcasses are checked and retrieved by the harvester.

2.7 If female kangaroos or wallabies are shot, the pouch must be checked thoroughly for pouch young (and any young found must be euthanased promptly, see Requirement 3.4).

2.8 Harvesters must confirm that shot kangaroos and wallabies are dead before processing the carcass.

2.9 If an animal shows signs of consciousness after shooting then a second shot must be taken immediately or an acceptable alternative (or secondary) method applied.

SECTION 3: Euthanasia of dependent young and wounded and injured kangaroos and wallabies

3.1 Animals must be checked for signs of unconsciousness immediately after the euthanasia method has been applied and until death is confirmed.

3.2 If an animal shows signs of consciousness after the application of a euthanasia method then it must be repeated and/or an acceptable secondary euthanasia method applied to ensure a quick death.

3.3 Death must be confirmed before leaving or disposing of the carcass.

3.4 Pouch young must be euthanased using an acceptable method (as described in *Appendix 5: Standard operating procedure for euthanasia of pouch young*) as soon as their mother has been confirmed dead. These are:

Unfurred pouch young <5cm length (including tail) - decapitation or cervical dislocation
Unfurred pouch young >5cm (including tail) – decapitation
Partially furred to fully furred pouch young - concussive blow to the head.

3.5 Harvesters must make every reasonable effort to euthanase dependent young-at-foot whenever practically possible, as described in *Appendix 6: Standard operating procedure for dealing with dependent young-at-foot*.

3.6 For euthanasia of smaller young-at-foot (approx. ≤5kg bodyweight) that have been caught by hand, the harvester must use a concussive blow to the head as described in *Appendix 5: Standard operating procedure for euthanasia of pouch young*.

3.7 For the euthanasia of larger, mobile young-at-foot, the harvester must shoot the animal using a combination of firearm and ammunition that complies with or exceeds the minimum specifications and within the maximum range specified in *Appendix 3: Firearm and Ammunition specifications* (Table 2). Harvesters must aim to hit the target animal in either:

the head (so as to destroy the vital areas of the brain); or

the chest (so as to destroy the heart, lungs and great blood vessels),

as shown in Figure 3 (Appendix 6*)*.

3.8 All reasonable efforts must be made to locate and euthanase kangaroos and wallabies that are wounded during shooting or otherwise injured as part of harvesting operations.

3.9 For the euthanasia of wounded or injured kangaroos or wallabies, when it is safe and practical to use a firearm, the harvester must shoot the animal using a combination of firearm and ammunition that complies with or exceeds the minimum specifications and within the maximum range specified in *Appendix 3: Firearm and Ammunition specifications* (Table 2). Harvesters must aim to hit the target animal in either:

the head (so as to destroy the vital areas of the brain); or

the chest (so as to destroy the heart, lungs and great blood vessels),

as described in Appendix 4. Shot placements are shown in shown in Figure 2 (Appendix 4).

3.10 For the euthanasia of wounded or injured kangaroos or wallabies, when it is *not* safe (or practical) to use a firearm, the harvester must euthanase the animal using a concussive blow to the head delivered with sufficient force to crush the skull and destroy the brain.