# Introduction to Caring for Orphaned Mammals



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Photo Above: Greater Glider Courtesy of Rachel Lyons

For our "wildlife we are both their greatest enemy and their only hope.

These wonderful creatures will not argue their case.
They will not put up a fight.
They will not beg for reprieve.
They will not say goodbye.
They will not cry out.
They will just vanish.

And after they are gone, there will be silence.
And there will be stillness.
And there will be empty places.
And nothing you can say will change this.

Nothing you can do will bring them back. Their future is entirely in our hands."

Bradley Trevor Greive. International Best-Selling Author and Passionate Wildlife Conservationist

Photo Cover Page: Short-eared Possum joey. Courtesy of Cathy Cope.

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# Contributors

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The following persons have contributed towards this manual since its original version in 2004:

Karen Scott (original manual and updates) Kathryn Kielly Gail Gipp Eleanor Hanger Rachel Lyons

# Introduction

This training manual and accompanying workshop has been developed for wildlife rehabilitators who have little or no experience with caring for orphaned mammals.

The purpose of the manual and workshop is to provide wildlife rehabilitators with knowledge of rescue techniques for orphaned mammals as well as various management topics which will assist them in caring for a variety of orphaned mammals.

This manual covers common species of mammals found in South-east Queensland however the management principals can be applied to other orphaned mammals found throughout Australia.

This manual should be read in conjunction with the species-specific training manuals developed by Wildcare Australia Inc.

It is preferred that wildlife rehabilitators would have completed this course prior to attending specialised mammal workshops with Wildcare Australia Inc. as these general topics are not covered in detail in the specialised workshops.

We also encourage experienced wildlife rehabilitators to take the opportunity when attending this workshop, to look objectively at their own management skills to ensure that they are maintaining a high standard of care for their animals and to help keep up to date with changes in orphan management.

This manual should also be read in conjunction with the Wildcare Australia Inc. training manual *Rescue and First Aid for Wildlife*.

# Legislation

There is state legislation which, in part, regulates the care of wildlife in Queensland. It is important that all wildlife rehabilitators understand the contents of:

- Code of Practice Care of Sick, Injured or Orphaned Protected Animals in Queensland (Queensland Government Department of Environment and Heritage Protection) referred to in this manual as the Code of Practice
- Animal Care and Protection Act 2001
- Nature Conservation Act 1992
- Nature Conservation (Wildlife Management) Regulation 2006
- Nature Conservation (Wildlife) Regulation 2006

Of most importance to wildlife rehabilitators are the *Code of Practice* and *Animal Care and Protection Act 2001*.

The *Code of Practice* endeavours to ensure that the activities of every person involved in the rescue and rehabilitation of native wildlife in Queensland result in the best possible conservation and animal welfare outcomes for sick, injured and orphaned wildlife. The *Code* covers important topics such as:

- Provision of veterinary care
- Rescue, handling and transporting
- Housing
- Diet
- Euthanasia
- Release
- Record keeping

The Animal Care and Protection Act 2001 promotes the responsible care and use of animals and their protection from cruelty. It provides that any person who holds an animal (whether it is owned by them or not) has a 'duty of care' to provide appropriate care for that animal. This includes wildlife rehabilitators holding sick, injured and orphaned wildlife.

# Classification of Mammals

There are millions of different organisms in the world and classification provides us with a way of grouping them, bringing together those which share common features and are more closely related to each other. It is a hierarchical system, which makes identification of an organism easier and helps in the general study, observation, and organisation of conservation efforts,

For example, a possum is an animal and is classified as belonging to the Kingdom **Animalia**. It has a backbone so it is grouped in the Phylum **Chordata** and as it is a mammal, it is in the Class **Mammalia**.

Classes are then divided into **Orders**. These are further divided into **Families** which are divided again into **Genera** and then **Species**.

All mammals feed their young on milk. They are also endothermic (warm blooded) as they can maintain their own body temperature and most have fur or hair.

The Class Mammalia is divided into three Sub Classes: **Prototheria** (Monotremes), **Marsupialia** (Marsupials) and **Eutheria** (Placentals).

Native mammals found in South-East Queensland can be classified as follows:

#### Subclass Prototheria (Monotremes)

Monotremes are the only mammals that lay eggs. As they have no teats or nipples, the young monotremes lap milk that is secreted from ducts on circular patches on the mother's belly.

Order Monotremata				
Family	Platypus	Ornithorhynchus anatinus		
Ornithorhynchidae				
Family Tachyglossidae	Short-beaked Echidna	Tachyglossus aculeatus		

#### Subclass Marsupialia (Marsupials)

Marsupials have a very short gestation time (the time in which the young develop in the mother's uterus). The young are born in a very undeveloped state, except for strong forelimbs which enable it to make its way from the mother's cloaca to the pouch. Once inside the pouch the young marsupial attaches itself to one of the teats.

As the young marsupial develops, the composition of the mother's milk changes from a dilute fluid rich in carbohydrates to a thick fluid high in fat. The young cannot maintain their own body temperature and rely on warmth from the mother.

Order Dasyuromorphia		
Family Dasyuridae	Northern Quoll	Dasyurus hallucatus
	Spotted Tailed Quoll	Dasyurus maculatus
	Brush-Tailed Phascogale	Phascogale tapoatafa
	Yellow-footed antechinus	Antechinus flavipes
	Brown Antechinus	Antechinus stuartii
	Common Dunnart	Sminthopsis murina
	Common Planigale	Planigale maculata
<b>Order</b> Peramelemorphia		
Family Peramelidae	Northern Brown Bandicoot	Isoodon macrourus
	Long-nosed Bandicoot	Perameles nasuta
<b>Order</b> Diprotodontia		
Family Phascolarctidea	Koala	Phascolarctos cinereus
Family	Greater Glider	Petauroides volans
Pseudocheiridae	Ringtail Possum	Pseudocheirus peregrinus
Family Petauridae	Yellow-bellied Glider	Petaurus australis
	Squirrel Glider	Petaurus norfolcensis
	Sugar Glider	Petaurus breviceps
Family Acrobatidae	Narrow-toed Feathertail Glider	Acrobates pygmaeus
	Broad-toed Feathertail Glider	Acrobates frontalis
Family Burramyidae	Eastern Pygmy-possum	Cercartetus nanus
Family Phalangeridae	Common Brushtail Possum	Trichosurus vulpecula
	Short-eared Possum	Trichosurus caninus
Family Potoroidae	Rufous Bettong	Aepyprymnus rufescens
	Long-nosed Potoroo	Potorous tridactylus
Family Macropodidae	Grey Kangaroo	Macropus giganteus
	Agile Wallaby	Macropus agilis
	Black-striped Wallaby	Macropus dorsalis
	Red-necked wallaby	Macropus rufogriseus
	Whiptail Wallaby	Macropus parryi
	Swamp Wallaby	Wallabia bicolor
	Red-legged Pademelon	Thylogale stigmactica
	Red-necked Pademelon	Thylogale thetis

#### Subclass Eutheria (Placentals)

Placental mammals have a long gestation time and the young are born more developed than marsupials. This results in a shorter lactation time.

While placental mammals include a large variety of species, there are only two orders of placental mammals that are native to Australia. These are the Order Chiroptera which are bats and the Order Rodentia which includes native rats, native mice and Melomys. The dingo is a species introduced by man, as are rabbits, dogs, cats, horses and pigs and other rodents, such as the Brown Rat and House Mouse.

Order Chiroptera				
Family Pteropodidae	Black Flying Fox	Pteropus alecto		
	Grey-headed Flying Fox	Pteropus poliocephalus		
	Little Red Flying Fox	Pteropus scapulatus		
	Eastern Tube-nosed Bat	Nyctimeme robinsoni		
	Queensland Blossom Bat	Syconycteris australis		
Family Rhinolophidae	Eastern Horseshoe Bat	Rhinolophus megaphyllus		
Family Emballonuridae	Yellow-bellied Sheath-tailed Bat	Saccolaimus flaviventris		
Family Molossidae	White-striped Free-tailed Bat	Austronomus (Tadarida) australis		
	Northern Free-tailed Bat	Mormopterus lumsdenae		
	East Coast Free-tailed Bat	Micronomus (Mormopterus)		
		norfolkensis		
<b>Family</b> Vespertilionidae	Large-footed Myotis	Myotis macropus		
	Hoary wattled bat	Chalinolobus nigrogriseus		
	Gould's Wattled Bat	Chalinolobus gouldii		
	Eastern Cave Bat	Vespadelus troughtoni		
	Little Broadnosed Bat	Scotorepens greyii		
	Eastern Bent-winged Bat	Miniopterus orianae		
		(schreibersii) oceanensis		
	Little Bentwing Bat	Miniopterus australis		
	Lesser Longeared Bat	Nyctophilus geoffroyi		
	Gould's Long-eared Bat	Nyctophilus gouldi		
Order Rodentia				
<b>Family</b> Muridae	Water Rat	Hydromys chrysogaster		
	Water Mouse	Xeromys myoides		
	Fawn-footed Melomys	Melomys cervinipes		
	Grassland Melomys	Melomys burtoni		
	Bush Rat	Rattus fuscipes		
	Swamp Rat	Rattus lutreolus		
	Pale Field Rat	Rattus tunneyi		

There are many different terms used in the wildlife rehabilitation industry when referring to orphaned mammals and it can certainly be confusing. Below is a list of terms commonly used to assist you to understand the information provided:

#### Classification

#### **Marsupials**

- Mammals which, after a fairly short gestation period, give birth to undeveloped young that continue development in the pouch. The pouch in some species is very rudimentary and only developed for the period the female is lactating.
- Species include: kangaroos, wallabies, possums, gliders, koalas, wombats, bandicoots.
- The term "joey" refers to all baby marsupials.

#### **Eutherian / Placental Mammals**

- · Mammals which give birth to fully developed young
- · Species include: humans, bats, rodents, and marine mammals

#### Monotreme

- · Egg-laying mammals
- · Species include: echidnas and platypus

#### **Arboreal**

- Animals that live in trees
- · Species include: possums, gliders, and koalas

#### **Terrestrial**

- Animals that live solely on or close to the ground
- · Species include: echidnas, bandicoots, and macropods

#### Diet

#### Herbivore (herbivorous)

• An animal that feeds on grass and other plants

#### Carnivore (carnivorous)

An animal that eats flesh

#### **Insective (insectivorous)**

· An animal that feeds on insects

#### Omnivore (omnivorous)

· An animal that feeds on both animal and plant foods

#### Frugivore (frugivorous)

· An animal that eats fruit

#### Browse / Leaf

- Branches of native vegetation used to feed animals, particularly arboreal species such as possums and gliders
- · The foliage of the browse provides a source of food
- The foliage, stems and branches provide materials for building and/or lining nests
- Branches provide feeding opportunities to glean insects hiding amongst the foliage/bark

#### **Natural Diet**

- The exact diet that an animal would eat in the wild
- Is species specific, but includes native vegetation foliage, insects, small reptiles and birds
- Is essential to the successful hand-raising of all species

#### Supplementary Diet

- Food items that an animal would not eat in the wild
- Common supplementary diet items include: fruit, vegetables, insects, milk replacers and supplements
- Supplementary diet should make up only a small portion of the animal's daily intake



Photo Right: A collection of browse/leaf for a Common Brushtail Possum. Courtesy of Michael Wilson

#### Stage of development: fur growth

#### Pinkie / Unfurred

- · No fur
- In very young unfurred joeys, the skin will be transparent and very pink. Note however that some species such as the Common Ringtail Possum, unfurred joeys have dark brown skin colouring.
- In older unfurred joeys, the skin will take on more of a grey appearance as the fur starts to grow beneath the surface.



#### **Cutting Fur**

- The fur is just breaking through the skin
- Skin will appear darker at this time and is sometimes described as 'velvet' or 'peach fuzz'



#### Just Furred / Flat Furred / Finely Furred

- · Short fur that is generally less than 8mm in length
- The fur sits 'flat' against the skin
- Sometimes described as "sleek fur"



#### **Fully Furred**

- Fluffy fur that is long in appearance
- · Looks like a miniature version of an adult



#### **Puggle**

- · Baby monotreme (platypus or echidna)
- Echidna puggles are young that are unspined or just spined



#### Photos above from top right:

- 1 Common Brushtail Possum joey (Karen Scott)
- 2 Short-eared Possum joey (Cathy Cope)
- 3 Rufous Bettong joey (Penelope Hacker)
- 4 Swamp Wallaby and Red-legged Pademelon joeys (Penelope Hacker)
- 5 Short-beaked Echidna puggle (Karen Scott)

#### Stage of development: pouch life

#### **Pouch Young**

- A young marsupial which spends all (or the majority) of its time in the pouch.
- The joey cannot thermoregulate (maintain its own body temperature) at this stage and requires the warmth provided by the mother's pouch.





#### Pouch Emergent / Late-stage Pouch Young

- A young marsupial which is starting to venture from mum's pouch.
- The joey is starting to climb on mum's belly or back (possums, gliders, koalas) or hop/move around a little on their own (kangaroos, wombats, bandicoots).



Photo Above: Just furred Red-necked Wallaby Courtesy of Kerry Johnston

#### **Out of Pouch**

- A marsupial which has been permanently evicted from mum's pouch.
- The joey will often still suckle from the teat by putting its head in the pouch.
- The joey clings to mum (arboreal species) or stays close to mum or in a nest (terrestrial species and some arboreal species).





Photos Above: Red-necked Wallaby with an older joey who is still dependent upon milk but much more active out of mum's pouch.

Courtesy of Kerry Johnston

#### Stage of development: interaction with mum

#### Front-Young (possums, koalas)

 Young marsupial joeys that are old enough to climb out of pouch and may still cling to the front/belly of mum

> Photo Right: Just furred Koala joey on mum's belly Courtesy of Australian Geographic



#### Back-Young / Back-Rider (possums, koalas)

• The joey is old enough to spend time clinging to mum's back

Photo Right: Short-eared Possum joey on mum's baby Courtesy of Eleanor Hanger



#### Foot Young / At Foot / At Heel (macropods)

- The joey is permanently out of mum's pouch but stays very close to her
- The joey will still often suckle from the teat

Photo Right: Whiptail Wallaby and 'at foot' joey Courtesy of Kerry Johnston



# Nest / Burrow Young (bandicoot, antechinus, gliders, echidna)

- Species that leave their young in a nest, burrow or hollow while they forage for food
- The young will be able to thermoregulate by this stage

Photo Right: Yellow-footed Antechinus are a species that leave their babies in a nest once they are furred.

Courtesy of Penelope Hacker



#### Release procedures

#### Pre-release

- The final stage of rehabilitation prior to release back to the animal's natural habitat
- The animal must have gained all necessary skills before this stage to survive in the wild
- This is not the time to start to think about the survival skills that it requires they must already have those skills by this stage

#### Crèche

- A group of animals of the same species and age that are placed together to form a 'family group'. We do not form groups of mixed species.
- Specific to certain species such as ringtail possums and flying foxes
- Flying Fox: animals are placed into crèche in the pre-release stage of their hand-raising process
- Ringtail possums: crèche is formed when joeys first arrive into care (rather than in the pre-release stage)

#### **Soft Release**

- The orphan is held in an enclosure/aviary at its intended release location for some time (from one week to many months) prior to its release
- This provides the animal with an opportunity to get used to the surroundings, the native vegetation at the site and provides an opportunity for wild animals in that the area to become accustomed to its presence
- Once the animal has the skills necessary to survive, the door to the enclosure is opened (at an appropriate time of day/night) and the animal is free to leave on its own accord
- The most important element of the soft release is that the animal is supported during the initial release period. It is able to return to the enclosure for security and may be offered supplementary food to help minimise the stress associated with release.
- This is the **PREFERRED option** for all mammal species
- It is essential for all orphans raised from pouch-young stage

#### Hard Release

- The orphan is held in an enclosure at a different location to its intended release site
- It is only taken to the release site at the actual release time
- The animal is released directly into its native habitat with no support provided (i.e. no ability to return to a safe enclosure or be provided with supplementary food)
- This is the **LEAST preferred option** for all mammal species
- The long-term survival of orphaned mammals released in this manner is significantly impacted
- Only suitable for some species that generally do not return to their enclosure such as bandicoots and antechinus

#### Semi-hard Release

- · A release method between a soft release and a hard release
- The animal is released directly into its native habitat with some support
- Support would include the provision of a nest box or drey (for possums and gliders) which is affixed in a suitable location and the animal placed in it. This box or drey should be the one that it has been using during their pre-release stage.
- Support in the way of providing supplementary food is also generally provided
- This method may be suitable for orphaned mammals that arrived into care as a juvenile and which are being released back to their rescue location
- If releasing orphans raised from pouch-young stage, you must be 100% confident that the animal has all the skills necessary for survival



Photo Above: Successful release of a koala back to its rescue location.

Courtesy of Kiersten Jones

# The Role of your Species Coordinator

Wildcare Australia Inc. has appointed Species Coordinators for each region to assist you in your wildlife caring journey. These Species Coordinators have been appointed due to their experience with caring for that species. Some of whom have more than 15 years' experience in caring for our native wildlife.

The Wildcare Species Coordinators are generous with their time and are there to provide information, assistance and support to less experienced rehabilitators. They also act as a great support for experienced rehabilitators.

#### Who do I contact if I have any queries about my animal?

The answer is your Species Coordinator. Your Coordinator has extensive experience and can answer any questions that you have. Do not rely on information received from fellow rehabilitators as the information that they provide may be inaccurate or simply may not be appropriate for your individual animal. While it is natural for wildlife rehabilitators to "swap stories" about their animal's progress, before taking on any advice offered by a fellow rehabilitator ALWAYS check with the appropriate Species Coordinator.

Likewise, if a fellow rehabilitator asks you for advice (regardless of your experience) encourage the rehabilitator to contact their appropriate Species Coordinator and discuss the issue with them directly. Never offer advice to a fellow rehabilitator as you may be responsible for a decline in the animal's health or possibly even its death. Wildcare will not tolerate rehabilitators giving advice to fellow rehabilitators without the express permission of their appropriate Species Coordinator.

#### Why can't I seek advice from another rehabilitator?

Your Species Coordinators have been chosen because of their knowledge of the species, but each one, like each experienced rehabilitator, may do things slightly differently than another, even though the end result may be the same. Problems can arise when you seek advice from too many people as the combination of advice provided may not work and the failure of the animal to thrive will then fall back on the Species Coordinator and yourself. We would prefer that you deal with only one person to prevent this from happening. This doesn't mean that you cannot listen, learn and discuss different things with other rehabilitators but please do not change anything until you discuss the issue with your Species Coordinator to check if it would be suitable for your individual animal.

Wildlife rehabilitation is about the sharing of information and even the Species Coordinators are still striving to learn and share new knowledge and skills.

#### What if I have a silly question?

We can guarantee that it has been asked before! The Species Coordinators are used to dealing with rehabilitators with little or no experience and will not think any less of you for asking an obvious, or what you might consider, a silly question. It is better, for your animal's well-being, to ask a silly question than to make an avoidable mistake! And remember, all of our Species Coordinators started with no experience too!

#### How often should I contact my Species Coordinator?

For new rehabilitators, it is expected that you will be in contact with your Species Coordinator at least every few days when you receive your very first animal. Once the animal is settled into care, then you would be expected to contact your Species Coordinator at least once a week to provide an update on your animal's progress.

Your Species Coordinator will want to know how much weight your animal has put on, if it is feeding well and what stage of development it is at. This will also give you an opportunity to discuss any issues that might be of concern to you.

If you experience any difficulties, or are simply just not sure that something you or your animal are doing is right in between these regular updates, do not hesitate to contact your Species Coordinator.

Most Species Coordinators can be contacted by either phone, text or by email.

#### Which Species Coordinator do I keep in touch with?

We are fortunate within Wildcare that we have numerous Species Coordinators for most mammal species and these are appointed according to species and region. When reporting to a Species Coordinator, always report to the same Coordinator and preferably one that is in your region. It is preferable that you do not alternate between Species Coordinators as neither will be able to properly monitor your animal's progress. There may be times though where a Species Coordinator may suggest that you speak with another Coordinator who may have more experience in a particular area.

#### What will happen if I don't keep in touch with my Species Coordinator?

One of the key elements of assessing and issuing Permit Endorsements, is the endorsement of your wildlife caring by your Species Coordinator.

If you fail to keep in touch with your appointed Species Coordinator, they will not be able to provide this endorsement on your behalf and therefore Wildcare may deny you a Permit. You will also miss out on the opportunity to learn and share information one-on-one with them. Furthermore, you risk the health and well-being of your animal and will certainly jeopardise your chances of being offered animals in future.

# Making the Decision to Care for Orphaned Mammals

Taking on the responsibility of caring for an orphaned mammal is a big commitment, not just in time and financial resources but it can also be an emotional experience that you may not be prepared for. Before making the final decision to care for an orphan, it is imperative that you understand exactly what the commitment entails.

Below are some considerations that may help you in deciding whether caring for orphaned mammals is the right decision for you.

#### Does your lifestyle lend itself to caring for orphaned mammals?

You should not attempt to raise an orphaned mammal if you will have difficulties fitting it into your lifestyle in a way in which it will thrive. There are many wildlife volunteers who would love the opportunity to care for orphaned mammals but simply do not have the resources or lifestyle to be able to do so.

Below are some key points that need to be carefully considered when deciding whether young animals are something that you will be able to successfully care for.

#### Work / Employment

#### → Are you permitted to take young animals with you to work?

- o You will need to seek permission from your employer.
- Some employers do not permit animals to be on site due to workplace health and safety concerns (e.g. health or hospitality industry).
- Some employers may not permit certain species of animals to be on site (e.g. bats).

#### → Are you able to attend to feeds within your work schedule?

- You will need to schedule feeds for your animal during work hours and for unfurred joeys, this will be every three (3) hours with each feed taking up to 30 minutes to complete.
- It is not in the best interests of your animal to leave it with someone else to be cared for during work hours as this causes young animals confusion and distress.

#### → Do you have an appropriate area at work to keep your animal?

- You will need a quiet area away from noise or disruption in which to keep your animal's enclosure. For example, a noisy factory or busy retail outlet is not suitable.
- o It is not appropriate to keep your animal in a car or outside during work hours. They must be in a place where you can frequently check on them throughout the day.

#### → Does your work schedule allow for the animal to display its natural behavior?

- o Most of our orphaned mammals are nocturnal and therefore tend to sleep more through the day, but become more active and therefore need more interaction by early evening.
- o If you work evenings/nights, your animal's natural behavior may be restricted by being contained to an enclosure during this time whilst you are at work.

#### **Domestic Pets**

#### $\rightarrow$ Can you house your animals away from domestic pets such as dogs or cats?

- Most wildlife rehabilitators have domestic pets. This does not exclude you from caring for native wildlife, however it is imperative that domestic animals are not permitted to interact with wildlife in care. This is a fundamental aspect of the Code of Practice.
- o The individual temperament of your dog or cat is completely irrelevant and you should never assume that because your dog or cat is "well trained" that this is not a serious element in making the decision to care for wildlife.
- Our orphaned mammals are not born with the natural instinct to fear domestic animals. By simply exposing them to the smell and sounds of dogs or cats, they will become accustomed to them and will learn not to fear them. This can be a death sentence to your animal upon release as they will not be able to distinguish the difference between a "good dog" and a "bad dog". Remember that many of our orphans come into care as a result of their mother being killed by a pet dog or cat.
- You must be able to keep all wildlife away from domestic pets. This means that their enclosures will need to be in an area that is inaccessible to your dog or cat. This would generally mean being kept in a separate room with the door shut.
- o The same principals apply when animals are being housed outdoors. Their enclosures must be in an area where your dogs and cats are not permitted. This might require you to partition off a section of your verandah or yard (or both) to ensure that no interaction can occur.

# → Can you minimise the stress associated with being near domestic dogs or cats?

You will need to be mindful that even the smell of domestic animals can be enough to jeopardise the survival of your animal. Pay particular attention to the smell of your clothing, the general smell of your house and general items used for your animals (such as towels, sheets etc).

#### → Do you keep predatory species such as snakes, monitors etc?

- o If you have pets that are considered predatory to mammals (for example large reptiles) you need to house them separately from wildlife in care. Native animals should never be housed with domestic animals.
- o If you have any questions in this regard, please seek advice from an experienced Species Coordinator.

#### Children

#### → Do you have young children?

- o Having young children certainly does not exclude you from caring for orphans however you will need to be able to objectively assess whether you are able to provide the best environment for an orphaned animal that requires stability, a regular routine and a quiet environment.
- o Again, having an area specifically dedicated to the housing of your animal is a possible solution.
- You should discuss this aspect of care with your appropriate Species Coordinator to ensure that you are able to provide the best environment for your animal.
- o Certain species of orphaned mammals are more easily managed than others. For example, species such as possums, gliders and bandicoots are more easily managed as they are confined to enclosures whereas species such as macropods require much more room to move around and are not confined to an enclosure.

#### **Routine and Stability**

#### → Are you able to keep the animal in a quiet and stable environment?

o This might be difficult, for example with noisy house-mates and excessive road noise.

#### → Are you able to maintain a good routine?

- o Irregular work hours, social or family commitments could be a problem.
- o Are you able to stick to a regular feeding pattern?

#### → Are you able to cope with night feeds?

- o Most of our mammals are nocturnal and therefore will require more attention during the night.
- o If you are not prepared to wake through the night to attend to feeds, then you should not take on the care of an animal that requires this. You should focus on older orphans that will not result in disruption to your sleep.

#### Commitment

#### → Are you able to be the primary care-giver for the animal?

- We must imitate as closely as possible the way in which a mother would raise her baby in the wild. With the exception of some bat species during the later part of raising, no Australian mammal species leaves their baby with another female for some "time out".
- You must be prepared to be the sole carer of the animal for the entire duration of its time with you and that will generally be for anything from 6 weeks to 12 months.
- o This means that you will be responsible for every feed, pouch change, veterinary visit etc whilst it is in care. This is a big commitment!
- It is not acceptable to routinely have your animal "baby sat" by another wildlife carer or family member as this causes the animal stress and confusion and will impact on its well-being.

#### → Do you have the support of your family?

- o Depending upon your living arrangements, caring for orphaned mammals will have an impact on your daily routine and your living arrangements.
- o Is your family prepared:
  - to keep noise to a minimum?
  - to have social functions and holidays impacted because you have joeys to feed?
  - To have part of your property dedicated to a quiet outdoor area for your animals?
- o It is imperative that you discuss these matters with your family prior to taking on the commitment.

#### **Financial Commitment**

#### → Are you able to afford the financial costs involved?

- Unfortunately, there are many costs involved in caring for wildlife, such as those for food, housing and veterinary products. These costs are born by the carer.
- When caring for some species the carer requires vaccinations, for example with the rabies vaccine in order to care for bats.
- o There are extensive details in this training manual as to the costs involved.
- If the financial cost is a factor for you, it is important that you speak with a Species Coordinator regarding this BEFORE making the decision to take on an orphan.

#### **Emotional Commitment**

#### → Are you prepared for the worst?

- o Caring for orphaned mammals is certainly a very rewarding experience and one which you should feel privileged to be able to do.
- It is important for their survival that orphaned mammals bond closely to you in the same manner that they would do in the wild with their mother. This bond goes two ways it is normal for you to develop a strong attachment to your orphan.
- O However, not every orphan survives and you must be prepared to cope with that loss. Many wildlife rehabilitators have cared for orphans for six months or more only to have them die or have to be euthanised expectedly. This can be an extremely emotional experience, particularly for new carers, and one that you must be prepared for.
- o If you do not think that you could cope with the loss of an animal that you have bonded with, then perhaps caring for orphaned mammals is not for you.

#### **Motives**

#### → Why do you want to care for orphaned mammals?

o Our aim is to raise our orphans to a state of maturity that not only allows them to be released, but also to ensure their survival in the wild after

- release. It is imperative that orphans be raised properly to give them the best chance of surviving.
- Ask yourself why you wish to raise an orphaned mammal? Are you doing it for yourself or for the animal? While many orphans are "cute", it is waste of resources and the animal's life, to raise an orphan if it is not going to survive once released.

#### Do you have the available equipment or are you prepared to purchase it?

As you will learn, orphaned mammals require specialised equipment. This equipment will vary depending upon the species and the stage of development. Purchasing this equipment can be expensive and you must factor this into your decision to care for orphaned mammals.

Unfurred orphans will require additional equipment which can be costly. This is one of the reasons that we recommend that new rehabilitators commence with a furred orphan, where you will require less equipment.

For more expensive items of equipment, such as an Intensive Care Unit (ICU), you should establish whether your local Council offers funding opportunities for volunteer wildlife carers to cover the cost.

# Are you prepared to care for an orphaned mammal that requires specialised care?

Most orphaned mammals come into care because their mother has been killed. The most common causes are road trauma and domestic animal attack. In a lot of cases, the orphaned young will also bear some evidence of injury from that trauma.

Most orphaned young will require veterinary attention when they first come into care. They may be simply dehydrated and require extra fluids or they may have fractured limbs that will require regular veterinary visits and the additional expenses that go with that.

All infant young that have been the victim of trauma, or are found without their mother, should be assessed by an experienced wildlife veterinarian. Many injuries and illnesses can remain undiagnosed and can be life threatening if they do not receive appropriate treatment.

The Code of Practice states that all wildlife must be assessed by a competent veterinarian.

#### How do I decide what species of orphaned mammal to care for?

Deciding what species of orphan to care for will depend upon a number of factors such as your lifestyle, home situation and the equipment and facilities that you may have at your disposal or be able to acquire.

To help you determine what species would suit you best, it is recommended that you attend a variety of workshops to learn more about specific mammal species. By discussing the different options with the Species Coordinators, or with other experienced mammal rehabilitators, you can find out more about what species would best suit you.

#### What are my responsibilities when deciding to care for orphaned mammals?

As with all species, you must be fully aware of your responsibilities when caring for sick, injured or orphaned wildlife.

Your responsibilities will include:

- Abiding by the guidelines and decisions made by Wildcare Australia Inc.
- Abiding by the Code of Practice Care of Sick, Injured or Orphaned Protected Animals in Queensland (Queensland Government Department of Environment and Heritage Protection).
- Abiding by all aspects of the Wildcare Australia Inc Safety Management Manual.
- Registering all animals in your care with the relevant Wildcare Species Coordinator.
- Keeping accurate records at all times. The Rescue and Examination Record form should record information covering growth and development, food and medication. This record form should stay with the animal until its final outcome.
- Notifying the appropriate Wildcare Species Coordinator of any changes to the status of the animal, such as death, release, escape or unusual or chronic illness.
- Being prepared to have your facilities and management techniques monitored by a more experienced wildlife rehabilitator.
- Completion of the Rescue and First Aid for Wildlife (Basic) training workshop.
- Completing a basic training workshop for the particular species you wish to care for, before taking on the care of that species.
- Attending at least one workshop each year for each species that you are caring for. This is a condition of your Rehabilitation Permit Endorsement and will also refresh and add to your skills and knowledge.
- Having suitable equipment and facilities required for the specific type of animal that you wish to care for.

#### What do I do once I have decided to care for orphaned mammals?

Once you have satisfied yourself that you are in a position to care for orphaned mammals you will need to contact the appropriate Species Coordinator. They will discuss various aspects with you to ensure that you are fully prepared for the commitment that you are about to undertake and help you decide what age animal would best suit your lifestyle and experience.

Donated items such as enclosures and pouches are provided to the relevant Species Coordinators and they can often help you to get set up with some of the equipment that you will need.

# Common Mammal Species of South-east Queensland

#### Species of South-east Queensland

Below is a list of the most common mammal species that come into care in the South-east Queensland region.

A brief overview of the species requirements and how difficult they are to hand-rear, can be found on the following pages. For more detailed information on their biology, care and management, you will need to attend a specific training workshop on the species that you are interested in caring for to gain a more in-depth understanding of their requirements. Each species-specific workshop provides a detailed training manual for that group of animals.

#### Possums and Gliders

Common Brushtail Possum Short-eared Brushtail Possum Common Ringtail Possum Sugar Glider Squirrel Glider Narrow-toed Feathertail Glider Broad-toed Feathertail Glider Greater Glider \* Yellow-bellied Glider \* Trichosurus vulpecula
Trichosurus caninus
Pseudocheirus peregrinus
Petaurus breviceps
Petaurus norfolcensis
Acrobates pygmaeus
Acrobates frontalis
Petauroides volans
Petaurus australis

#### **Macropods**

Eastern Grey Kangaroo Whiptail Wallaby Red-necked Wallaby Black-striped Wallaby \* Swamp Wallaby Agile Wallaby \* Red Necked Pademelon Red Legged Pademelon Rufous Bettong \* Long-nosed Potoroo \* Macropus giganteus
Macropus parryi
Macropus rufogriseus
Macropus dorsalis
Wallabia bicolor
Macropus agilis
Thylogale thetis
Thylogale stigmatica
Aepyprymnus rufescens
Potorous tridactylus

#### **Bats**

Grey Headed Flying Fox
Black Flying Fox
Little Red Flying Fox
Beccari's Free-tail Bat
Gould's Wattled Bat
Gould's Long-eared Bat \*
Little Broad-nosed Bat \*
Eastern Broad-nosed Bat \*
Large Footed Myotis \*
Eastern Freetail Bat \*

Pteropus poliocephalus
Pteropus alecto
Pteropus scapulatus
Mormopterus beccarii
Chalinolobus gouldii
Nyctophilus gouldi
Scotorepens greyii
Scotorepens orion
Myotis macropus
Mormopterus ridei

#### Other Mammals

Koala
Short-beaked Echidna
Northern Brown Bandicoot
Long Nosed Bandicoot
Yellow-footed Antechinus
Brown Antechinus \*
Brush-tailed Phascogale \*
Bush Rat \*
Swamp Rat \*
Pale Field Rat \*
Fawn-footed Melomys \*
Grassland Melomys \*

Phascolarctos cinereus
Tachyglossus aculeatus
Isoodon macrourus
Perameles nasuta
Antechinus flavipes
Antechinus stuartii
Phascogale tapoatafa
Rattus fuscipes
Rattus lutreolus
Rattus tunneyi
Melomys cervinipes
Melomys burtoni

<sup>\*</sup> Less-common species that to come into care

# Orphaned Mammal Sheets



Photo Above: Red-necked Wallaby and joey.
Courtesy of Kerry Johnston

## Common Brushtail Possum

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

Natural Habitat Dry and moderately wet sclerophyll forests, woodlands and urban

areas

Natural Diet Native leaves, native fruits, native blossoms, seeds, grass, fungi

and insects. In urban areas, have adapted to a number of

introduced plant species

**Supplementary** 

Diet

Supplementary foods may be given.

Details are provided in the Caring for Possum notes or from your

Species Coordinator

Natural Behaviour Nocturnal, arboreal

**Social Behaviour** Solitary and very territorial

**Development** Females may give birth in the first year. Females produce a single

young (twins are rare) 16-18 days after mating. Young remain in the mother's pouch for 4-5 months, weaning occurs at around 7 months, and the young becomes independent at around 9 months

of age.

Basic Housing Pet carry cage

requirements Cage (1m x 1m x 1.2m)

Outdoor aviary with branches of varying sizes (3m x 2m x 2m)

Wooden possum box

Caring Notes One of the most common possum species that comes into care.

Suitable for new mammal carers.

Furred/just furred orphans are generally fairly hardy.

Unfurred joeys should go to a more experienced possum

rehabilitator.

Preferable to raise orphans in pairs (either housed together or

separately) to reduce humanization. Can be in care for up to 5 months.



Photo Courtesy of J Hanger

## Short-eared Possum

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

**Natural Habitat** Tall, wet sclerophyll forests and rainforests with a good under

storey

Natural Diet Native leaves, native fruit, native blossoms, fungi, lichen, bark

and insects

**Supplementary** 

Diet

Supplementary foods may be given.

Details are provided in the Caring for Possum notes or from your

Species Coordinator

Natural Behaviour Nocturnal, arboreal

Social Behaviour Adults in this area of SEQ, northern NSW are believed to form

monogamous pairs.

**Development** Males sexually mature at 30-36 months, females at 2 years. A

single young or occasionally twins are born 15-17 days after conception. It attaches to a teat in the mother's pouch which it vacates 5-6 months later. It rides on its mother's back until weaned at 8-9 months. Juveniles disperse when they are 18-36

months old.

Basic Housing requirements

**Housing** Pet carry cage

Cage  $(1m \times 1m \times 1.2m)$ 

Outdoor aviary with branches of varying diameters (3m x 2m x

2m)

Wooden possum box

**Caring Notes** One of the least common possum species to come into care.

An appropriate species for new mammal rehabilitators. Furred/just furred orphans are generally fairly hardy.

Unfurred joeys should go to a more experienced possum

rehabilitator.

Orphans will remain in care longer as their development is slower

than that of the Common Brushtail Possum.

Orphaned young preferably raised in pairs (either housed

together or separately), but can be raised individually.

Can be in care for up to 8 months.



Photo Courtesy of J Hanger

# Common Ringtail Possum

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

Natural Habitat Forests, woodlands, rainforests, tea tree thickets and dense shrub

**Natural Diet** Leaves, flowers and fruits of Eucalyptus spp. and other native

plants. In urban areas, they eat a number of introduced plant species. (Don't give any flowers or fruits before the joey has

reached 150 grams.)

Supplementary Diet

Not recommended, as the inclusion of supplementary foods can lead to gastro-intestinal problems and can be fatal. Small amounts of vegetables, fruit, nuts and seeds can be given once the joey is

over 200 grams.

**Natural** Behaviour

Nocturnal, arboreal, folivores. They are coprophagic, producing two types of faecal pellets; large soft pellets coming from the caecum, are produced whilst the possum is resting during the day and are eaten by it and its young, harder faecal pellets are produced at night when they are active and these are not eaten so

often.

Social Behaviour Live in family groups usually comprising an adult male with one or

two adult females, their dependant offspring and immature

offspring from the previous breeding season.

Sexually mature at about 12 months. Litters vary from 1-4, but Development

usually 2 young are born. Newborns attach to one of the 4 teats in the mother's pouch for 42-49 days. They leave the pouch at about 4 months and are left in the nest for the next 2 weeks or are carried on their mother's back while she forages. Males have been

observed assisting females in caring for young.

**Basic Housing** requirements

Pet carry cage

Cage (approx.  $1m \times 1m \times 1.2m$ )

Outdoor aviary with branches of varying sizes (3m x 2m x 2m)

Artificial dreys, branches of varying sizes.

Require a specialized natural diet (limited supplementary foods). **Caring Notes** 

> Orphaned young MUST be raised in groups so if you cannot care for more than one orphan at a time, this species would be unsuitable. Orphan young (50g - 100g) must have access to the

pap or fresh pellets of an adult ringtail.

Common orphan to come into care (particularly in Brisbane area). Unfurred joeys should go to a more experienced possum

rehabilitator - these joeys have a high mortality rate.

They are a more nervous animal than Brushtail possums and

suffer from stress far more easily. Can be in care for up to 5 months.

Photo Courtesy of J Hanger

# Sugar Glider

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

**Natural Habitat** 

Wet and dry eucalypt forests and woodlands, usually with wattles

**Natural Diet** 

Acacia gum and eucalypt sap licked from gashes in tree trunks made with their lower incisor teeth, nectar, pollen, manna, honeydew, beetles, moths, spiders and other invertebrates

Supplementary Diet Natural

Behaviour

Nocturnal, arboreal and social within their own group

Finely chopped fruit, nuts and seeds sprinkled with High Protein Supplement. Invertebrates that have not been contaminated with pesticides or herbicides. N.B. One or two mealworms that have been gut-loaded may be given, more will make the gliders fat and lethargic.

Social Behaviour

Type social group consists of 3-4 adult females and 2-3 adult males with one male being the more dominant together with the young of the season.

**Development** 

Females become sexually mature at 8-15 months, males at 12 months. Females can rear up to 2 litters per season. Twins are usually born 16 days after mating and remain in the mother's pouch for 40 days, emerging at 60-70 days. Young remain in the nest for another 50 days and forage with their mother until 7-10 months old. Diet and in particular protein content effect the size of litters produced in gliders and possums.

Basic Housing requirements

Pet carry cage, cage  $(1m \times 1m \times 1.2m)$ , aviary, wooden glider box, branches of varying thickness, including string barks and paperbarks.

**Caring Notes** 

Very specialized diet.

Orphans more appropriate for experienced possum/glider rehabilitators.

Unfurred joeys should go to a more experienced possum or glider rehabilitator.

Orphans should be raised in groups to simulate their natural social structure and so that they can be released as a group.

Orphans do not come into care very often.

Can be in care for up to 2 months.



Photo Courtesy of Australian Wildlife Conservancy

# Squirrel Glider

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

**Natural Habitat** Sclerophyll forests and woodlands.

Natural Diet Nectar, pollen, invertebrates, such as caterpillars, weevils, beetles,

moths, Eucalypt sap and Acacia gum, manna and honeydew.

Supplementary Diet

Nocturnal, arboreal and social within their own group

Natural Behaviour Finely chopped fruit, nuts and seeds sprinkled with High Protein Supplement. Invertebrates that have not been contaminated with pesticides or herbicides. N.B. One or two mealworms that have been gut-loaded may be given, more will make the gliders fat and

lethargic.

**Social Behaviour** They nest usually in pairs or family groups comprising one mature male, one or more adult females, and their offspring of the season.

**Development** Sexually mature at about 12 months. Females often give birth to

twins. Newborns remain in mother's pouch until they vacate at about 70 days. They then remain in the next for another 30 days before accompanying the mother on foraging trips until weaned at 120 days. Diet and in particular protein content effect the size of

litters produced in gliders and possums.

Basic Housing requirements

Pet carry cage, cage (1m x 1m x 1.2m), aviary, wooden glider box, branches of varying thickness, including some stringybarks and paperbarks.

**Caring Notes** Very specialized diet.

Orphans more appropriate for experienced possum/glider

rehabilitators.

Unfurred joeys should go to a more experienced possum or glider

rehabilitator.

Orphans should be raised in groups to simulate their natural social

structure and so that they can be released as a group.

Orphans do not come into care very often.

Can be in care for up to 2 months.



Photo Courtesy of Australian Museum

### Feathertail Glider

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

**Natural Habitat** Wet and dry sclerophyll forests and woodlands

**Natural Diet** Pollen, nectar, insects, honeydew and manna

**Supplementary** 

Diet

Very finely chopped fruit, nuts and seeds sprinkled with High

Protein Supplement

Natural Behaviour Nocturnal, arboreal, social within own group

Social Behaviour Live in tree hollows of usually 5-6 individuals, females form

matrilineal groups comprising mothers and their female offspring.

Males are generally solitary outside of breeding season.

**Development** Females become sexually active at 6 months. Can have embryonic

diapause, litter size varies between 1-4, although 2-3 is more usual. Young remain in pouch for 60-65 days, staying in the nest until weaned independent at 95-100 days. Diet and in particular protein content effect the size of litters produced in gliders and

possums.

Basic Housing requirements

Escape proof container, cage (1m x 1m x 1.2m) fly wire screened, and aviary fly wire screened, small glider box, branches of varying

diameters.

**Caring Notes** Very specialized diet.

Orphans very difficult to raise - orphans should go to experienced

glider rehabilitator.

Orphans should be raised in groups to simulate their natural

social structure and so that they can be released as a group.

Orphans very rarely come into care. Can be in care for up to 6 weeks.



Photo Courtesy of Penelope Hacker

# Eastern Grey Kangaroo

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

Natural Habitat Dry sclerophyll forests, woodlands and low open scrub with

grassy areas.

Grasses and low shrubby vegetation **Natural Diet** 

Macropod pellets, Lucerne hay Supplementary Diet

Nocturnal 1 **Natural Behaviour** 

Form mobs of 10 or more animals with a dominant male. Social Behaviour

Sexually mature at 20-36 months. Young vacate the pouch at Development

about 11 months and suckle at foot until about 18 months old.

**Basic Housing** requirements

Macropod basket or hanging bag.

Quiet dedicated area of the house where the joey can be

Secure fenced yard with sheltered area with dense under-story

and shrubs.

Yard must be aware from direct contact, smell and noise of

dogs.

Fairly common orphan to come into care. **Caring Notes** 

Should be raised in small groups.

Orphans generally not suitable for new macropod carers.

Species not as hardy as wallaby and pademelon species.

They are very nervous animals and suffer from stress far more

easily than other macropod species.

They should be raised with other Eastern Grey kangaroos to

simulate their natural mob behaviour.

They remain in care for up to 8 months before going to prerelease where they will remain in care for a further 3-6 months. They are the least likely species to survive through to release.

They are not suitable for people with children or large numbers

of people in the house.



Photo Courtesy of Karen Scott

# Whiptail Wallaby

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

**Natural Habitat** Open forest with a grassy understorey, often in hilly areas.

**Natural Diet** Grass, herbs and ferns.

Supplementary Diet Macropod pellets, lucerne hay

Natural Behaviour Nocturnal

**Social Behaviour** Very gregarious and live in mobs of up to 30-50 animals.

**Development** Females sexually mature at 18-24 months, males at 2-3 years.

Young vacate the pouch at around 38 weeks and suckle at foot

for until 15 months old.

Basic Housing Macropod basket or hanging bag.

requirements Quiet dedicated area of the house where the joey can be housed.

Secure fenced yard with sheltered area with dense under-story

and shrubs.

Yard must be aware from direct contact, smell and noise of dogs.

Caring Notes Orphans vary rarely come into care.

Preferable to raise orphans in pairs or small groups.

Orphans more appropriate to go to experienced macropod carers

who has raised Eastern Grey kangaroos.

Whiptail wallabies are more similar to kangaroos in nature as

opposed to other wallaby species.

They are a very nervous animal and suffer easily from stress.

They remain in care for up to 8 months before going to prerelease where they will remain in care for up to a further 3

months.

Not suitable for households with large numbers of people or

children.



Photo Courtesy of Kerry Johnston

# Red Necked Wallaby

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

Natural Habitat Wet and dry sclerophyll forests and woodlands with grassy

areas and a dense understorey and tall coastal heaths

**Natural Diet** Grasses and herbs

**Supplementary Diet** Macropod pellets, lucerne hay

Natural Behaviour Nocturnal

**Social Behaviour** Generally solitary

**Development** Females sexually mature at 11-21 months, males at 13-19

months.

Young vacate the pouch by 40-43 weeks and suckle at foot

until 12-17 months old.

Basic Housing Macropod basket or hanging bag.

requirements Quiet dedicated area of the house where the joey can be

housed.

Secure fenced yard with sheltered area with dense under-story

and shrubs.

Yard must be aware from direct contact, smell and noise of

dogs.

Caring Notes The most common orphan macropod to come into care in

South-east Queensland.

Preferable to raise orphans in pairs or small groups.

Fairly hardy species.

Just furred or furred joeys suitable for new macropod

rehabilitators.

They remain in care for up to 6 months before going to prerelease where they will remain in care for up to a further 2

months.



Photo Courtesy of Karen Scott

## Swamp Wallaby

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

**Natural Habitat** Rainforests, sclerophyll forests and woodlands with a dense

understorey and heathlands

Natural Diet Browse on shrubs, pine seedlings, rushes, fungi, vines, ferns

and grasses.

**Supplementary Diet** Macropod pellets, lucerne hay

Natural Behaviour Nocturnal

requirements

**Social Behaviour** Generally solitary.

**Development** Sexually mature at 15-18 months. Young vacate the pouch at

about 36 weeks and suckle at foot until about 15 months old.

Basic Housing Macropod basket or hanging bag.

Quiet dedicated area of the house where the joey can be

housed.

Secure fenced yard with sheltered area with dense under-story

and shrubs.

Yard must be aware from direct contact, smell and noise of

dogs.

Caring Notes Fairly common orphan to come into care in South-east

Queensland.

Preferable to raise orphans in pairs or small groups.

Reasonably hardy species.

More specialized diet that Red Necked Wallaby

They remain in care for up to 6 months before going to prerelease where they will remain in care for up to a further 2

months.



Photo Courtesy of Karen Scott

## Red Necked Pademelon

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

**Natural Habitat** Margins of closed forests and rainforests

**Natural Diet** Grasses, herbs and leaves

Supplementary Diet

Macropod pellets, lucerne hay

Natural Behaviour Nocturnal

**Social Behaviour** Shy and generally solitary. Often congregate in small feeding

groups.

**Development** Sexually mature at 17 months. Young vacate the pouch by 26

weeks and suckle at foot for a further 4 weeks.

Basic Housing Macropod basket or hanging bag.

requirements

Quiet dedicated area of the house where the joey can be housed.

Secure fenced yard with sheltered area with dense under-story

and shrubs.

Yard must be aware from direct contact, smell and noise of dogs.

Caring Notes Orphans come into care fairly regularly from hinterland areas

but not in large quantities.

Preferable to raise orphans in pairs or small groups.

Fairly hardy species.

Need a very secure yard that is snake proof - they are exploring

outside from 400 grams.

They remain in care for up to 4 months before going to prerelease where they will remain in care for up to a further 2

months.

Not suitable for households with children, cats or large number

of people.



Photo Courtesy of Penelope Hacker

## Northern Brown Bandicoot

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

**Natural Habitat** Woodlands, forests and grasslands with low ground cover.

Sleep in concealed nests of ground litter piled over shallow depressions. Sometimes shelter in hollow logs and grass tussocks.

**Natural Diet** Insects, larvae, worms, berries, grass seeds and plant roots.

Supplementary Diet Low-fat mince, small amounts of fruit, vegetables, meal worms, hardboiled egg yolk, insects and invertebrates.

Natural Behaviour Nocturnal

Social Behaviour Solitary. Orphans can usually be raised together however on

occasion orphans will need to be separated.

Development

Sexually mature at 3-4 months. Females rear several litters of 1-7 (usually 2-4) young per year, born only 12.5 days after mating. They have 8 teats to which the young attach for about 50 days, thereafter remaining in the next until weaned at about 2 months.

**Basic Housing requirements**Large escape proof container, deep enough to allow for 6 inches of soil and leaf litter. Smooth bottom and sides to prevent bandicoot from damaging its nose. Secure lid so that they do not jump out and to keep insects from escaping.

**Caring Notes**Furred orphans suitable for rehabilitators with limited mammal experience.

Unfurred orphans should be placed with an experienced mammal carer.

Orphaned young do not come into care very often.



Photo Courtesy of Karen Scott

## Long-nosed Bandicoot

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

Natural Habitat Damp sites in rainforests, sclerophyll forests, woodlands, heaths

and grasslands.

Sleep in well-concealed nests of dry grass and plant matter with a

well concealed entrance.

Natural Diet A high fat and protein diet, which consist of invertebrates such as

worms, insects and larvae, eggs, fungi, seeds and plant roots.

Supplementary Diet Low-fat mince, small amount of fruit, vegetables, meal worms,

hardboiled egg yolk, insects, invertebrates.

Natural Behaviour

Nocturnal

Social Behaviour Solitary. Orphans can usually be raised together however on

occasion orphans will need to be separated.

**Development** Sexually mature at 4-5 months. Several litters of 1-5 (usually 2-3)

young are reared per year, born only 12.5 days after mating. Newborns are about 13mm long and weight about 0.25g. They attach to the 8 teats in the mother's pouch, opening their eyes at 45-50 days. They then leave the pouch and remain in the nest

until weaned at about 2 months.

Basic Housing requirements

Large escape proof container with deep enough to allow for 6 inches of soil and leaf litter. Smooth bottom and sides to prevent bandicoot from damaging its nose. Secure lid so that they do not

jump out and to keep insects from escaping.

Caring Notes Furred orphans suitable for rehabilitators with limited mammal

experience.

Unfurred orphans should be placed with an experienced mammal

carer.

Orphaned young do not come into care very often.



Photo Courtesy of Australian Wildlife Conservancy

## Koala

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

**Natural Habitat** Eucalypt forests and woodlands

**Natural Diet** Range of Eucalypt leaves

Supplementary

**Diet** 

None

Natural Behaviour Nocturnal

**Social Behaviour** Solitary animals.

**Development** Sexually mature at about 24 months. Females give birth to a

single young. Young vacate the pouch at 7-8 months and ride on

their mothers back until 11-12 months of age.

Basic Housing requirements

Carry basket.

Numerous tree forks

Outdoor aviary (4m x 4m x 2m)

Caring Notes Require a Koala Rehabilitation Permit from Department of

Environment and Resource Management

High mortality rate in orphans.

Not suitable for new mammal rehabilitators.



Photo Courtesy of Karen Scott

## Black Flying Fox

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

**Natural Habitat** Rainforests, mangroves, wet sclerophyll forests and woodlands.

Natural Diet Pollen and nectar from native plant species, mainly eucalypts and

wattles, fruits, figs and leaves.

Supplementary

Diet

Fruit

Natural Behaviour Nocturnal

**Social Behaviour** Congregate in camps of several hundred to hundreds of thousands

of bats.

**Development** Females give birth to one young at a time. The baby is carried with

the mother for 3-4 weeks until well-furred and is then left in the camp at night while the mother forages for food. Young can fly at 2

months and are independent at around 13 weeks of age.

Basic Housing requirements

Carry basket.

Folding clothes-airer

Tree forks.

**Caring Notes** Rehabilitators must be vaccinated for Australian Bat Lyssavirus.

Must be raised with other baby flying foxes as they are a highly

social species.

Can be raised with Grey-Headed Flying Foxes.



Photo Courtesy of Bats Qld

## Grey Headed Flying Fox

The following information is extracted from "Key Guide to Australian Mammals" by Leonard Cronin 2000.

Natural Habitat Wet and dry sclerophyll forests, rainforests, paperbark swamps

and mangroves.

Natural Diet Pollen and nectar from native plant species, mainly eucalypts and

wattles, fruits, figs and leaves.

**Supplementary** 

**Diet** 

Fruit

Natural Behaviour Nocturnal

**Social Behaviour** Congregate in camps of several hundred to hundreds of thousands

of bats.

**Development** Females give birth to one young at a time. The baby is carried with

the mother for 3-4 weeks until well-furred and is then left in the camp at night while the mother forages for food. Young can fly at

3-4 months and are weaned at around 5-6 months.

Basic Housing requirements

Carry basket.

Folding clothes-airer

Tree forks.

**Caring Notes** Rehabilitators must be vaccinated for Australian Bat Lyssavirus.

Must be raised with other baby flying foxes as they are a highly

social species.

Can be raised with Black Flying Foxes.

Listed as nationally vulnerable.



Photo Courtesy of Bats Qld

## Common Mammal Species of South-east Queensland

## What species is right for me?

You should give careful consideration to the species that you wish to care for to ensure that you can adequately provide for all of its needs. Some species are more easily cared for whilst others have very specialised feeding and housing needs and by understanding the natural behaviour and diet of any species, you can give consideration as to whether you can meet these needs.

The following information will assist you with deciding what species of orphaned mammal you can, or would like to, care for. Particular consideration must be given to the following:

### Natural diet

You must ensure that your orphan has access to its natural diet **every day** as a priority to properly prepare it for release.

The natural diet will depend upon the species but may include:

- **For possums** (herbivores) collecting a large amount of natural vegetation (i.e. browse/leaf) such as eucalypt leaf and other native plants, shrubs, bark and vines. Many species also require the addition of native flowers, buds, seeds, nuts and fungi
- **For gliders** (omnivores) collecting a large amount of natural vegetation that is harbouring insects amongst with branches that contain sap, nectar, native fruit and flowers
- For koalas and the Greater Glider (herbivores) collecting a large amount of specific eucalypt species
- For echidnas (carnivorous) collecting fresh, active termite and ant nests/mounds
- **For bandicoots** (omnivores) collecting a large range of insects, grubs, larvae, worms, roots and tubers
- **For macropods** (herbivores) collecting a large range of grasses, native vegetation, native herbs etc
- **For native rodents** (omnivores) collecting a range of native vegetation along with insects and seeds
- For flying foxes (frugivores) collecting a large range of native fruit and flowers
- For microbats (carnivorous) collecting a large range of insects

Providing a natural diet is one of the most crucial factors in successfully raising orphans and often is an area where a lot of rehabilitators fail. Once you have an understanding of the natural diet of the species in your care, ask yourself "would it eat this in the wild"? If the answer is "no" then you should not be feeding it to your animal. If you cannot collect enough native and natural food for the animal in your care, you should not be looking after that species.

The provision of an animal's natural diet is commenced at the exact same time that it would commence eating it if being raised by its natural mother. It is not something that is undertaken "just before release". For all species, this will commence when their teeth first erupt which is at a very early age. An animal's natural diet is essential to ensure that its gut flora is appropriately established at the correct time which helps provide the natural immunity that it requires.

### Natural behaviour

Most Australian mammal species are nocturnal. You need to consider whether you are generally home in the evening hours to provide appropriate care including:

- providing fresh vegetation
- providing supplementary food at late evening and throughout the night if needed
- monitoring its behavior when it is active
- providing appropriate "play time" during its active times through the night

You must also consider whether you can provide appropriate and regular enrichment to the animals in your care to simulate its natural behavior. This might include:

- staggering the provision of its natural diet throughout the night (e.g. providing live food from one to three times through the night)
- providing enrichment such as logs, active termite mounds etc.

### Social behavior

Some mammal species live in social family groups. In captivity, we need to ensure that we imitate this natural behaviour by raising orphans of the same species together. If you cannot care for more than one orphan at a time, then you will not be able to adequately care for those species that need to be raised in groups.

The most common species that **must** be raised in groups include:

- gliders (all species except the Greater Glider)
- flying foxes and microbats (all species)
- Common Ringtail Possums

Although other species may not necessarily live in social family groups, we still recommend that all rehabilitators take on at least two animals of the same species as this allows them to bond with each other. When it comes time to reduce human contact in the final stages of their preparation for release, the process is less stressful and they adapt much more quickly.

## Housing requirements

You must be prepared to either purchase or build appropriate housing. You need to consider whether your home and yard are suitable to house orphans during the later stages of their care.

Some aspects that you need to consider include:

- Enclosures must be large enough to provide the animal with sufficient room to exercise and gain muscle mass and strength;
- Enclosures must enable some exposure to the elements (e.g. sunshine, rain).
- Enclosures must be of good quality and well-built to prevent accidental injury or escape.
- Enclosures must be situated in an area that provides them security from domestic animals, wild dogs/foxes.
- Enclosures should be rodent and snake-proof.
- For species such as possums and gliders, you must provide for a box or drey that
  can be taken with the animal at release to provide them with a 'home' at their
  release site.

You must also ensure that the size of the enclosures are in accordance with the *Code of Practice* and Wildcare's standards relating to housing.

As wildlife carers, we MUST understand how each species lives in the wild, so that we can raise them to survive after release.

### Resources

There are a number of excellent natural history books on Australian mammals (including possums, gliders, kangaroos, flying foxes, koalas and small mammals) which are an excellent investment.

Alternatively, check your local library as most have these publications available for loan.

# Basic Rescue Techniques and 24-Hour Care



Photo Above: Orphaned koala joey. Courtesy of Karen Scott

The information provided below is a brief overview of the rescue of orphans. For detailed information regarding wildlife rescues, please refer to the Wildcare training manual Rescue and First Aid for Wildlife which contains in-depth information about attending wildlife rescues.

## A note about safety

The safety of yourself, motorists and by-standers must always be of the highest priority when dealing with any wildlife rescue.

Wildcare volunteers should refer to the Wildcare Safety Management Manual and Rescue and First Aid for Wildlife training manual for detailed information regarding safety procedures and guidelines. All Wildcare rescuers and carers must abide by the safety guidelines listed in such manuals at all times.

Wildlife rehabilitators should be aware that although small, orphaned mammals can still carry zoonotic diseases. You should always practice a high standard of hygiene at all times and be aware of potential zoonotic diseases relevant to the species that you are rescuing and/or caring for. Information regarding zoonotic diseases can be found in the *Rescue and First Aid for Wildlife* manual.

## Why do orphaned mammals come into care?

The most common cause of orphaning includes:

- The mother being killed by road trauma;
- The mother being killed by domestic animal (such as dog or cat);
- Being intentionally thrown from the pouch by their mother as a result of being chased by a dog, fox etc;
- Being intentionally thrown from the pouch by their mother in periods of drought or flood; or
- Being found on their own for no apparent reason.

## What equipment will I need to rescue orphaned mammals?

The basic equipment that you will need in order to attend an orphaned mammal rescue includes:

- Carry cage, basket or bag (species dependent)
- Warm outer pouch (e.g. feather pouch or thick cotton or woollen pouch)
- Cotton inner pouch liners (size will depend upon the species and age of orphan)
- A heat source such as a Snugglesafe heat disk or hot water bottle filled with warm water (not boiling water), or reusable first aid heat pack.
- Protective gloves (for older orphans that may bite or scratch)

- Disposable gloves (for messy situations such as removing a young from its mother's pouch)
- Scissors (for cutting the mother's teat if joey is still attached)
- Safety pin (for pinning the teat to the inside of pouch liner)
- Waterless antibacterial hand wash (for washing hands afterwards)

## What is the procedure for attending a rescue for an orphaned mammal?

## → Where is the joey?

If the joey is still in the mother's pouch, and if you are going to be more than ten minutes, ask the caller to wrap the mother's body in a blanket or large towel to try to maintain body temperature until you arrive, particularly in cooler weather and if the mother has only just recently been killed.

If the joey is not in the mother's pouch, make sure that the caller has the joey properly secured and is applying appropriate warmth. The joey should be wrapped in a pillow case, towel or small blanket with the head covered to minimise stress.

If a dead mother with live joey is still on the road, instruct the caller how to confirm death and how to safely remove the mother from the road (provided it is safe for them to do so). Discourage the caller from removing the joey from the pouch.

## → Does the joey have fur?

This will help you establish what artificial warmth you will need to take for the joey.

## → Does the caller know what time the mother was killed?

It is very important to establish a time frame. A joey whose mother was killed quite some time earlier will be dehydrated and in shock and could also be suffering from hypoglycemia and/or hypothermia.

Heat a Snugglesafe heat disk or fill a hot water bottle before leaving home and place it in your outer pouches so that the pouches are being warmed while you are traveling.

## What do I do once I get to the rescue?

When you first arrive, stand back and assess the situation. Make sure that the mother and/or joey is in a clear and safe position well off the road. Ensure that you abide by all safety requirements for working near roads (i.e. wearing a high-visibility vest) which are set out in the Wildcare Safety Management Manual.

Check whether the mother is dead. If not, leave the joey in the pouch and make arrangements to get the mother to a vet immediately. For macropods, contact the nearest Trauma Carer without delay. In this instance, the first priority is dealing with the mother's injuries. Do not remove the joey from the mother's pouch unless it is in immediate danger of falling out or is severely injured.

If the mother is dead, check her body temperature. If her body is cold, you will need to remove the orphan from the pouch promptly. If her body is still warm, you may opt to leave the joey in the pouch and transport both mother and baby home before removing from the pouch. In this instance, place the hot water bottle that you have taken with you underneath the mother's body (**but not directly on the pouch**) to try to maintain the mother's body temperature. If you live more than 5-10 minutes from the rescue site, remove the joey at the scene. Leaving the joey in a dead mother's pouch for too long can expose the joey to bacteria that may impact on the joey's survival.

Before attempting to remove the orphan from the pouch, check whether the teat is still in the orphan's mouth. For orphans that have a fine covering of fur, you can use your thumb and forefinger to gently apply pressure to the sides of the mouth and the orphan should release its grip on the teat. If this is unsuccessful, remove the joey by cutting the teat (see guidelines below). For finely furred or furred joeys, remove them from the mother's pouch by gently scooping them into your hands and removing from the pouch. Place them into a pre-prepared pouch. Never pick up a macropod joey by grasping around the ribs as you would a dog or cat as you can do enormous damage to their fragile rib cages. Larger macropod joeys can be removed from the pouch by grasping the base of the tail as close to their body as possible with one hand. Cup your other hand between their arms and place them head first into your cotton pouch.

If the mother's pouch is very tight and you aren't able to get your hands into the pouch, you may be able to gently manoeuvre the joey out of the pouch by manipulating the joey gently from the outside. If this is unsuccessful you will need to cut the mother's pouch taking care to keep your fingers between the scissors and the joey (and again only doing this after confirming the mother is dead).

For small unfurred orphans that have the teat firmly in their mouth, leave the teat in the mouth. Get your scissors and safety pin from your rescue kit. Put the safety pin through the mother's teat towards her belly. Stretch the teat out and cut it as close to the mother's body as you can. Place the joey immediately into the warmed pouch liner and pin the teat to the pouch liner. This will ensure that the joey does not swallow the teat. Never attempt to pull the teat out of the joey's mouth as you can cause irreparable damage to the joey's mouth.

Put the joey into your outer pouch. For smaller mammals (possums, gliders, bandicoots, bush rats etc) secure the inner pouch liners with an elastic band to prevent the joey from climbing out and escaping and getting cold.

Before leaving the rescue site, take note of:

## → What species

Identifying the mother is a lot easier for an inexperienced rehabilitator than trying to identify a small unfurred joey. If you are unable to take the mother's body and cannot identify the species, take a photo with your mobile phone and send it to your Species Coordinator for correct identification.

### → What injuries the mother sustained

This information may be beneficial in pre-empting injuries that the joey may have also sustained. For example, if the mother received injuries to her abdomen or rump areas, there is a great possibility that the joey could also be injured.

## → What condition the mother was in

Had the mother only recently been killed or was her body condition indicative of having been killed one or two days earlier? This information will assist you in determining whether the joey requires immediate veterinary attention. If the mother has been in poor health for some time, the joey's health may also have been compromised.

## $\rightarrow$ How many joeys there are

It is important to understand how many young the various marsupial species have. The following is a guide to common species encountered. Refer to the next section.







Photos – Deceased female Northern Brown Bandicoot showing extended pouch indicating presence of several joeys. The pouch of bandicoots faces backwards as opposed to other species such as possums and macropods.

The pouch contained three, uninjured joeys.

Photos courtesy of Karen Scott

## The pouch is empty - how do I know if there should be a joey?

There will be situations where you do a pouch check and there is no joey present. It is important to make sure that you carefully assess the pouch and teats to establish whether there could be a joey nearby.

## → Check the pouch carefully

Remember that marsupial joeys when first born are about the size of a jelly-bean. Check the entire pouch carefully as the joey could have become detached from the teat. In larger species such as kangaroos and wallabies, you will need to stretch the pouch open and have a very close look through the folds of skin. **Never rely on just feeling the outside of the pouch.** 

## → Check the size of the teats

Once born, a marsupial joey will attach itself to one teat in the pouch for the entire period it is suckling. It will not 'switch' to another teat. Once a joey has been suckling on a teat for some time, the teat will become stretched and will be much longer than the other teat/s. If one teat is elongated, then a joey either is or has recently been suckling from it. If teats are identical, then the mother may not have a lactating young.

## → Check if the mother is lactating

You can gently squeeze the teats to check if there is any milk present. If there is, you will see tiny beads of milk form at the top of the teat. If she is lactating, there is a dependent joey that needs to be accounted for.

Bear in mind that some marsupials do not carry their young in their pouch for the entire period that they are suckling. Some species, such as bandicoots and antechinus, will leave their young in a nest or burrow once they are too big to carry. In these cases, it is usually impossible to locate the young.

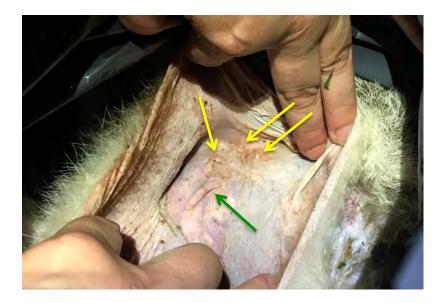


Photo – The inside of the pouch of a Red-necked Wallaby. Note the three smaller teats (yellow) – these are inactive teats, and one larger (green), elongated teat. The elongated teat indicates the presence of a suckling joey.

Photos courtesy of Karen Scott

## Checklist - Pouch Check

POSSUMS			
Species	Number of Young	Pouch Life	Rescue Notes
Common Brushtail Possum	Normally only have one joey but occasionally have twins	Will keep joey with them at all times. Once at older back-young stage, may move to nearby tree but stays close to mum until getting ready to disperse.	If lactating and no joe present, check surrounding area carefully including nearby trees.
Short-eared Possum	Normally only have one joey but occasionally have twins	Will keep joey with them at all times. Once at older back-young stage, may move to nearby tree but stays close to mum until getting ready to disperse.	If lactating and no joe present, check surrounding area carefully including nearby trees.  Short-eared Possums rely on their mothers for much longer (>18 months). Check for large juveniles nearby
Common Ringtail Possum	Up to 3 joeys	Will keep joey with them at all times. Once at older back-young stage, may move to nearby tree but stays close to mum until getting ready to disperse.	If lactating and no joey present, check surrounding area carefully including nearby trees.
GLIDERS			
Species	Number of Young	Pouch Life	Rescue Notes
Squirrel Glider and Sugar Glider	Up to 3 joeys	Will keep joeys in pouch until just furred and then will leave in nest/burrow.	If lactating and no joey present, check surrounding area carefully including nearby trees.
Feathertail Glider	2 to 4 joeys	Will keep joeys in pouch until just furred and then will leave in nest/burrow.	As above
Greater Glider	1 joey	Will carry joey as a back- young until well furred. Joey will then stay close to mum in the same or nearby tree.	As above
Yellow-bellied Glider	1 joey	Will carry joey as a back- young until well furred. Joey will then stay close to mum in the same or nearby tree.	As above

MACROPODS			
Species	Number of Young	Pouch Life	Rescue Notes
Eastern Grey Kangaroo	1 pouch young and often an at-foot joey as well	Will carry joey in pouch until well furred. Once too big to remain in pouch, will stay close to mum "at foot" and should not stray far from her.	If pouch is very elongated, indicative of a large pouch young or very recently vacated.  If lactating and teat is quite elongated but pouch is not very stretched, check the surrounding area
			carefully for an 'at foot' young.
Red-necked Wallaby	1 pouch young Will often still have an "at foot" joey spending time with them but not reliant on milk.	As above	As above
Swamp Wallaby	As above	As above	Have been known to leave their furred joeys in bush nearby for short periods and then return to collect them.
Red-necked Pademelon and Red-legged Pademelon	As above	As above	As above
OTHER MAMM	IALS		
Species	Number of Young	Pouch Life	Rescue Notes
Echidna	1 pouch young	Will carry baby in their pouch until spines close to erupting and then will leave in burrow. Burrow could be a considerable distance from rescue location. Important to check surrounding area of injured echidnas as it is often difficult to tell if they are lactating.	Pouch-young can easily be thrown from pouch on impact and they can "roll away" from the point of impact some distance. Search for at least 30- 50 metres. Echidnas do NOT vocalise so you will not hear an orphaned echidna calling out.

OTHER MAMMALS			
Species	Number of Young	Pouch Life	Rescue Notes
Bandicoot	2 to 6 joeys	Will carry babies in their pouch until just-furred and then will leave in a nest/burrow.  Older furred young may follow the mother around whilst foraging.	The nest/burrow can be difficult to locate.
Antechinus and Brush-tailed Phascogale		Will carry babies in their pouch until cutting fur and then will leave in a nest. Older furred young may follow the mother around whilst foraging.	Check with residents if they are aware of nest location. Misplaced joeys have been successfully reunited with their mother up to several days later because the daytime resting place of the mother was known.

When checking the surrounding area for a potentially lost joey, keep as quiet as possible and take note of any noises nearby which could be the joey calling for its mother or moving in the bush/trees. You should make yourself familiar with the call of different mammal species.

## How can I retrieve a lost joey?

It can be very difficult in some situations to retrieve a joey separated from its mother. Older joeys that are very mobile are particularly difficult to retrieve as they will often take off in fright and you can easily lose sight of them.

One method that has proven to be successful on occasion, is leaving the dead mother in a safe location, keeping a short distance away and remaining quiet. They may return to their mother for security and at that time, may be able to be captured. This method is particularly useful for macropods. Placing the mother's body in the corner of a yard may aid in being able to capture the joey.

For arboreal species, if the joey is only a short distance up a tree, you may be able to use a net or ladder to retrieve the joey. Please do not climb trees and put yourself at risk of falling. Refer to the Wildcare *Safety Management Manual* for guidelines regarding climbing trees and using ladders.

If you find yourself in the situation where you are not able to retrieve a joey easily, that has been thrown or escaped from the pouch, please contact an experienced rescuer for assistance.

## What do I do when I get home?

When you get home, there are a number of things that you will need to do:

## $\rightarrow$ Undertake a thorough assessment

Make a thorough assessment of the joey's health. You should do this in a quiet and warm area. Remember that you are a predator as far as the joey is concerned and it will be very frightened, so the aim is to examine the joey quickly but efficiently to minimise stress.

When examining the orphan, open the pouch only enough to allow you access to the joey. Starting at the head quickly work your way down the body and extremities including the tail. Make a note of any cuts, bruises, fractures, swollen or inflamed areas and areas that are warm to touch.

Refer to your notes from the Rescue and First Aid for Wildlife for comprehensive information on conducting a thorough assessment.

## → Weigh the joey

Ensure you have weighed the pouch and marked it before you put the joey in it – do not place the joey directly on scales. Then with the joey in the pouch you can weigh it quickly so that it will not need to be unduly disturbed until its first feed.

## $\rightarrow$ Provide gentle warmth

All joeys that come into care should be treated for shock and provided with appropriate warmth. Exceptions to this would be in the case of fully furred joeys in the middle of summer, however they should still be closely monitored.

Check to see if the joey is cold. This can be done by placing your finger in the side of the joey's mouth, or for smaller animals, placing the joey's head against the skin of your neck. Warm your hands first – don't place a cold finger in the joey's mouth. If the orphan is cold, keep it wrapped up and apply gentle warmth until it reaches the required core body temperature. Be aware that this can take several hours, particularly for larger animals, such as kangaroos. Do not attempt to feed a cold joey as this can result in death. Refer to the chapter on providing warmth for more information.

## $\rightarrow$ Provide fluids

If it has been sometime between the mother's death and the joey coming into care, the joey will be dehydrated. Only when the joey is warmed up, should you attempt to feed it. Feed glucose and water every two hours for the first 2 to 6 hours and then proceed with an appropriate milk formula. Refer to the "feeding" section of this manual for more information. It is important that you contact your Species Coordinator urgently for joeys in this condition, as they may require the care of an experienced rehabilitator or a wildlife veterinarian.

If the joey has come into care only a short period after the mother's death you may give one glucose and water feed and then start the milk formula feeds.

The provision of fluid therapy to young animals is a complex one
– if the joey is more than only slightly dehydrated, you should
seek advice from a wildlife veterinarian or an experienced
Species Coordinator.

## → Contact your Species Coordinator

Contact your appropriate Coordinator as soon as possible for further direction.

## What should I expect when offering an orphaned mammal its first feed?

Newly orphaned mammals can be difficult to feed as everything is unfamiliar to them, including the taste of the glucodin or milk formula as well as the taste and texture of the artificial teat. They can be very stubborn and rarely feed well for the first 24 hours.

If you are inexperienced with feeding the species that you have rescued, you should seek immediate help from an experienced carer. Orphaned mammals can become dehydrated very quickly and can deteriorate significantly even within the first 6 to 12 hours. As they become more dehydrated, the lower their survival rate will be.

Newly orphaned mammals are also at a higher risk of aspiration pneumonia (i.e. fluids inadvertently entering their lungs). This can result in their death. If you are not experienced with the species that you have rescued, or do not have the appropriate feeding equipment for that species, you must seek advice from a more experienced carer.

We must also remember that they have previously had "milk on tap" and are used to being fed a small amount very frequently. It will take them some time to adjust to being fed a larger quantity less frequently. As a general rule of thumb, joeys will only consume what they are able to when they first come into care and the amount that they are prepared to take will vary greatly. It is for this reason that we need to offer small feeds more frequently during the first few days until they are able to consume more each feed. As a guide, they should consume a minimum of 10% of their body weight per day to maintain their weight and hydration.

For more information refer to the section on feeding.

## Why do I need to contact my Species Coordinator as soon as possible?

In the best interests of the animal, it is important that the animal receive appropriate care as soon as possible if it is going to have the best chance of survival. In some instances, this may mean transferring the animal to a more experienced rehabilitator straight away. Because many of orphans come into care in a critical state, they will often be stabilised by a more experienced wildlife rehabilitator and then be passed on to a less experienced rehabilitator who will continue to care for that animal.

We have to remember that the priority is the welfare of the animal – not what the wildlife carer wants.

## What information will the Species Coordinator need to know?

The Species Coordinator will want to know the following:

- · accurate identification of the species
- weight
- stage of development (e.g. unfurred, eyes open, ears up)
- the circumstances under which the animal came into care (e.g. road trauma, dog attack)
- how long the joey has been without maternal nutrition (this may be unknown)
- · any visible injuries
- · and any food/fluids provided.

Your Species Coordinator will then direct you as to the appropriate course of action.



Swamp Wallaby hit and killed by a car.
Unfortunately, most people who hit wildlife do not stop to check that the animal is dead or whether it has a joey in the pouch.

It is imperative that all wildlife are pulled off the road and that all marsupials and flying foxes are checked for young.

Photos courtesy of Australia Zoo Wildlife Hospital







## Assessment Checklist for Orphaned Mammals

Clinical Signs	Healthy / Normal	Sick / Injured
Demeanour	<ul> <li>Responsive (wriggles) when handled</li> <li>Bright, alert and looking around (for joeys with eyes open)</li> <li>Vocalise (calling for mother, stress)</li> <li>Tries to bite, scratch, kick (for furred joeys)</li> </ul>	<ul> <li>Non-responsive when handled (lays flat in hand and does not wriggle)</li> <li>Depressed</li> <li>Unconscious</li> <li>Teeth grinding (sign of pain or stress)</li> <li>Vocalising in pain</li> </ul>
Mobility / Limbs	Able to move all limbs	<ul> <li>Abnormalities in movement (e.g. only using front legs, dragging hind limb, falling over, swaying)</li> <li>Head tilted to one side</li> <li>Paralysis (trauma)</li> <li>(Indicative of trauma related injury)</li> </ul>
Body Condition	<ul> <li>Good body condition</li> <li>Good muscle tone (for fully furred joeys)</li> <li>Good fur condition</li> <li>Note: Joeys that have never left mum's pouch will have minimal muscle mass. They may appear somewhat 'lanky'.</li> </ul>	<ul> <li>Open wounds</li> <li>Puncture wounds</li> <li>Poor body condition (malnourished)</li> <li>Lacking muscle tone (see note)</li> <li>Bruising (trauma)</li> <li>(Indicative of trauma or chronic illness or disease)</li> </ul>
Breathing	Normal (handling may result in increased respiration rate)	<ul> <li>Slow and deep</li> <li>Open mouthed</li> <li>Noisy</li> <li>Shallow</li> <li>Rapid</li> <li>Laboured (noticeable effort to breath)</li> <li>Sneezing</li> <li>Coughing</li> <li>Audible breathing sounds (clicking, ticking, gurgling sounds)</li> <li>Shaking its head (possible obstruction or head injury)</li> </ul>
Head	Symmetrical	<ul> <li>Not symmetrical</li> <li>Indentations</li> <li>Swelling</li> <li>Crepitation (Make a crackling sound) (Indicative of trauma related injury)</li> </ul>
Nose	<ul><li> Straight</li><li> No discharge or bleeding</li></ul>	<ul> <li>Distorted (trauma, fracture)</li> <li>Blood from nostrils (trauma)</li> <li>Abrasions (trauma)</li> <li>Swelling (trauma)</li> </ul>

Clinical Signs	Healthy / Normal	Sick / Injured
Eyes	<ul> <li>Bright</li> <li>Shiny</li> <li>Note: you will not be able to check this with joeys that have not as yet opened their eyes.</li> </ul>	<ul> <li>Dull (pain/dehydration)</li> <li>Sunken (dehydrated)</li> <li>Closed (pain/dehydration, orphaned)</li> <li>Protrusion (trauma)</li> <li>Swelling (trauma)</li> <li>Clear fluid (trauma)</li> <li>Nystagmus (head injury)</li> <li>Unequal pupils (trauma)</li> <li>Unreactive pupil(s) (trauma)</li> </ul>
Mouth	<ul> <li>No discharge</li> <li>Symmetrical</li> <li>Teeth and tongue intact</li> </ul> Note: the sides of the mouth will still be fused in very young marsupial joeys.	Misaligned jaw (trauma)     Blood (trauma)     Swelling (trauma)     Crepitation (trauma)     Pale mucous membrane (shock / dehydration)     Slow capillary refill (shock & dehydration)
Ears	No discharge  Note: the ears will be closed in very young marsupial joeys.	Blood     Clear fluid (Indicative of trauma related injury)
Fur / Skin	<ul> <li>Furred joeys - Shiny fur</li> <li>Unfurred joeys - Smooth, hydrated skin</li> <li>Unfurred joeys - skin should be transparent to pink.</li> <li>Joeys that are just cutting fur - skin will be a slightly grey colour.</li> </ul>	<ul> <li>Dull, short matted fur (chronic condition)</li> <li>Patchy or missing fur (dog/cat /bird attack)</li> <li>Wet patches of fur (dog/cat attack)</li> <li>Fungal infections (chronic illness)</li> </ul>
Cloaca / Pouch / Scrotum	<ul><li>Clean</li><li>Free of discharge</li></ul>	<ul><li>Diarrhoea</li><li>Blood</li><li>Lacerations</li><li>Swelling</li><li>(Indicative of trauma related injury)</li></ul>
Tail	<ul> <li>Straight or curled (dependent upon species)</li> <li>Part missing (old injury or congenital defect)</li> </ul>	<ul> <li>Swelling</li> <li>Lack of movement</li> <li>Missing all or part (fresh injury)</li> <li>(Indicative of trauma related injury)</li> </ul>

## Assessing Viability

## What is meant by "viability"?

Marsupial young are born very under-developed and develop in their mother's pouch. The mother is able to provide them with everything that they require to develop – the right pouch temperature and humidity, the correct milk formula and natural immunity. During this initial stage of the joey's life, only the joey's mother is able to provide the essential nutrients that it requires. Despite considerable advances in wildlife skills and resources, we are not able to provide joeys at this initial stage of their development with these essential requirements. Therefore, until the stage of development that we are able to successfully hand-rear young joeys, they are considered to be "unviable".

## Why not try to hand-rear them?

While some rehabilitators have defied the odds and successfully reared joeys that would have been considered unviable, the joeys would have missed out on vital maternal nutrition that we simply cannot duplicate. In most cases the animal's growth may be permanently retarded or it may lack immunity from disease.

Many of these animals may initially survive but will die for no apparent reason towards the later stages of their care.

While it is human nature to want to save every orphan, attempting to save an animal that is clearly not viable only prolongs its suffering. To attempt to raise an unviable joey for that "one in a hundred" chance that it might survive, is unethical when you consider the suffering that the other 99 animals will endure.

Be guided by your Species Coordinator and feel free to discuss the issue with them in more detail.

## What do I do if I rescue an unviable joey?

If you attend a rescue for an orphaned mammal and believe that it is not viable, follow the undermentioned steps:

- **Double and triple check the identification** If you are not very experienced with that particular species, do not take it for granted that the species is what was stated to you. Always seek your own confirmation that you have identified the species accurately. Your Species Coordinator or an experienced carer for that species will be able to assist with this.
- **Keep the joey warm** You will still need to follow all standard procedures for the rescue of an orphaned mammal, even though it may be euthanised. Keep the joey warm by placing it into a warm pouch environment or by securing it in a single pouch and placing it against your body for warmth.
- **Seek help** Seek the assistance of a veterinarian or Wildcare Trauma Carer who will be able to humanely euthanise the joey.

## How do I know if a joey is viable or not?

Traditionally, viability was assessed by weight. These days this method is used as a **guide only.** There are many factors that render using weight only as unreliable when assessing viability including:

- **The hydration of the joey** a small joey that is markedly dehydrated may be up to 15% lighter in body weight which will be corrected once adequate fluid therapy is administered.
- The size/age of the mother small, first-time mothers may have a smaller joey.
- The sex of the joey males may be slightly larger than females although this is generally only a very slight variation.
- **Genetics of the joey** joeys coming from large healthy mothers will typically be larger.
- The area where the joey originated animals coming from good habitat may be in better body condition than animals coming from habitat where there are limited resources.
- **The condition of the mother** mothers that present malnourished as a result of chronic injury or disease, will often have joeys that are also malnourished.

The following pages contain more information and photographs of viable and un-viable joeys.

## Viability Checklist for Marsupial Joeys

Feature	Unviable	Viable
Eyes	<ul><li>Eyes closed</li><li>No colour on/around eyes</li><li>No eyelashes formed</li></ul>	<ul> <li>Eyes open; or</li> <li>Eye lids well-formed and eyelashes formed</li> <li>Colour on eyes/eye lids</li> <li>(Ringtail possum joeys must have eyes open)</li> </ul>
Ears	<ul><li>Ears down flat</li><li>Ears stuck to head</li><li>Ears not open</li></ul>	<ul><li>Ears up; or</li><li>Ears partly up or at least unstuck from head</li><li>Ears open</li></ul>
Nose	No colour	Grey/brown coloration
Mouth	<ul><li>Well fused on the side</li><li>Only small opening at the front of the mouth</li></ul>	Mouth able to open fully (not fused)
Claws	• No coloration (clear) except possums	<ul><li>Coloration (brown/black) for most species</li><li>For possums - clear/creamy</li></ul>
Skin	<ul> <li>No coloration (with the exception of Ringtail possum joeys, which naturally have dark coloured skin)</li> <li>Skin very transparent-like (can see small veins and organs underneath skin)</li> </ul>	Skin not so transparent     Pink infant skin may be greyish in colour

## Minimum Weight Guide for Common Species

Remember – this is a GUIDE only!

Possums & Gliders		Macropods	
	Min. weight		Min. weight
Common Brushtail Possum	60-70 grams	Red Necked Wallaby	180 grams
Short-eared Possum	80-90 grams	Swamp Wallaby	150 grams
Common Ringtail Possum	Eyes must be open	Whiptail Wallaby	300 grams
Sugar Glider	10 grams	Red Necked Pademelon	60 grams
Squirrel Glider	15 grams	Red Kangaroo	400 grams
Feathertail Glider	2-3 grams Lightly furred	Eastern Grey Kangaroo	400 grams

## **Examples of VIABLE joeys**



(Left) Red Necked Pademelon joey – approx. 60 grams.

## Note:

- Coloration on the eyes and nose
- Skin though is still pink and slightly transparent



(Left) Red Necked wallaby – approximately 250-300 grams.

## Note:

- Eyes are open
- Ears are partly up
- Good coloration on his eyes, nose and claws



(Left) Common Brushtail Possum – approximately 150 grams.

## Note:

- Eyes are open
- Ears are unfolded
- Good coloration

The grey coloration to his skin indicates that fur will shortly be breaking through the skin.

## **Examples of UN-VIABLE joeys**



(Left) Common Brushtail Possum - < 50 grams.

### Note:

- Eyes are not well formed
- Ears are still pink and folded flat to the head with no coloration
- Mouth is still fused at the sides



(Left) Common Ringtail possum joeys - < 40 grams

### Note:

- Skin is still transparent
- · Eyes and ears closed

Note: Ringtail Possum joeys have dark skin naturally (as opposed to other marsupial joeys). The coloration of their skin is not an indication of viability.



(Left) Northern Brown Bandicoot joeys - <10 grams

## Note:

- Skin is still transparent
- Eyes and ears closed
- Mouth is still fused on the sides

## General Care and Management



Photo Above: Orphaned Brush-tailed Rock Wallaby.
Courtesy of Kerry Johnston

We must realise that all orphaned native animals that come into care are wild animals and have been traumatised by the loss of their mother. Some will be in a state of shock and all will be terrified and therefore extremely stressed.

## It is believed that more native animals die in care from stress than from any other single cause.

Bearing this in mind, we must try to alleviate the stress on our orphaned mammals as best we can.

## How does stress manifest itself?

Stress in all native wildlife can manifest in many different ways including:

- Not feeding well
- Not making regular and appropriate weight gains
- Developing diarrhea
- Developing Candida (yeast/thrush)
- Lethargy
- Grinding its teeth
- Vocalising
- Succumbing to stress-related diseases (e.g. myopathy in macropods)
- Eventually dying.

## Our aim must always be to identify causes of stress and to minimise them.

## What things will cause stress to my orphaned mammal?

The initial causes of stress for orphaned mammals include:

- the loss/death of its mother;
- any injury that the orphan sustained in its orphaning;
- the lack of food;
- · the lack of warmth;
- the lack of security following its mother's death; and
- being treated inappropriately by a member of the public or wildlife volunteer.

The information below looks at the primary senses and lists some of the causes of stress that your animal may be subjected to.

Sense: TOUCH Sense: HEARING

- Being handled by predators HUMANS!
- Feel of latex teat in the mouth
- Feel of a syringe in the mouth
- Dryness of artificial pouches
- Fluctuating temperatures
- Inappropriate temperature

- Loud radio, stereo or television
- Excessive talking
- Barking dogs
- Noisy children
- Vacuuming
- Loud cars

Sense: TASTE Sense: SMELL

- Being fed inappropriate foods
- Being fed inappropriate quantities of food
- Taste of artificial milk replacers
- Taste of supplements such as Glucodin® or Lectade ®
- Domestic animals
- Predatory animals (e.g. snakes, raptors)
- Perfume or strong deodorant
- Cigarette smoke
- Cooking odours
- Perfumed washing detergent and fabric softener
- Strong smells found in a veterinary surgery
- Disinfectants

### Other causes of Stress

- Being managed inappropriately for its age, such as being kept in a pouch in a small box when it should be in a large cage with suitable vegetation and branches to explore.
- Being raised alone (especially for social species like ringtail possums and some gliders).
- Being separated from its siblings.

## How do I minimise stress on my orphan?

You cannot alleviate some of the stresses listed above, for example, the food and the handling, although you can keep it to a minimum. There are however other factors that you can control.

## $\rightarrow$ Appropriate warmth

With controlled heat of either an ICU or a closely-monitored hot water bottle (filled with warm water) or electric heat pad, we can maintain a constant temperature. Overheating an orphan can kill it. A constantly fluctuating temperature, allowing

the animal to get too cold or too hot, can cause unnecessary stress and leave the animal susceptible to becoming ill.

### $\rightarrow$ Noise

Keep the orphan in a quiet, secure area away from small children and excessive noise (e.g. television, stereo, vacuum cleaner, lawn mower, power tools).

## $\rightarrow$ Erratic feeding regime

Feed the animal at regular intervals according to its needs – for example three hourly, four hourly, or a regime that suits the animal's needs and stick to it.

### → Different handlers

Make sure that only one person handles the animal. This is of the utmost importance. Allowing different members of the family to feed and handle an orphaned joey is very stressful for it. Remember our aim is to try to mirror as closely as possible how the mother would rear her joey. A mother of any animal would never let another animal near its young whilst in its pouch. It is extremely important for the joey to bond to only one person, so that it does not become imprinted on humans and has the best possible chance of survival in the wild once released. Orphans that are handled by numerous people have a much lower chance of survival.

## $\rightarrow$ Association with family pets

Apart from being stressful for the animal, allowing it to mix with family pets will leave it vulnerable to attack by other dogs or cats that it encounters upon its release, as it may not develop its natural fear of domestic and feral animals. Your domestic pets may also transmit diseases or parasites, such as *Toxoplasmosis gondii*.

### $\rightarrow$ Housing

Do not house the animal in the same area as their natural predators. For example, don't house mammals with snakes, dogs, cats or large birds.

When an animal comes into your care, it considers you to be its predator. Bear this in mind until the animal recognises you as its food source and has accepted you as its foster mother.

Stress depresses the immune system leaving the animal vulnerable to disease.

## Stages of Release

There are two stages to release: pre-release and post-release.

## Stage 1: Pre-release

- Is the final stage of rehabilitation prior to release back to the animal's natural habitat.
- By this stage, the animal must have gained all necessary skills to survive in the wild.
- This is not the time to start to think about the survival skills that it requires.
- The animal should be displaying its natural behaviour.

## Stage 2: Post-release

- Is the time following the actual release.
- Ideally, animals should be released in a manner that allows them to be monitored by either a wildlife rehabilitator or the resident at the release site.
- Monitoring can include regular, discrete monitoring of nest boxes or dreys and could include the provision of supplementary food for a short while following release. This provides an opportunity to check on their health and condition.

## Release Methods

### → Soft Release

This is the preferred option for all mammal species and is essential for all orphans raised from pouch-young stage.

The orphan is held in appropriate housing at the release location for a period of time. This will vary depending upon the species and the conditions of the pre-release facilities, but may be from one week to many months.

The soft release method provides the animal with an opportunity to get used to the surroundings, the native vegetation at the site and others of its species that may be living in the area. It also allows wild animals of the species to become accustomed to the new-comer's presence. For some species, it also provides an opportunity for them to bond with or become accustomed to the other animals at that pre-release facility.

Once the animal has the skills necessary to survive, the door to the enclosure is opened (at an appropriate time of day/night) and the animal is free to leave of its own accord.

The most important element of the soft release is that the animal is supported during the initial release period. For example, it is able to return to the enclosure for security and may be offered supplementary food to help minimise the stress associated with release.

### → Hard Release

This is the least preferred option for all mammal species as the long-term survival of orphaned mammals released in this manner is significantly impacted.

It is only suitable for certain species that generally do not return to their enclosure postrelease such as bandicoots and antechinus.

A hard release involves the orphan being held in an enclosure at a different location until it is ready for release. It is only taken to the release site for the actual release.

The animal is released directly into its native environment with no support provided. That is, it has no ability to return to the safety of its enclosure or to be provided with supplementary food.

Only experienced wildlife rehabilitators should raise animals for a hard release. They must also be raised in enclosures that are large enough to allow them to obtain the necessary muscle strength and climbing/gliding experience they will require to survive.

### → Semi-hard Release

This method of release is typically a hard release but with some support provided.

Support would include the provision of a nest box or drey (for possums and gliders) which is affixed in a suitable location and the animal placed in it. This box or drey should be the one that it has been using in pre-release.

Support in the way of providing supplementary food is also generally provided.

This method may be suitable for orphaned mammals that arrived into care as older juveniles and which are being released back to their rescue location.

If releasing orphans raised from pouch-young stage, you must be 100% confident that the animal has all the skills necessary for survival.

# Preparation for Release

Preparation for release should begin on the day that the animal comes into your care.

It is your responsibility to provide the animal with all that it needs, physically and emotionally so that it can be successfully integrated back into its natural environment.

Can you fulfill these requirements?

# How do I know my animal is ready for release?

Certain criteria must be met before an animal is ready for release.

The animal must be:

#### → Healthy

- It must be free of all disease
- The *Code of Practice* recommends that all wildlife receive a veterinary check before release.

# → Mentally mature

- It must be mentally prepared for the challenges that it will face upon release.
- Achievable by ensuring that the animal is allowed to develop its natural behaviour at appropriate times and is not 'held back' by the carer.
- Some individual animals may take slightly longer than others to be mature enough to cope with release.

## → Physically fit

- The animal must be in peak physical condition which can only be achieved through providing it with appropriate housing, diet and exercise.
- Macropods and small mammals must be able to negotiate trees, fallen logs, stumps, rocks and uneven ground.
- Possums and gliders must be able to manage moving branches as well as fixed objects.
- Gliders must be able to confidently glide from one tree to another without crashing.

#### → Familiar with its natural food

- It must recognise its natural food which may be vegetation or live food such as insects.
- It must be able to find it. For example, an echidna must recognise that termites are found in termite mounds, gliders must recognise and know how to access sap and manna.

## → Familiar with its own species

- It must be able to recognise its own species and not think it is a human or domestic pet.
- It must be socialised in a group where necessary (e.g. ringtail possums, gliders, kangaroos).

#### > Acclimatised to the weather

- It must have been exposed to the elements for some time prior to release (e.g. sunshine, overcast days, rain, wind).
- All pre-release enclosures should have at least half of the enclosure exposed to the elements.

#### → Conditioned to the sounds and smells of its natural environment

- It must be accustomed to the general sounds of the environment including other wildlife, road noise etc.
- This can be easily achieved by ensuring that the animal is moved to an appropriate outdoor enclosure at the appropriate time of its rehabilitation.

#### → De-humanised

- It is not unusual for the strong bond that is formed between animal and its primary carer to be maintained through to release.
- However, this should not be extended to other people. For example, the animal must not readily approach strangers.
- It must not be displaying inappropriate behaviour, such as seeking cuddles, sitting on your shoulder or head, jumping on your lap or trying to enter your house.

# $\rightarrow$ Alert to danger

- This includes predators such as dogs and cats which can be easily achieved by not allowing them to have any contact with domestic animals.
- Must not be allowed to become complacent with predatory species, such as snakes, large reptiles or large birds.

# Timing of release

When considering an appropriate day and time to release your animal via either soft or hard release methods, there are many other considerations that should be considered including:

#### → Weather

- Do not release during extreme weather events or if they are expected to occur soon after release. For example, storms, heavy rain, excessively high temperatures.
- Remember that our mammals are thermo-regulating by the time they are ready for release, so cold weather is generally not a reason to delay release. They do not need to be 'wintered over'.

# → Timing

- Prior to release, you must have a solid understanding of the species natural behavior in particular, when are they most active?
- Most mammals should be released well after dark once day-time birds and predators are asleep.
- It is recommended that you provide some supplementary food in the evening of the release to reduce stress on the animal. This allows it to explore its new location without having to find food and shelter.

#### → Availability of food

- For species that rely on specific natural diet (particularly nectar or insects), the abundance of food should be considered.
- Excessive rain can impact on the availability of nectar and flowers which may result in a reduction in food availability.
- The breeding cycle of insects is also very important for insectivorous mammals (such as gliders and microbats).
- A scarce food supply will have a high impact on the survivability of your animal.

# I can't release from my property, can I still care for orphaned mammals?

It is preferable for one person to take an orphan right through to release, however many people are not able to fulfil all of the pre-release requirements for certain animals. If you are in this position you may be able to raise the animal to the point where it needs to be housed in a larger enclosure and then transfer it on to another rehabilitator who has the facilities to take it through to release.

# What if I don't think my animal will survive in the wild?

You need to carefully consider the reasons why you don't believe it will survive. Most of the reasons will be poor management – that is, not allowing the animal to develop at its natural pace (e.g. humanising it), not providing an adequate natural diet or not providing adequate housing to allow it to develop the strength that it requires.

If you believe that there is a genuine reason for the animal to be unreleasable, then you need to speak with the Wildcare President or Vice-President to discuss other possible options. It is illegal to hold an unreleasable animal in your care without an appropriate Permit to Keep issued by the Department of Environment and Heritage Protection (EHP).

Do not take it for granted that your animal will be able to find a home in a wildlife park or zoo. They very rarely accept them and their placement through the Queensland Species Management Plan (QSMP) is generally limited to species that have a conservational or educational value. They do not take animals that have been raised inappropriately by wildlife rehabilitators.

# We raise to release to the wild.

# Hand-raising Equipment



Photo Above: Orphaned Northern Brown Bandicoots.
Courtesy of Ben Nottidge.

There are many essential items that you will require in order to successfully hand-raise orphaned mammals. There are also many items that are specific to certain species. In addition, there are items that whilst they are not essential, they will make the hand-raising process much more efficient and often result in a much better outcome for the animal.

On the following pages, you will find detailed information about regularly-used items, including:

- What species they are generally used for.
- Whether the item is an essential item (for all species) or a specialised item (for a particular species).
- The cost (note that these are approximate only).
- The best place to source the item (based on the knowledge of our experienced carers).

# Although the list looks quite extensive, please remember:

- You may already have some of these items on hand (particularly kitchen utensils).
- If you are able to sew then the cost of pouches will be limited to the cost of fabric only.
- Some items are periodically donated to Wildcare to distribute to carers.
- Some items such as ICU's will not be required if you are only caring for furred joeys.
- Some items are for specific species so if you are not caring for that species, you will not require them.

Note: the table below is based on the requirements for **one** animal.

	Essential	Specialised	Minimum Quantity Needed	Estimated Cost Per Item	
Feeding Equipment	Feeding Equipment				
Teats (Latex or silicone)	Y		4	\$1.00 - \$4.00	
Disposable syringes	Y		4	\$0.30 - \$0.80	
Glass bottles	Y		4	\$0.30 - \$1.00	
Cannulas	Y		2	Free	
Disposal pipettes		Y	50	\$5.00/pack 100	
Glass syringes - 10mL		Y	2	\$13.00	

	Essential	Specialised	Minimum Quantity Needed	Estimated Cost Per Item
Heating Equipment				
Hot water bottle	Y		1	\$7.00
Snugglesafe Heat Disk	Y		1	\$35.00
Digital indoor-outdoor thermometer with probe	Y		1	\$5.00
Electric heat pad		Y	1	\$80.00
Humidicrib / ICU		Y	1	\$900.00
Pouches – Outer				
Feather/Doona pouch	Y		1	\$25.00
Thick cotton pouches	Y		4	\$10.00
Pouches - Inner				
Numerous cotton, flannelette pouch liners of various sizes (not synthetic)	Y		20	\$2 - \$4
Fluids				
Glucodin	Y		1	\$6.00
Lectade		Y	1	\$13.00
Appropriate milk replacer	Y		1	Varies
Linen			•	
Old towels, blankets, bunny rugs (not synthetic)	Y		Lots	Free
Utensils			·	
Kitchen scales	Y		1	\$20 - \$40
Measuring cups and spoons	Y		1	\$5.00
Bottle brushes	Y		1	\$4.00
Bottles for storing made-up milk formula	Y		1	\$5.00
Sterilising Products			•	
Sterilising solution – F10®	Y		1	\$25.00
Baby bottle steamer or vegetable steamer	Y		1	\$8 - \$60
Nappy sanitizing solution – Napisan®	Y		1	\$10.00
Antibacterial hand wash	Y		1	\$5.00
Other				
Tissues	Y		Lots	\$2.00
Cotton wool balls		Y	1	\$3.00
Skin cream for unfurred joeys	Y		1	\$12.00
Betadine ®		Y	1	\$8.00
Wildcare Rescue Record Book	Y	1	1	\$4.00
Pet carry cage for small orphans	Y		1	\$15-\$40

# Scales

Required for: All species

**Used for:** • Weighing your animal regularly

Weighing milk powderWeighing supplements

#### General Kitchen Scales

• An essential item for all species

- Suitable for weighing most orphans until they are wellfurred
- Source from general retail outlets (e.g. department or kitchen stores, online stores)
- Cost: \$20 \$80 depending upon brand/quality
- Require at least 2kg maximum capacity
- 1g increments preferable



- Specialised item which includes a large platform for weighing larger animals such as fully furred joeys, echidnas, and adult mammals
- Source from eBay (search for 'postal scales', 'kitchen scales' or '40kg scales')
- Cost: \$45 \$60 through eBay
- Most come as 40kg capacity with 1g increments
- You can purchase a deep plastic tray from Bunnings that fits neatly on the platform to assist with weighing

#### **Small Capacity Scales**

- Specialised item to weigh very small mammals including gliders, antechinus, microbats, puggles
- Source from eBay (search for 'jewellery scales')
- Cost: \$8 \$40 through eBay
- Most come as 100g or 200g capacity
- Some come as 0.1g increments but you can get some that are 0.01g increments also at a slightly higher cost





# General Household Items

Required for: All species

**Used for:** • Measuring and making milk formula and oral supplements

• Storing milk, food and supplements.

#### **Electric Kettle**

- An essential item for all species
- Used to boil water to mix milk formula and oral supplements (e.g. glucose and electrolyte replacers)
- Source from general retail outlets
- Cost: \$15+ depending upon brand/quality



# **Storage Containers**

- For storing milk formulas, food supplements, feeding equipment etc.
- Use good quality, air-tight containers to prevent contamination and to preserve the shelf-life of products
- · Once allocated for wildlife, do not use for human food
- Mark each container clearly as to the contents



#### Measuring cups, spoons, jugs, bottles, whisks

- Used for measuring supplements and making milk and oral supplements
- Ideally, once allocated for wildlife, do not use for human food
- Bottles that have a wide opening/neck are ideal for mixing and storing milk formula (e.g. human baby bottles)
- Small whisks are ideal for mixing milk formulas to a smooth consistency



#### Alarm Clock

- A necessity to ensure that night-time feeds are provided on time
- If you don't have one get one!
- Tip from an experienced carer place it outside of arm's reach so that you have to get out of bed to turn it off otherwise it is easy to turn it off and go back to sleep!



# Cleaning, Disinfecting and Sterilising Equipment

**Required for:** All species

**Used for:** Ensuring high level of hygiene for all aspects of wildlife rescue

and rehabilitation

#### **Antibacterial Hand Wash**

• Used for washing hands before and after handling all animals

- Used after handling dirty linen for washing
- General antibacterial hand wash available from supermarkets is suitable for general, everyday use
- A veterinary-grade hand wash should be used when handling animals with infectious conditions, such as Candida and dermatitis and when hand-feeding orphaned echidnas Recommended product: Chlorhexidine Surgical Hand wash manufactured by Microshield and is available for purchase through most chemists
- Source: Supermarket or chemist



#### Waterless Hand Wash or Disposal Hand Wipes

- Used for cleaning hands when hand-washing with water is not practical
- · Handy for wiping hands between feeding a number of animals
- Essential part of rescue kit for when handling deceased or diseased animals
- Source: Supermarket or chemist

#### Dishwashing Liquid

- Used for soaking and washing all feeding equipment
- Use a good quality product to aid in more effective cleaning
- Source: Supermarket

#### General Household Cleaner

- Used to clean and remove organic material from rescue equipment, enclosures, branches, pet carry cages
- Sourced from supermarket (e.g. Domestos, Pine-O-Clean)
- Look for a good quality product that will aid in removing faeces, urine, blood, uneaten food
- · Rinse thoroughly from items after washing
- All equipment must be thoroughly cleaned and free from all organic material before it can be successfully disinfected
- Source: Supermarket

#### F10

- Veterinary-grade disinfectant used for disinfecting rescue equipment, feeding equipment and enclosures
- The most commonly used disinfectant in the veterinary and wildlife industries
- Can be used in a spray bottle for rescue equipment and enclosures
- Can be used diluted in a container of water to soak feeding equipment such as teats, bottles and bowls
- Approximate cost: \$25 (200mL bottle) but is very concentrated
- Follow manufacturers instructions for specific use but generally 1mL to 500mL water
- Source: Wildlife supplier (see Appendix)



- Used for washing linen including towels, blankets, pouches
- Try to always use the same brand for your wildlife linen to minimise stress on your animals by constantly changing scents/smells
- Use a good quality product to ensure efficient cleaning Wildlife linen can become very soiled and urine, faeces and blood will stain quickly
- Use products that are either scent-free or have only a subtle scent
- Source: Supermarket



# Sanitising Powders or Liquids

- Used for sterilizing soiled linen (e.g. towels, blankets)
- Used for sterilizing pouches for unfurred joeys to ensure a more hygienic environment
- NapiSan is one example of a product commonly used by wildlife carers for this purpose
- Source: Supermarket



# **Anti-fungal Laundry Rinses**

- Used to aid in disinfecting linen when an animal has a fungal skin infection, such as Candida/yeast. Products available include Canestan.
- Follow the manufacturers instructions
- Source: Supermarket



#### **Bottle Brushes**

- Used for cleaning feeding and storage bottles
- Ensure that you use an appropriate sized brush for the bottle (i.e. don't use a tiny brush to try to clean a large bottle)
- Large brushes suitable for cleaning baby bottles and 100mL and 200mL bottles are readily available at supermarkets in the baby section
- Small brushes suitable for cleaning small bottles (25mL and 50mL are more difficult to come by Some large brushes come with a small teat brush which are generally suitable for small bottles
- Piksters Interdental Brushes are good for syringe teats.
- Small brushes can also be sourced through eBay (search for 'spout brush') and come in a variety of sizes for nominal cost (< \$5)
- Source: Supermarket, chemist or eBay







# Sterilising Unit

- Used to sterilise feeding equipment using a microwave
- Human baby sterilising units are available at a cost of \$20 \$90
- Vegetable steamer are a suitable substitute and are used in the same manner but at a lower cost of \$10
- Electric sterilising units (used for human babies) can also be used
- Source: Retail outlet, department stores, chemists





# Feeding Equipment

**Required for:** All species

**Used for:** Feeding milk replacers, supplements, medications and some

supplementary foods.

More detailed information regarding feeding equipment can be found in the Section on Feeding.

#### **Teats**

- Used to feed orphaned joeys.
- Designed to imitate the shape and size of specific species.
- Most common teats are made from latex however recently silicone teats have become available.
- Standard teats are designed to fit onto glass bottles or 10mL syringes.
- Syringe teats are available which fit on the tip of the syringe and are used for feeding very small mammals.
- Cost: \$1 each (latex) and \$3 \$6 each (silicone).
- Source: Wildlife supplier (see Appendix).



Photo above: Variety of bottle teats available from Wildcare Australia Inc.





Photos above – variety of syringe teats available from Wildife Supplies for Sale www.wildlifesupplies.org

#### **Bottles**

- Used to feed orphaned joeys and can also be used to store made-up formula.
- Glass bottles are preferred as they are more easily cleaned and disinfected.
- Clear glass bottles provide better visibility to see the milk flow.
- Source: Wildlife supplier (see Appendix).



#### **Syringes - Disposable**

- Used to accurately measure milk and oral supplements.
- Used as an alternative to a bottle for feeding small joeys.
- Used to administer oral medications and supplements.
- Good quality disposable syringes can be washing and sterilised so that they can be re-used (e.g. Basik brand).
- If using disposable syringes for injections they are single use only do not reuse under any circumstances.
- 10mL syringes can be used with most standard teats.
- 1mL syringes are commonly used with cannulas or syringe teats.
- Source: Wildlife supplier (see Appendix).

## Syringes - Glass

- Used by some carers to feed unfurred joeys and animals that are generally harder to feed (e.g. koala joeys).
- 10mL glass syringes can be used with a standard teat.
- Preferred feeding method for feeding joeys that are consuming less than 10mL per feed as the flow can be more effectively managed as opposed to a bottle and teat.
- Source: Wildlife supplier (see Appendix) or cheap ones are available through eBay (search for 'glass syringe').

#### Cannulas

- Cannulas are the small plastic tube-like section of an intravenous catheter set which is used in both human and veterinary medicine for the administration of fluids or drugs. The cannula is the section that is left in the vein to enable administration.
- Do not use catheter sets that have been used previously only use new ones.
- Generally expensive to purchase brand new (\$2 \$5 each) however Wildcare usually has a supply of them available to distribute to those who are handraising small species such as gliders, antechinus etc.
- Source: Wildcare Species Coordinators





#### **Eye Droppers**

- Available in both plastic and glass options.
- Can be used to feed small animals that are able to lap from the tip.
- Not commonly used as they can be hard to clean and disinfect.
- Preferable to use a good quality disposable syringe.



#### **Disposable Pipettes**

- Used for feeding baby echidnas (puggles).
- Most common sizes used 1mL and 3mL.
- Could be used for small mammals that are able to lap from the tip.
- Single-use only as they are unable to be washed and disinfected.
- Available in bulk through eBay at nominal cost (search for 'disposable pipette').
- Cost: \$5.00 for 3mL (pack of 100).



#### **Bowls**

- Used to offer water and food for all species.
- The size, design and depth of the bowl will be dependent upon the species. Do not use a deep dish for small animals as it may pose a drowning risk.
- Heavy ceramic bowls are preferable to prevent the animal accidently tipping them over.
- Easily sourced at low cost at Op Shops or discount stores (e.g. Reject Shop).
- Cost: \$0.50 + depending upon size and quality.







# **Coop Cups**

- Used to offer water and food for arboreal species.
- Includes a bracket with hooks that easily secure to the horizontal wire of enclosures and aviaries.
- Stainless steel varieties will last much longer and are less prone to rust.
- Easy to clean.
- Cost: \$3 \$10 depending upon size.
- Source: Wildlife suppliers (see Appendix), pet shops or online retailers.





## **Baby Bottles**

- Used to mix and store milk formula for all.
- Look for bottles with a wide mouth that will accommodate the scoop that comes with most formulas and that includes a sealing disk so that you can use the bottle without the teat that it comes with.
- Easy to clean with a wide bottle brush.
- Cost: \$3 \$10 depending upon brand size.
- Source: Department stores and online retailers.



# Linen

**Required for:** All species

**Used for:** Housing all orphaned mammal species.

Lining carriers and enclosures.

More detailed information regarding pouches can be found in the Section on Pouches.

#### **Outer Pouches**

- The outer layer of pouches which provide an additional level of warmth to the joey.
- Usually made from a thicker material.
- Can be made from sheepskin, wool, feather-down, thick cotton fabric.

#### Inner Pouches (pouch-liners)

- The inner-most layer of pouches which the animal is placed directly into.
- Must be made from cotton no synthetics.
- Can be made from either new fabric/material or recycled items (such as sheets) provided they are in good condition.

#### Small Blankets (Bunny-rugs)

• Used to line baskets and carry cages to provide an additional layer of warmth.

# Wash-clothes (Face washers)

- Used to wrap and secure very small joeys for feeding.
- Particularly useful when feeding a litter or group of joeys.
- Can use the same wash-cloth for the group but a clean one must be used for each feed.

#### **Teddy Bears**

- Used as a comfort aid for orphaned joeys.
- Provides them something to cling to whilst in their pouch or when learning to explore their surroundings.
- Mostly used for arboreal species that would cling to their mum's back including koalas, possums and gliders.
- Look for ones that will wash well as they will require regular washing as the joeys will generally urinate on them.
- They must be in good condition and not pose a risk of the fake fur or stuffing being ingested and ensure that all embellishments are removed (e.g. ribbon, bows).
- Source: General retailers, Op Shops.



# Toileting and Cleaning

**Required for:** All species

**Used for:** Cleaning and toileting all mammal species.

#### **Facial Tissues**

- Used for toileting orphaned mammals (refer to section on Toileting).
- Used for cleaning face and body.
- Use a good quality brand that is soft the cloaca is very sensitive, particularly in very small species.
- Used extensively by wildlife carers when their babies unexpectedly die.
- Source: Supermarket or chemist.



### Make-up Removal Pads

- Used by some wildlife carers as an alternative to tissues for toileting.
- Much more expensive option.
- · Source: Supermarket or chemist.



# Oral Supplements

**Required for:** All species

**Used for:** Correcting conditions such as shock, dehydration, diarrhoea.

#### Glucose Powder

• Used to replenish glucose during times of stress including shock and dehydration.

Most commonly used product is Glucodin.

Source: Supermarket or chemist.

• Cost: \$6 (325g)



#### Milk Replacers

- Used to provide nutrition to dependent orphaned mammals.
- Refer to the section on Feeding for details about the products available.
- Commonly used products include: Wombaroo, Di-Vetelact and Biolac.
- Source: Wildlife suppliers (See Appendix)
- Cost: Varies between product and size of packaging.

### **Electrolyte Replacers**

- Used to replenish electrolytes during bouts of diarrhoea.
- Most commonly used products include Lectade, Vytrate or Spark.
- Source: Wildlife suppliers (See Appendix), veterinary clinics or some pet shops.
- Cost: \$20 \$40 (200mL)





## **Impact**

- A colostrum replacer manufactured by Wombaroo.
- Aids in increasing immunity during times of stress.
- Used as a supplement to boost the nutritional content of milk replacers.
- Can aid in fur growth and quality.
- Source: Wildlife supplies (See Appendix)
- Cost: \$15 (50g) much more economical to buy in 250g or 500g quantity.



# Heating Equipment

**Required for:** All species

**Used for:** Maintaining a constant temperature for animals that are not

able to thermoregulate or require additional heat when

treating conditions such as shock or hypothermia.

#### **Probe Thermometer**

• An essential item used to monitor the ambient temperature surrounding the orphan.

• Used in conjunction with various heating sources including hot water bottles, Snugglesafe, Intensive Care Units.

- Two models available:
- Indoor-Outdoor Thermometer display shows both the temperature where the head unit is located (indoor temperature) and the temperature where the probe is located (outdoor thermometer). The 'outdoor' reading is the one that we are mostly concerned about as this is the ambient temperature surrounding your animal.
- Outdoor Thermometer this variation only has one display which is the temperature where the probe is situated.
- High quality units are available through pet retailers however from experience a cheaper, generic brand is just as effective and a much more affordable option.
- Source: eBay (search for 'Indoor outdoor thermometer')

Cost: \$4 - \$10

#### **Hot Water Bottle**

- Filled with warm tap water to provide gentle warmth to rescued animals.
- Good for infrequent, short-term use (for just a few hours).
- Easily accessible from supermarkets, retail shops and chemists.
- Ensure that it is adequately covered with a towel to prevent scalding the animal's skin.
- Source: Department stores and chemists.
- Cost: \$7-\$10







# Snugglesafe heating disk

• Provides more consistent warmth than a hot water bottle and maintains warmth for up to 10 hours.

- · Currently the most preferred heating option.
- Is heated in a microwave

• Source: Wildcare Australia Inc.

• Cost: \$35 (Wildcare) - RRP \$80



# Re-usable first aid heat packs

- Marketed as a first aid product for providing instant heat.
- Packs contain a thick clear fluid that once activated (by clicking a small disk in the product), warms quickly.
- Wrap well, as they can be very hot initially.
- Depending upon the size, will remain warm for 30-60 minutes.
- Great addition for your rescue kit.
- Can be re-used by boiling.
- Generic varieties available on eBay are generally much cheaper and from experience, seem to last just as well as the more expensive brands from first aid suppliers. Search for 'pocket warmers'.
- Source: First aid suppliers or eBay
- Cost: \$5 \$50





#### **Electric Heat Pads**

- Are generally 26cm x 36cm in size (or larger) and are designed to lay flat.
- Used to provide warmth by positioning under the animal's enclosure.
- Often difficult to regulate the temperature.
- Should only be used with a thermostat unit to prevent over-heating.
- Note: Many joeys have died from over-heating with the use of a heat pad. These must be monitored very closely.
- Use one that is designed specifically for animals. Heat pads designed for people generally include an automatic function that turns the unit off after 2 hours to prevent scalding. Look for brands such as Wombaroo or Warm-a-Pet.
- These are less-frequently used by wildlife carers as many have now upgraded to an ICU for caring for small orphans.
- Source: Wildlife suppliers.
- Warm-a-Pet products: http://www.warmapet.com.au/
- Cost: \$60-\$100





## Intensive Care Units (ICU) / Humidicribs

- The preferred option to provide warmth to orphaned or sick/injured wildlife.
- Provides a consistent flow of warmth and minimises the risks of over-heating.
- Expensive to purchase but are now considered a necessity if you wish to care for unfurred joeys.
- Some local councils offer grant funding to experienced wildlife volunteers and these are a popular item to apply for.
- Source: Wildlife supplies (see Appendix)
- Cost: \$900 \$1500 depending upon size





#### Skin Lubricants

- Use to moisturise the skin of unfurred joeys.
- Only use products that are 'natural' check the ingredients carefully and do not use anything that contains petroleum. If you can't pronounce the ingredients, then don't use it.
- The need to use skin lubricants is now mostly redundant when using ICUs as they provide a good level of humidity to maintain a good level of hydration in the joey's skin.
- Please check with your Species Coordinator before using any products to ensure that they are suitable.
- Source: Chemist

# Teats and Cannulas

#### **Teats**

Teats used for feeding orphaned mammals are generally made from latex however recently, teats made from silicone have become available. Teats come in a variety of shapes, sizes and varying thicknesses to suit different stages of development for various species.

They are readily available through a number of wildlife suppliers listed in the Appendices.

#### Which teat do I use?

Much research has been undertaken into the design of the teats available and it is recommended that you use the teat specifically designed for that individual species.

Because teats are hand-made, there can be some variance within each type of teat, for example some teats are softer than others and some are wider and/or shorter than others. If your orphan does not have the capacity to suckle very well, choose a softer teat. On the other hand, if your orphan is a very strong sucker, you may need to choose a harder teat.

#### When do I use a cannula?

Cannulas are very useful for feeding very tiny orphaned mammals, such as unfurred possums and gliders, or small native rodents and dasyurids, such as antechinus.

A cannula is the plastic tubular section of an intravenous catheter. It has a port at one end which fits onto the end of a syringe and a long, thin tubular plastic section that is inserted into a vein for providing intravenous fluids. We use this tubular plastic section to feed very small mammals as it enables a very slow and fine delivery of milk.

Generally, to obtain a cannula you will need to purchase an entire catheter set, however expired sets are often donated to Wildcare and these are provided to carers at no charge.

Cannulas are generally fairly long but can be trimmed to size with a small pair of sharp scissors. Make sure that the end is smooth after cutting - a nail emery board can be used to ensure that no sharp edges remain which could easily damage the animal's tongue as it laps from the tip.

Cannulas come in a variety of gauges (referred to as 'g'). The smaller the number, the larger the diameter. You should always use a small gauge cannula for a very small animal and can progress to a larger size as the animal grows and the quantity of milk consumed is increased.

The most commonly used cannulas are as follows:

Gauge	Colour	Suitable for		
24g	Yellow	Very tiny joeys, such as unfurred/just-furred antechinus, Feather-tail Gliders, microbats.		
		Very fine cannula with very little rigidity.		
		Use with a 1mL syringe to provide adequate control.		
22g	Blue	Tiny joeys, such as antechinus, bandicoots, Feather-tail gliders, Sugar/Squirrel gliders, microbats.		
		Very fine cannula with little rigidity.		
		Use with a 1mL syringe to provide adequate control		
20g	Pink	Unfurred joeys, including possums, gliders, bandicoot.		
		More rigidity and slightly faster flow.		
		One of the most commonly used sizes.		
		Use with a 1mL or 2.5mL syringe.		
18g	Green	Unfurred to just-furred joeys, including possums, gliders, bandicoots, etc.		
		Use with a 1mL or 2.5mL syringe.		
16g	Grey	Just furred joeys that are lapping well.		
		Quite rigid and faster flow.		
		Usually used with a 2.5mL syringe by this stage.		
14g	Orange	Used for furred or compromised joeys.		
		Generally used with a 2.5mL or 5mL syringe.		

#### How do I put a hole in the end of the teat?

When you purchase your teats, they will not have any holes in them. The size and type of hole that you put in the teat will depend upon the size and species of your orphan.

Inappropriately sized teats are one of the most common causes of aspiration in orphaned mammals which can easily lead to pneumonia and even death. When determining the size of the hole needed, think about the flow of milk from the mother's teat. It does not pour out, it is a very slow, controlled flow that only comes out through suckling. This is the flow you must aim for with artificial teats, regardless of the size of the joey.

There are several methods that you can use to put a hole in a teat including:

- Using a needle to place a small hole;
- Using a fine pair of sharp scissors to cut a small vertical slit;
- Using a skewer to pierce a small hole.

Bear in mind, that placing a very fine hole in a teat is something that takes some practice. If you are unsure how to do this, or require some guidance, please speak with your Species Coordinator or an experienced carer.

# Using a needle

- 1. Heat a 21g or 22g needle over a flame (such as a tealight) until it is red hot;
- 2. Alternatively use a small darning needle to pierce the hole;
- 3. Very carefully pierce a hole through the top of the teat and run the needle back and forth a few times;
- 4. Immediately place the teat in a cup of cold water to seal the hole and prevent it from becoming larger than intended;
- 5. Once cooled, fill the teat with water, hold the large end closed and squeeze the water through the hole you just created. The water should spray out at the same rate that it would from the mother's teat if squeezed.
- 6. Check the teat the hole should barely be visible.

For very small mammals (such as unfurred possums, gliders and macropods), use a 21g or 22g needle. For furred possums and macropods use a 20g or 18g needle.

# **Using scissors**

This method works best by using a small pair of cuticle, embroidery or fine veterinary surgery scissors.

- 7. Hold the tip of the teat flat in your fingers and cut a very small, vertical slit at the tip of the teat.
- 8. Once released from your fingertips you should not be able to see the slit unless you turn the teat  $90^{\circ}$ .
- 9. This method is good for older animals that are very strong suckers as the hole will close over when they release the teat and open again when they suck, reducing the risk of aspiration.

For larger mammals (such as out-of-pouch macropods), you can use a small pair of curved cuticle scissors and cut a very small hole in the top of the teat whilst holding the teat flat between your fingers. When using scissors in this way, the curved scissors help to prevent the hole being cut too big.

#### Using a skewer

A metal skewer can be used to pierce a hole by:

- 10. Placing the teat over the pointed end of the metal skewer;
- 11. Push the skewer through the pointed end of the teat. It should stretch quite some way and will then pierce through the teat.
- 12. Although the tear may appear to be quite large when stretched, once the skewer is removed the tear should only be very small.

If you put a hole in a teat and realise that it is slightly too large, keep it for when the joey is older. If you make a mistake and put too large a hole in the teat, you may not be able to use that teat at all and should discard it.

Remember – the desired outcome of putting any hole in a teat is a VERY slow supply of milk to the orphan. The milk should only drip from the teat and not run from it. A teat that runs too fast can cause your orphan to inhale milk which could lead to pneumonia and even death.

# How do I know if the hole is too big for my orphan?

Remember that we are aiming to imitate as much as possible the natural flow of milk from its mother.

When your orphan is suckling on the teat, pay close attention to the air bubbles that appear in the bottle. Bubbles should appear at a steady pace and should not be excessively large. The joey should not appear to be gagging on the milk and excess milk should not run from the joey's mouth or nose.

For small orphans, it is advisable to lean their head on a slight angle so that any excess milk is more likely to run from the side of their mouth.

If milk starts to come through your orphan's nostrils, this means that your orphan has inhaled milk. Immediately stop feeding and hold the joey upright with its head pointing downwards to allow the milk to run from the nostrils. If you feel that less milk is coming out compared to what you think may have been inhaled, tip the joey upside down and gently pat its back. In this instance, you should contact your appropriate Species Coordinator or veterinarian, as your joey is likely to develop aspiration pneumonia.

If your joey does this on more than one occasion, you should contact your Species Coordinator to discuss the issue urgently as it is likely to be a management issue.

#### How many teats do I need for each orphan?

It takes practice to get appropriate size holes in teats so always ensure that you have a good supply of spare teats on hand. Never place yourself in a situation where you do not have any spare teats. Some orphans will chew teats and they will need to be replaced regularly.

You should check each teat before using it to ensure that the hole is not getting too big for your orphan. Holes will continue to get larger the more the teat is used and they can deteriorate through the feeding, washing and sterilizing process. Once you notice that the hole is getting too big, then either discard the teat or keep it for an older animal.

Be mindful when using the microwave to steam sterilise your equipment as often the heat may cause very fine, small holes to seal over and you may have to stretch the teat to unseal the hole before each use.

It is also recommended that you use more than one teat for each animal at any given time. Usually having a rotation of at least 2 or 3 teats for each animal is a good idea as some joeys are particularly stubborn and can become accustomed to feeding from

only one teat. If you use only one teat at a time, when you need to replace it the orphan may refuse to feed from the new teat because it feels and smells different. This happens quite often.

When you introduce a new teat into the rotation, it often helps to wash and sterilise the teat a few times before using it. This seems to result in it being more readily accepted by a fussy orphan.

# How do I store my teats?

Brand new, unused teats can be stored in a plastic container or zip-lock bag out of direct sunlight. Kept properly, unused teats can keep for several years.

Teats that have been used should be kept in a covered plastic container in the refrigerator after being thoroughly cleaned, sterilised and dried. This helps to ensure that they do not become mouldy and it prolongs their life. Teats that has been stored for several weeks or longer, should be re-sterilised prior to being used.

#### Do I need to sterilise my teats and cannulas?

Yes - all teats and cannulas should be properly sterilised before being used.

New teats often come coated in a powder-like substance; they need to be thoroughly cleaned with hot soapy water and a teat brush or Pikster dental brush, before being sterilised.

If not properly cleaned, milk residue can remain in used teats and can lead to bacterial growth, risking the health of your orphan.

# Bottles and Syringes

#### **Bottles**

Glass bottles are commonly used to feed a wide variety of species. They come in a variety of sizes ranging from 15mL through to 200mL, are inexpensive, easy accessible and will last a long time (provided you don't drop them!).

Bottles are commonly used for orphans that are taking more than 10mL per feed and can only be used with teats.

The use of plastic bottles is our least preferred option, as they generally have a smaller, shorter neck and the teats do not seem to fit on them as well. They are also difficult to that they are clean.

# **Syringes - Disposable**

Disposable syringes are made from plastic and available in various sizes including 1mL, 2.5 mL (or 3mL), 5mL, 10mL and 20mL. They are made entirely from plastic and are designed by manufacturers to be single-use and disposable.

They are very economical and can be easily cleaned and sterilised in the same manner as teats and bottles. Disposable syringes will require replacing regularly as they will eventually start to stick when the plunger is pressed and at that point, should be discarded.

Disposable syringes are more commonly used to feed smaller orphans who are taking less than 10mL per feed. Depending upon the size, they can be used with either a teat or a cannula.

They are also used to administer oral medications.

Having a number of each size should be considered an essential part of your hand-raising equipment.

Always use a good quality brand (such as Basik) when using disposable syringes for feeding or oral medications as they will last much longer than a cheaper option (brands such as Terumo have a much shorter life-span). They will eventually start to stick when pressing the plunger and at that point, they should be discarded.

#### Syringes - Glass

Glass syringes are available in various sizes including - 1mL, 2mL, 5mL and 10mL. Some are made entirely of glass, others of glass with a metal tip. The 1mL, 2mL and 5mL sizes are suitable for use with a cannula. The 10mL size is suitable for use with a standard teat and is the most commonly used by experienced wildlife carers. Glass syringes are a lot more expensive than plastic syringes and can be easily broken. They were also at one point more difficult to source however eBay has recently proved to be a good source to purchase the cheaper brands.

Glass syringes are easily cleaned and sterilised, and can be cold-sterilised (with F10®) and/or sterilised in the microwave by using a steam sterilising unit. If you find that the plunger in your glass syringe becomes "sticky" and does not plunge smoothly, rub

the plunger gently with fine steel wool. This should remove any residue and it should operate smoothly again.

The glass syringe differs from a plastic syringe in that it lacks the rubber base at the end of the plunger and therefore does not grip the inside of the chamber. When the plunger is not held firmly, it will depress on its own and milk will flow from the syringe.

It takes a fair amount of practice to use a glass syringe confidently and it is best to practice using a disposable syringe before moving on to using a glass syringe. Although it may be daunting to learn to use a glass syringe, for those carers who have mastered the technique, they no longer use any other method to feed small joeys.

If you are interested in learning how to use a glass syringe, speak with a koala carer as most of them are very confident in the use of them.

# How do I know whether to use a bottle or a syringe?

A number of factors will influence whether you will use a bottle or a syringe to feed your orphan.

**The use of a teat as opposed to a cannula** - If you have decided to use a cannula to feed a small orphan you will need to use it a with a disposable or glass syringe, as the cannula fits onto the tip of the syringe. Cannulas are not used with bottles.

If you have opted to use a standard teat, then you have the option of using either a bottle or a 10mL syringe.

**The quantity of milk to be fed** - For small orphans that are only consuming a small quantity (1mL - 10mL), using a syringe is more appropriate as you can see at a glance how much milk is left to be consumed. When using a bottle and teat for small quantities of milk, the milk settles in the teat when in the feeding position and it is difficult to gauge how quickly the orphan is feeding and how much it has consumed.

If your orphan is a very strong feeder - Some orphans have the ability to suck very hard on the teat. If fed with a bottle you have no control over the flow of the milk. This can lead to your orphan inhaling milk. For these orphans, it may be more appropriate to use a syringe and teat. Glass syringes in these cases are a much better option than a disposable syringe.

*If your orphan is a poor feeder* - Some orphans tire very quickly at feed time and do not have the capacity to suckle very well. This is particularly the case for orphans when they first come into care and for those that are compromised in some way.

For these orphans using a syringe is a better option as you can provide a very slow and steady supply of milk to the orphan without them using a great deal of energy. It is very important however that you do not feed milk to an orphan that is not swallowing. To monitor this, you should gently place a finger along the throat/neck so that you can feel the swallowing motion. Failure to do this, can lead to your orphan aspirating milk.

For inexperienced rehabilitators who have an orphan that is a poor feeder, you should consult your Species Coordinator or an experienced rehabilitator as a matter of priority. You cannot allow your animal to become dehydrated and also the problem may indicate an underlying issue.

# How do I choose the size of bottle or syringe to use?

The following is a general guide for what size bottles, syringes and teats are used for various species.

Species	Age / Development	Bottle	Syringe
Possums	Unfurred to just-furred		2.5mL
			5mL
			10mL
			with or without syringe teat or cannula
	Fully furred	25mL with possum teat	n/a – lapping from bowl
	Will then progress to lapping from a bowl once taking more than 25mls per feed.		
Gliders	Unfurred to just-furred	Not suitable	1mL
			2.5mL
			with or without syringe teat or cannula
	Fully furred	Not suitable	2.5mL
			5mL
	Will then progress to lapping		with or without
	from a bowl once taking more than 5mls per feed.		syringe teat or cannula

Species	Age / Development	Bottle	Syringe
Macropods	Unfurred wallabies and kangaroos Unfurred and furred pademelons	25mL with fine pointed macropod teat	10mL with fine pointed macropod teat
	Unfurred kangaroos Furred in-pouch wallabies Furred out-of-pouch pademelons	50mL with fine pointed macropod teat	Not suitable
	Furred out-of-pouch wallabies Furred kangaroos	100mL with medium macropod teat	Not suitable
	Furred out-of-pouch kangaroos	200mL with large macropod teat	Not suitable
Flying Foxes	All stages of development	25mL with flying fox teat	10mL with flying fox teat
Bandicoots	All stages of development	Not applicable	1mL 2.5mL 5mL with syringe teat or cannula
Dasyurids and Native Rodents	All stages of development	Not applicable	1mL 2.5ml with cannula
Koala	All stages of development	25mL 50mL with possum/koala teat	1mL 2.5mL 10mL with syringe teat or possum/koala teat

# How many bottles or syringes do I need for each orphan?

Regardless of which method you use, always keep at least 3 or 4 spare bottles or syringes on hand to allow for breakage and general wear. If you choose to use a syringe for feeding and then run out or break your last remaining one and have to revert to using a bottle, your orphan may have difficulties as it would have become accustomed to feeding in a particular manner. This is particularly important for orphans that feed too quickly.

If using bottles – you can choose to use only one bottle at any given time for each orphan provided that you sterilise the bottle between each feed. Many rehabilitators tend to purchase enough bottles so that they have enough for each day. For example, if your orphan is on 6 feeds a day, then you need 6 bottles and 6 teats. You can then make up a whole day's supply of feeds and store in the fridge, so that they are ready at each feed time. You only then need to wash and sterilise once a day which is a much more efficient method.

If using glass syringes, which are more expensive, carers generally use 2 or 3 syringes for each orphan.

If using plastic syringes, which are fairly inexpensive, always make sure that you have several spares on hand.

## How do I store my bottles and syringes?

Bottles and syringes that have been recently cleaned and sterilised (within the last 24 hours) can be left in the steam steriliser between feeds. Alternatively remove them from the sterilizing unit and store in a clean, plastic container with a lid in the refrigerator.

Bottles and syringes that are not being used should be sterilised and dried thoroughly before being stored. They can then be stored in an air-tight container in either the refrigerator or cupboard. Before using again (if they have not been used for more than 2 weeks), it is recommended that they are re-sterilised before use.

#### Do I need to sterilise my bottles and syringes?

Yes - all bottles (including lids) and syringes should be properly cleaned and sterilised before being used.

New bottles should be thoroughly cleaned with hot soapy water and sterilised before use.

New disposable syringes that come in a sealed packet can be used immediately as they are pre-sterilised.

Milk residue can remain in used bottles and syringes and can lead to the growth of bacteria, which risks the health of your orphan. Bottles that start to become opaque, especially around the bottom rim, indicate that there is a build-up of heated milk residue.

# Washing and Sterilising Feeding Equipment

# How do I wash my feeding equipment?

Most rehabilitators ensure that they have sufficient bottles and teats for each orphan so that they only have to wash and sterilise feeding equipment once a day. This is particularly useful for rehabilitators who work or have a number of animals in care. The following procedure is based on this routine.

- 1. After feeding your orphan, rinse the bottle and teat in cold water thoroughly. Doing this promptly after each feed will reduce the risk of bacteria forming (particularly in the latex teats), will make them easier to clean and will prolong the life of plastic items, such as syringes and cannulas.
- 2. After rinsing, place the feeding equipment (bottles, teats, syringes and cannulas) in a large plastic container filled with cold tap water and a small amount of good quality dishwashing detergent. Ensure that bottles are fully submerged in the water. Pull syringes part and submerge. Feeding equipment can stay in this solution for up to 24 hours. Fresh water and detergent should be made up at least once a day. This step helps to remove any remaining milk residue from the equipment and makes cleaning easier.
- 3. At the end of the day, place the feeding equipment in a sink filled with hot water and good quality dishwashing detergent. Make sure that all items are submerged in the water and leave them to soak for 5-10 minutes.
- 4. Wash all equipment thoroughly with appropriate bottle brushes. You will need to use a small teat brush to clean the teats, syringes and small bottles. There are a variety of bottle brushes available in different sizes to suit different sized bottles and teats and some that are small enough to fit inside small syringes.
- 5. Rinse all feeding equipment under warm water. It is important that all detergent is removed.
- 6. You can now proceed to sterilise your equipment (see instructions below).

#### STEAM-STERILISING

Most rehabilitators now opt to sterilise feeding equipment in the microwave. The two most commonly used methods are:

- Using a human baby bottle steriliser (brands such as Avent, Tommee Tippee or generic brands); or
- Using a microwave vegetable steamer (brands such as Starmaid or Sistema) is a much cheaper alternative and works in the same way.

Steam sterilising is achieved by placing a small amount of water in the bottom of the sterilising unit and microwaving on the highest power level. The following time guide is recommended, based on recommendations provided by Avent and Tommee Tippee.

Microwave Wattage	Time
Up to 850	8 minutes
850 – 1000	6 minutes
1100 +	4 minutes

A Handy Reference Sheet has been created summarizing the Wildcare recommended sterilizing procedure which you can print and place in the kitchen for easy reference. (See Appendix).

#### F10 DISINFECTANT

An alternative method to steam sterilising is cold sterilising which uses a chemical rather than heat.

The preferred method of cold sterilising is through the use of F10 which is a veterinary-grade disinfectant. It is commonly used by veterinary clinics as it has excellent disinfecting properties and is believed to kill most bacteria, viruses and fungi.

To sterilise feeding equipment using F10®:

- 1. Follow the steps 1 through to 5 listed previously. Once the equipment is thoroughly cleaned and rinsed then proceed with the following steps.
- 2. Fill a clean plastic container with cold water. Plastic marinating containers are good to use as they usually come with a plastic insert that can be used to hold the equipment submerged.
- 3. Add 1mL of F10® solution to each 500mls of water.
- 4. Place the freshly cleaned bottles, lids, teats and syringes in the water ensuring that they are fully submerged and that no air bubbles are trapped inside.
- 5. Equipment should remain in the sterilising solution for at least 30 minutes. Do not leave the equipment in the solution for more than 2 hours as the teats seem to disintegrate at a quicker rate when using this method.
- 6. After sterilisation, the equipment can be removed (with freshly cleaned hands) and rinsed with warm pre-boiled water.
- 7. Discard the F10 solution after each use.
- 8. For additional sterilisation, they can then also be steam-sterilised.
- 9. Ensure that all equipment is dried thoroughly before it is stored in a sterile airtight container until required.

#### LESS PREFERRED METHODS OF STERILISING

There are several methods of sterilising that were previously used by wildlife carers for many years but are now less preferred.

# **Boiling**

This method is not commonly used as there is a high risk of breaking the glass bottles. It is also much more time consuming and there is some question as to whether this method kills all species of bacteria that may be present on the equipment.

If using this option, place the bottles, lids and teats in a saucepan of water and bring them to the boil for a minimum of 10 minutes.

#### Milton® Sterilising Solution

The use of Milton® sterilising solution is now less frequently used by wildlife rehabilitators. Pediatric wards in human hospitals no longer use Milton. There have been some concerns raised that it may not be effective against some bacteria and fungi that are commonly seen in orphaned wildlife (e.g. *Candida*). You could use 'candidiasis'.

To sterilise equipment using Milton® solution follow these steps:

- 1. Follow the steps 1 through to 5 listed previously. Once the equipment is thoroughly cleaned and rinsed then proceed with the next steps.
- 2. Add 25mL of Milton solution to 2 litres of water.
- 3. Place the feeding equipment in the water ensuring that they are fully submerged and that no air bubbles are trapped in the bottles and syringes.
- 4. Equipment should remain in the sterilising solution for at least 1 hour.
- 5. After sterilisation, the equipment can be removed (with freshly cleaned hands) and rinsed with warm pre-boiled water.
- 6. Discard the Milton solution after each use.
- 7. Ensure that all equipment is dried thoroughly before they are stored in a sterile airtight container until required.

If using a brand other than Milton®, please read the directions and follow the manufacturer's directions.

Before using feeding equipment sterilised in Milton®, you must rinse it in warm pre-boiled water. All traces of sterilising solution must be removed. It is believed that small traces of the solution have been responsible for some orphans becoming sick and even dying.

When raising orphaned young, we try to imitate the way their mother would care for them. This includes providing them with a warm and secure pouch. It is imperative that when your orphan leaves its pouch and starts to explore its surrounds, the pouch is always within easy reach for it to retreat to if it feels insecure.

# Outer pouches

Outer pouches are the outer-most layer of the orphan's pouches and provide additional warmth.

They are usually slightly bigger than the pouch liners that you will use for your orphan.

The outer pouches require less-frequent washing and therefore can be made of thicker materials that may otherwise be impractical to wash each day. They are generally washed once they become soiled (from milk, urine or faeces) or at the very least every few weeks.

The most commonly used outer pouches are listed below.

## **Bed Doonas**

- Bed doonas or comforters made from cotton make excellent outer pouches.
- Do not use synthetic fabrics (such as polyester or microfibre).
- They can be easily cut and sewn into suitable sizes.
- They are easily washed and dried and tend to wear quite well.
- They do not require an industrial or specialised sewing machine to make.
- Pouches made from good quality, thick doonas and comforters, are very soft and provide a nice pouch environment for your orphan.
- If good quality, they will regulate the temperature very well.
- Second-hand doonas and comforters are readily available at Op Shops and one single bed doona will make many pouches.
- If well made, they pose no health risk from ingesting fibres.

#### **Knitted pouches**

- Knitted pouches must be made from pure wool (not synthetic fibres such as acrylic) which allow the fibres to 'breathe'.
- The use of synthetic fibres causing the joey to 'sweat' and they are more prone to over-heating.
- They should contain no lose threads and knitted with a close weave to prevent heads, limbs or claws from becoming entangled.

#### Feather or doona pouches

- Feather (or doona) pouches are made from down/feather pillows or doonas.
- They can be made in sizes to suit individual species and ages.
- They should be covered in a very closely woven fabric (e.g. down-proof japara fabric) which will prevent the small, sharp sections of the down and feathers from poking through and causing discomfort to the animal.
- If well made, they are very soft and joeys are able to get comfortable easily and to move about freely.
- They regulate the temperature extremely well and often require much less artificial heat from a heat source.
- They should be covered with a large pouch liner to protect them from excessive soiling (pillow cases are a good fit for the larger sizes).
- Feather pouches can be washed in the washing machine; however, it is important that they are dried in a clothes dryer to inhibit mould growth and unpleasant odours. Large sizes will take several hours to dry in a dryer.

Some wildlife suppliers do sell feather pouches (see Appendix) or alternatively you can make your own by using the following guide:

- a) Purchase a down/feather pillow.
- b) Shake the pillow so that the down is towards the bottom.
- c) Carefully cut the top of pillow and remove about half of the contents.
- d) Sew the seam closed again.
- e) Push the top section of the pillow in towards the middle so that you create a 'well' in the centre. You will have to manipulate the feather/down to create the pouch area in the middle.

Be careful when removing the down if you are asthmatic or suffer from allergies. This process is best done very carefully and outside to minimise mess.

The instructions above will make a feather pouch suitable for a wallaby joey. By

making some small adjustments, you could get 2 or 3 suitable sized feather pouches suitable for small possum or glider joeys.

You can also make feather pouches from a feather/down doona by cutting it into rectangular lengths and then sewing to form a pouch. If using this method, it is easier to sew two opposing seams on either side of your proposed cutting line first to minimise mess.

Photo Right: Feather pouches available through
Wildcare. location.
Courtesy of Karen Scott



#### Sheepskin pouches

Sheepskin pouches were commonly used some years back when we were able to source them. They came in a variety of sizes, were fairly hard wearing and could be easily cleaned by soaking in a wool wash and hanging in the shade to dry.

Alternatives now include using sheepskin products (such as car seat covers) and cutting and sewing them into pouches. The difficulty with doing this is that you would generally need an industrial sewing machine. Carers have used sheepskin car headrest covers as ready-made pouches.

Sheepskin pouches are not suitable for animals that require additional heat as the heat centralises rather than encompasses the joey. They do however work well for older joeys that are thermoregulating.

Sheepskin pouches should always be fully lined with a cotton pouch to prevent the orphan from sucking or chewing on the fibres which could cause intestinal issues.

Care should also be taken when using them with joeys that are at pouch-emergent stage as joeys have been known to suffocate in them when another joey has laid on top of them to sleep. To prevent this, use heavy-duty nappy pins to secure the sheepskin pouch to the basket liner or carry bag.

## Pouch liners

Pouch liners are the inner pouches into which your orphan will be placed directly.

#### What should pouch liners be made of?

Pouch liners need to be made from natural fibres such as cotton or cotton flannelette. Do not use synthetic materials as these do not 'breathe' sufficiently and will cause the joey to under or over heat.

You can use new cotton fabric to make pouches or you can recycle other fabric such as flannelette bed sheets, t-shirts or singlets.

#### How should pouch liners be made?

When making pouch liners you must ensure that there are no loose or fraying threads in which the joey can get tangled, or on which it can chew or choke. They should be made in a rectangular shape so that the pouch is deeper than it is wide. They can also be sewn with a curved bottom to imitate the curve in the mother's pouch.

There are instructions in the Appendix that explain in detail the procedure for sewing pouch liners.

#### How many pouch liners will I need?

It is recommended that you use two to three pouch liners at a time, with each one placed within the next. This means that when the inner-most pouch becomes soiled you can remove this pouch for washing and your orphan then goes into the second pouch liner. A new pouch liner is then placed on the outside of the remaining pouches. This ensures that the orphan's smell is retained in the pouches, which is very important for minimizing stress.

You will need quite a few pouch liners for each animal. It is not uncommon for an orphaned mammal to wet its pouch liners right through, in which case you will have 3 dirty pouches at once. A conservative estimate would be to have at least 25 pouches for each animal. As your orphan grows older and becomes accustomed to its toileting regime it generally will not soil its pouches as often. This is one area, where it is best to be over-prepared.

Photo Right: Brush-tailed Rock Wallaby in several layers of pouch liners.

Courtesy of Kerry Johnston.

## Size of pouches

The size of pouch that you will need will depend upon the species and stage of development of your orphan. The pouch needs to be small enough for the orphan to feel secure but large enough that it can move around in the pouch if it desires, and to provide access for you to feed and toilet it in the pouch.

The following is a general guide for pouch sizes:

Gliders	Unfurred Furred	10cm x 15cm (with ties) 15cm x 20cm
Possums	Unfurred Furred	15cm x 20cm 20cm x 25cm
Wallabies	Unfurred Just furred Furred - in pouch Furred - out of pouch	20cm x 25cm 25cm x 35cm 30cm x 40cm 45cm x 55cm
Kangaroos	Unfurred Just furred Furred - in pouch Furred - out of pouch	25cm x 35cm 40cm x 55cm 50cm x 65cm 75cm x 85cm
Pademelons	Unfurred Just furred Furred - in pouch Furred - out of pouch	15cm x 20cm 20cm x 30cm 25cm x 35cm 35cm x 45cm

You will need pouch liners of various sizes to accommodate your orphan at its different stages of development.

## How do I wash my pouches?

All pouches (both outer and inner) should be washed in a good quality washing liquid or powder.

They should then be dried either by placing outside in the sun or in a clothes dryer. They must be fully dry before using again or storing.

Even if the pouches are only wet from urine they should never be dried and re-used without washing them first.

Always use the same washing liquid or powder for your animal's washing as it will become accustomed to the smell. Do not use products with strong scents.

#### How do I sanitise my pouches?

It is ideal to sanitise all pouches and linen during the washing process by the use of a nappy sanitising product such as NapiSan®. This helps to kill any bacterial growth caused by spilt milk, urine or faeces.

Read the instructions carefully on the packaging to ensure that you use the product according to the manufacturer's instructions for sanitising baby nappies.

If your orphan is at the stage of development where it has dirt, grass or foliage in its pouch, ensure that you remove all such material before soaking. For heavily soiled pouches, rinse the pouches thoroughly to remove any excess organic material before sanitising.

For some carers, regularly sanitising all linen may be difficult to manage simply because of the number of animals that they have in care, the size and number of pouches and linen to sanitise and the availability of water (for those on tank/rain water).

It is recommended that all linen being used for unfurred or compromised joeys is sanitised before washing as well as linen that is badly soiled. It is however acceptable to omit this stage for healthy, furred joeys.

#### When do I need to change my orphan's pouches?

If your orphan's pouch is wet from urine it will need to be changed immediately. Leaving your orphaned joey in a wet pouch can make the orphan cold, uncomfortable and induce stress. It can also lead to skin infections.

If your orphan's pouch is soiled with faeces it will also need to be changed immediately. Orphans with diarrhoea may need to have their pouch changed numerous times between feeds.

If **ANY** amount of milk is spilt or dropped onto your orphan's pouch it will need to be changed immediately. Milk quickly harbors bacteria and failure to change the pouch will jeopardise your orphan's health.

Once the orphan has commenced eating its natural diet; grass including soil, grasses, leaves, native flowers, bark etc., these will usually work their way into your orphan's pouches. This is not classed as a "dirty pouch" and these bits can be shaken out of the pouch.

# Heating and Skin Lubrication

During the first half of their pouch life, orphaned marsupials cannot maintain their own body temperature. Their mother's pouch is kept tightly closed in order to regulate the warmth and humidity that the orphan requires. It is imperative therefore in care that we imitate this environment as closely as possible. Failure to provide adequate warmth may result in complications such as hypothermia, pneumonia and death.

#### How do I know if my orphan needs artificial warmth?

The stage of development of your orphan will generally determine whether the animal will require artificial warmth. The following is a general guide for mammals and the appropriate temperature that needs to be maintained.

Joeys that are unfurred, eyes closed and ears down	32°C
Joeys that are unfurred, eyes open and ears up	32°C
Joeys that are just furred, eyes open and ears up	32°C
Joeys that are furred with long sleek fur, eyes open and ears up	30°C
Joeys that are fully furred with thick dense fur, eyes open and ears up	28°C

It is important to note that the above guidelines are for the South-east Queensland region. Wildlife carers in other areas, particularly in colder regions may require higher temperatures.

Just after half way through an orphaned marsupial's pouch life, it will start to thermoregulate (that is, maintain its own body temperature). Some orphaned marsupials will start to thermoregulate at an earlier stage than others. Taking heat from a joey too early or leaving it on too late can make a joey expend unnecessary energy that it requires for growth and development causing problems such as poor fur growth, licking of forearms to cool down and strong urine.

Please note that the above guidelines are a **GUIDE ONLY**. All animals are individuals and some joeys may need to be kept slightly warmer than others of the same age whilst others may start to thermoregulate at an earlier age. It takes experience to be able to identify at what temperature you need to keep your individual animal.

# How do I know if my orphan is thermoregulating?

Orphaned marsupials that are thermoregulating are warm to the touch without any artificial warmth being applied. When feeling your orphan to see if it is warm or not, pay particular attention to the extremities. Quite often the orphan's body will feel warm but its feet and tail may feel cold. This means that your orphan is not quite thermoregulating.

#### How do I calculate the temperature of my orphan?

When we talk about an orphan being maintained at 32° we are referring to the ambient temperature around the orphan. To accurately monitor the temperature of your orphan you will need a digital thermometer with a probe. This probe is inserted in the second pouch liner, to the **side** of the orphan. This will give a fairly accurate reading of the ambient temperature.

If you place the probe underneath the orphan you will achieve a higher temperature reading. Likewise, if you place the probe above the orphan you will receive a lower reading. It is important therefore to ensure that the probe is positioned at the side.

Make sure that when adjusting the orphan's pouch or removing the pouch liners to feed your orphan that the probe is placed back into position correctly. Some carers like to use a safety pin to secure the probe into position.

## How do I provide artificial warmth to my orphan?

There are a number of methods that can be used to provide warmth to your orphan. The method that you use will depend a number of factors including:

- How much heat is required (e.g. an unfurred joey will require a higher and more constant temperature than a just-furring joey)
- Your financial resources
- Whether you are only keeping the joey short-term

Here are some options:

#### Warm outer pouch

Keeping your orphan in a warm outer pouch (e.g. feather pouch) is sometimes sufficient to maintain the correct ambient temperature for your orphan. Some orphans will not require artificial warmth during the day as the outer pouch will maintain a consistent temperature. This would generally apply to older joeys that are starting to cut-fur, however they will still require additional warmth at night.

#### Hot water bottle

Fill the hot water bottle with hot water from the tap (not boiling water). Place the hot water bottle underneath or to the side of your outer pouch. Do not place it in the outer pouch directly in contact with the inner pouch liners. Using a hot water bottle can be awkward depending upon how you have set up your orphan's pouch as the water bottle will need to be refilled with fresh hot water at regular intervals. This may cause regular disruption to your orphan when it is resting. It also does not provide the most consistent form of warmth.

This method is good if you are simply rescuing a joey and not caring for it long-term. It is not a very practical method for long-term warmth.

#### Electric heat pad

Electric heat pads are a good way of providing warmth to your orphan. Once set up you do not have to disturb your orphan in order to adjust the temperature as the control mechanism is situated outside of the orphan's environment. Ideally electric heat pads should be moulded into a "U" shape around the base of the outer pouch so that warmth is coming from both sides and the bottom.

If using an electric heat pad, you must use a digital thermometer (preferably one with an alarm) to accurately monitor the orphan's temperature. It is very easy to "cook" a joey and heat pads over time can create hot spots.

#### Humidicrib or Brooder®

In previous years, some rehabilitators have been fortunate enough to acquire an out-of-service human infant humidicrib. While these have been extremely useful, they have been fairly expensive to purchase and maintain. Most models are now out of service and finding replacement parts for them has been difficult.

More recently, small animal brooders or intensive care units have been manufactured for the small animal veterinary industry and these have become very popular with wildlife rehabilitators.

The most commonly used brands are Vetario, Brinsea and RCOM.

The Vetario and Brinsea units are basically the same with only a few small differences. Some units have an oxygen and nebuliser port, which most wildlife rehabilitators would not require. Some units have an optional external water reservoir which can provide a much higher level of humidity which is useful for species such as microbats.

The RCOM units have become a good alternative to the Vetario and Brinsea brands. They work in basically the same manner but are a different shape.

One of the advantages of using an ICU is that the humidity is well-regulated by filling the water reservoir. For unfurred joeys, the correct humidity means that you generally do not need to lubricate their skin.

Copies of the information brochures for these products are included in these training notes. A small ICU ranges in price from \$800-\$1,000. While expensive, it is an excellent investment for a wildlife rehabilitator who looks after unfurred joeys.

When using an ICU, there is no need to use a warm outer pouch. Using too many pouches will prevent the warm air from reaching the joey. Generally, placing the joey in a few pouch liners is sufficient to keep the joey warm.

#### How do I know which method to use?

Outlined below are the advantages and disadvantages of the above heating methods.

Option	Advantages	Disadvantages
Warm outer pouch	<ul> <li>Cheap</li> <li>Good for just-furring and furred joeys that are starting to thermoregulate</li> </ul>	Do not provide sufficient warmth for young unfurred joeys
Snugglesafe Heat Disk	<ul> <li>Cheap (~ \$35 via Wildcare)</li> <li>Maintains heat for &gt; 10 hours</li> <li>Easy cleaned and disinfected</li> </ul>	Must be heated in microwave
Hot water bottle	<ul><li>Cheap</li><li>Good for rescues and overnight care</li></ul>	<ul> <li>Fluctuations in temperature</li> <li>Re-filling bottle disturbs the joey unnecessarily</li> </ul>
Electric heat pad	<ul> <li>Better for long-term care</li> <li>Prevents disturbances to the joey.</li> </ul>	<ul> <li>More expensive (Approx. \$60)</li> <li>Must be used in conjunction with a thermostat.</li> <li>Need a digital thermometer (\$5+)</li> <li>Can still cause burns, overheating and death if not vigilant or not connected to a thermostat.</li> </ul>
Humidicrib/ Brooder	<ul> <li>No need to provide skin lubrication</li> <li>Keeps a constant temperature</li> <li>Good for joeys that regularly get out of their pouch (e.g. possums, koalas, gliders, bandicoots).</li> <li>Portable</li> </ul>	• Initial cost (\$800 - \$1,000)

#### How do I know if my orphan has been kept too cold?

If you feel your orphan and their body, legs, arms and/or tail feel cold, they are not being kept warm enough. In this event, correct the temperature of your orphan's pouch environment immediately and closely monitor the temperature. If your orphan has been cold for some time they can become hypothermic. Should this occur contact your Species Coordinator immediately. In extreme cases, you may need to take the orphan to your vet to ensure that it has no long-term effects on your orphan's health.

This situation can arise in the event of a power-outage during the night and you have been unaware of it occurring.

## How do I know if my orphan has been kept too warm?

If your orphan's body feels very hot or if their skin is red then your orphan may have overheated and could be suffering from hyperthermia. If your orphan is "sweating" or licking its forearms, this is also a sign of overheating. It is important to gently lower your orphan's body temperature by removing the orphan, in its inner pouch liners, until the outer pouch's temperature has been reduced.

Overheating your orphan can lead to its death so it is imperative that, if you suspect your orphan has been overheated, you immediately contact your Species Coordinator or a wildlife veterinarian. The orphan may require additional fluids to be administered over several days to prevent its organs from being adversely effected.

# What are the signs that my orphan is being maintained at the right temperature?

Your orphan should be warm to touch and should be bright and alert (depending upon its stage of development). For unfurred joeys, their skin should be a nice light pink colour.

#### How do I keep my unfurred joeys skin from drying?

If you are using an ICU, you will find that your joey's skin will not dry out in the same way as when using other methods of heating.

There are a number of products that are used by wildlife rehabilitators to lubricate the skin of unfurred orphans, the most common ones being QV Cream® or lanolin. When purchasing cream for your joey, make sure that it does not contain ingredients such as petroleum or canola oil.

You will need to apply lotion/cream to your unfurred joey at least once a day. This can be done by either of two methods:

• Put a small amount of lotion on the back of your hand and rub it into your skin slightly to warm it. Gently use the warmed lotion to rub into your orphan's skin, ensuring that the entire orphan's body is lubricated. Try to do this during the warmer times of the day so that your orphan does not become cold.

When heating cream or lotion to put on your joey's skin, ALWAYS test it first to ensure that it is not too hot.

When using products such as lanolin or wool fat, be careful not to use too much as this can cause complications.

## When do I stop lubricating my orphan?

When your orphan starts to cut fur, you can stop applying the lotion to the furred areas. Continue to apply lotion to the hands, feet and tail (for macropods) once a day. Once your orphan has fine fur over its entire body continue to monitor the orphan's feet and hands and apply lotion as required.



(Above and right) Swamp Wallaby joey that was kept slightly too warm over a period of time. Notice the 'leathery' and inflamed skin.

The joey suffered other complications from the overheating and died.

Photos courtesy of Karen Scott







(Above) Indoor-outdoor digital thermometer

(Above right) Wombaroo brand heat pad.

(Right) Warm-A-Pet brand heat pad.

(Bottom right) Brinsea humidicrib units.

(Below left) QV Cream







# How do I determine what milk replacer to use for my orphaned mammal?

There are a number of milk formulas on the market that are suitable for rearing orphaned mammals. There is no "right" or "wrong" brand of milk. The right milk is the one that is right for your individual orphan. Like human babies, some orphans do not tolerate certain brands or types of milk formula.

It is essential that all rehabilitators liaise closely with their relevant Species Coordinator regarding the most suitable milk formula for their orphan.

#### **BIOLAC**

Biolac is specifically designed for marsupials. It comes in three different stages M-100, M-150 and M-200.

Unfurred macropods are started on M-100. When dense fur has developed, progress to M-150, which is a transition milk. Then when the joey is producing solid, dark pellets, change to the M-200 formula. Note that for macropod joeys the transition period between the development of fur and the production of solid dark pellets is longer than in most mammal species.

Possums should be fed on M-100 formula until weaned. They are never transitioned to the M-150 or M-200 stages.

Each formula stage is mixed up as follows:

M-100	160 gra	ms of milk <sub>l</sub>	powder p	er litre	of water
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16 grams per 100mL

Feed 10-15% of bodyweight per day each 24-hour period. For possums, the feeding quantity is 20-30% per 24-hour period.

M-150 180 grams of milk powder per litre of water

18 grams per 100mL

Feed 10-15% of bodyweight each 24-hour period

M-200 240 grams of milk powder per litre of water

24 grams per 100mL

Feed 10-15% of bodyweight each 24-hour period

Please note that this is a guide only. You should consult with your relevant Species Coordinator as to how much to feed your joey.



#### **DI-VETELACT**

Di-Vetelact is suitable for most species of orphaned mammals. It is easily prepared by mixing 1 scoop of powder to 40mL of pre-boiled water, depending on the species and age. For some species however, the strength of the milk is altered and it is imperative that when using Di-Vetelact you follow exactly the advice of the Species Coordinator for that particular species. For most species, Di-Vetelact is not used on its own but is enhanced by the addition of specific supplements to increase its nutritional value.



Di-Vetelact only comes in one stage and the same formula is used throughout the various stages of development of your orphan.

Di-vetelact must be made fresh every 24 hours. You do not need to add additional water to the milk as the formula contains both a food and water source.

#### **WOMBAROO**

Refer to the Wombaroo publication *Milk Replacers & Food Supplements for Native Animals* contained in the Appendix which includes detailed information regarding their products as well as development charts for many common species.

Wombaroo milk formulas are formulated for specific species and include:

Kangaroo milk replacer Flying fox milk replacer Echidna milk replacer Koala milk replacer Possum milk replacer Insectivorous bat milk replacer Wombat milk replacer

In addition to there being a specific formula for a specific species, they also come in various 'stages' which relate to the age of the animal.

Because Wombaroo milk replacers are very concentrated, it is imperative that you do not feed your orphan more than the recommended daily intake, as this will result in health complications.

Wombaroo is a good alternative to Biolac and Di-Vetelact if you have an orphan that is not feeding well and therefore not consuming sufficient quantity.

Wombaroo milk replacers are a more concentrated form of milk replacer and are regarded as a "food source only". Your orphan will require water in addition to the recommended milk quantity.

#### What does the >0.7 mean on the Wombaroo milk replacers?

Most of the milk replacers that Wombaroo produces are divided into different stages of development. The Wombaroo milk stages are related to the time that a joey has already spent in the pouch. A joey at "fully out of pouch age" has completed 100% of its pouch life so it has an age factor of 1.

Therefore, the number (e.g. 0.4, 0.6, >0.7) refers to the percentage of pouch life that the orphan has completed. For example, a kangaroo joey which has completed 40% of its pouch life would be placed on the 0.4 milk replacer, a possum joey which has completed 80% or more of its pouch life would be placed on the >0.8 milk replacer and so on.

When your orphan is ready to change to the next stage of milk, you will need to gradually do this as indicated in the Wombaroo charts.

#### How do I determine what stage of development my orphaned joey is at?

The following is a guideline as to the characteristics of orphaned possum and macropod joeys and what milk replacer they should be placed on.

Possum	<0.8	For joeys with less than 80% of pouch life completed. Furless. Pink skin, or brownish in the case of ringtails. Eyes closed to just opening. Ears drooped. Faeces: yellow custard to toothpaste consistency.	
	>0.8	For joeys with greater than 80% of pouch life completed. Fur: Short soft to dense long. Spends time out of pouch. Faeces: toothpaste to soft then firm green pellets.	
Macropods	<0.4	For joeys with less than 40% of pouch life completed. Furless. Pink skin. Eyes closed. Ears down. Faeces: Yellow custard consistency.	
	0.4	For joeys with 40% of pouch life completed. Furless. Darkening skin. Eyes nearly open or just opened. Ears nearly erect. Faeces: Yellow toothpaste.	
	0.6	For joeys with 60% of pouch life completed. Fur: Fine to short. Ears erect. Faeces: Mustard toothpaste to soft green pellets.	
	>0.7	For joeys with greater than 70% of pouch life completed. Fur: Short to dense. Spends time out of pouch. Faeces: soft to firm green pellets.	

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#### What is Colostrum?

Colostrum is the first milk produced after birth. It is high in protein much of which is immunoglobulin which is a group of proteins with antibody activity that are produced in response to infection by micro-organisms. Wombaroo manufacture a colostrum replacer called Impact and it is recommended for use in pouch-bound marsupials. Impact is easily added to milk formula at the time of mixing.



Marsupials receive colostrum in the maternal milk until weaned. Therefore, we recommend that the maintenance dose be used (1g of Impact powder per 100mL of milk) per day. Best practice is to use it until they are weaned.

Rehabilitators have also received good results from using Impact during times of stress and/or illness in older animals.

For more information regarding Impact, please refer to the Wombaroo booklet included in the Appendix.

#### How much milk formula do I need to feed my orphan?

If you have chosen to use a Wombaroo milk formula for your orphan you will need to establish the recommended daily intake for your orphan. Once you have established what stage of development your orphan is at, you have to check the weight guidelines on the back of the pack to establish the daily requirement for their weight. For example, if your joey is on >0.7 Kangaroo Milk and weighs 2000 grams and requires six feeds per day, you will feed your joey 17.5mL milk replacer per feed. Remember to offer additional water at each feed either added to your milk replacer or separately after their milk feed.

If using Wombaroo milk replacers it is imperative as mentioned previously that you strictly adhere to the daily nutritional guidelines. Feeding either too little or too much will cause health complications for your orphan.

If using Di-Vetelact the following is a general rule as to how much your joey should consume each day:

Unfurred joeys Up to 30% of body weight

Furred joeys Minimum of 10% to 15% of body weight

Please note that the above guidelines for Di-Vetelact are guidelines only. If using Di-Vetelact please consult with your Species Coordinator about the quantity of milk that you are offering your orphan and how much they are consuming each feed. It is important to keep a record of how much your orphan drinks each feed so that you can advise your Coordinator accordingly.

As orphaned mammals are all individuals, the fluid requirements will differ between orphans.

#### How do I make up my orphan's milk formula?

All milk formulas listed above come in a powder form which is added to pre-boiled water and mixed well to a smooth consistency.

When making milk formula it is essential that you ALWAYS use PRE-BOILED WATER. Never use water straight from the tap.

Di-Vetelact milk replacer is available in various sizes ranging from 375 grams to 20kgs. It comes with a scoop. Remember that you will have to make up fresh Di-Vetelact milk formula every 24 hours so only make up the quantity that you will require for that period.

Place the required number of scoops into a mixing jug and add the pre-measured amount of warm, pre-boiled water. For example, measure out 2 level scoops of Di-Vetelact powder and place into a mixing jug, add 80mls of warm (not hot) pre-boiled water into the mixing jug and mix with a spoon, fork or whisk until the powder is completely dissolved. Store the milk immediately in the fridge.

To make up Biolac milk, dilute the measured quantity with a small amount of warm, pre-boiled water and mix into a paste with a spoon, then add more water to the required amount and mix well.

Biolac, once made up, can be stored in the refrigerator for up to 48 hours. It is essential that it is mixed well before use.

Wombaroo milk replacers now also come with a scoop but because Wombaroo is such a concentrated formula, it is recommended that you measure out the powder by weight by using an accurate set of kitchen scales (preferably in 1g increments). To make the milk formula, read the directions on the pack carefully, as the directions for each Wombaroo milk formula differ.

By way of example, if you were making up Wombaroo >0.7 Kangaroo Milk replacer, you would measure out 25 grams of powder, then add approximately 40mL of warm pre-boiled water to the powder to make a paste. Mix the powder with the water with a fork, spoon or whisk until the powder is dissolved and there are no lumps. Add additional water until you reach 100mL. It is important that you make the milk replacers <u>UP</u> to 100mL and not ADD the powder to 100mL (which would thereby make up approximately 120mL of milk, thus making the milk less concentrated). Ensure that the water is lukewarm. Wombaroo milk replacers will go grainy (like sand) if the water is too hot.

All milk formulas should be made fresh every 24 hours. You can freeze made-up milk formula for up to two weeks. This can be placed in the refrigerator to thaw when required (ice cube trays are useful for storing small quantities).

#### How do I heat up my orphan's milk formula?

If using a bottle and teat, the most common method of heating the milk formula is by placing the bottle in a cup of hot water until the milk has reached the desired temperature of approximately 30 degrees. To test the temperature of the milk, put a small amount on the inside of your upper forearm, to make sure that it is not too cold or hot.

It is handy to keep the cup of hot water with you when feeding particularly if your orphan tires during feeding and you need to keep the milk warm.

Never re-heat milk and offer it to your orphan. If the milk goes cold then it will need to be discarded.

When feeding joeys small quantities of milk be aware that the milk will become cold very quickly. In winter, warm milk can chill within a matter of minutes. It is important that you do not re-heat milk in this instance.

#### How often do I need to feed my orphan?

The number of feeds that you need to offer your orphan each day will depend upon its age and stage of development. The following is a general guideline that can be applied to most common mammal species.

Stage of Development	No. of Bottles Per day	Frequency of Feeds
Unfurred with eyes closed and ears down	8 bottles / day	Every 3 hours
Unfurred but eyes open and ears up	6 bottles / day	Every 4 hours
Finely furred, eyes open and ears up	6 bottles / day	Every 4 hours
Short sleek fur, eyes open and ears up	5 bottles / day	Every 5 hours
Long sleek fur, eyes open and ears up	4 bottles / day	Every 6 hours
Thick dense fur, eyes open and ears up	3 bottles / day	Every 8 hours

It is important for younger orphans to space their feeds evenly around the clock. Do not provide most feeds in a short period of time and allow the young to go without a feed for an excessive period. This creates a "feast and famine" routine for the orphan which will cause it a great deal of stress. Remember, in the wild the young mammal has access to its mother's milk around the clock and it can feed whenever it needs.

It is also essential to maintain a good routine for your orphan's feeds. Joeys become very stressed and fail to thrive if their feed times are not set and their routine becomes broken.

#### How do I actually feed my orphan?

When orphans first come into care, remember that they are very frightened and they do not understand that you are trying to help them. It is usual for orphans new into care to hiss, kick and even attempt to bite you when you try to feed them. If you maintain a good routine with your orphan it will soon learn that you are not going to hurt it and it will eagerly look forward to its feed.

Always feed your young orphan in its pouch liners. Make sure that your orphan is secure in the pouch and that just its head is protruding. For all orphans, cover their face with your left hand (if you are right handed) so that just their nose and mouth is protruding. This seems to keep the orphan quiet and allows them to concentrate on feeding instead of looking around.

For smaller joeys, tilt their head slightly to allow excess milk to escape from the side of their mouth to prevent milk inhalation.

Place the teat at the orphan's lips. Some orphans will readily accept the teat and will drink well. Remember though that an artificial teat is very different in taste and smell

to its mother's so initially your orphan may not readily accept it. If the joey does not readily accept the teat, you can use your thumb and forefinger to gently apply light pressure to the corner of the orphan's mouth, just enough for you to slip the teat into the side of its mouth. Once in the mouth gently move the teat around to the front. Ensure that the teat is above the tongue and not below. Some orphans will immediately start to suckle and some may think about it for a while.

When orphans initially come into care they are not used to drinking a larger quantity of milk at three to four hourly intervals. They are accustomed to having milk available at all times from their mother, so be patient. You may have to offer feeds more regularly for the first few days until it becomes accustomed to being fed larger quantities at regular intervals.

**REMEMBER** - when you receive your first orphan, no doubt you will be nervous about feeding it. Try to remain calm and patient. If you become stressed the orphan will pick up on this and will be less likely to feed. It is worthwhile for new carers, if you receive your first mammal from an experienced rehabilitator, to try feeding your orphan with that rehabilitator, so that you can obtain some practical guidance. If you are having difficulties feeding your orphan please contact your Species Coordinator immediately to try to rectify the problem. Leaving your orphan without proper feeding for even a few hours can cause the animal to become dehydrated and/or hypoglycemic.

#### **GLASS SYRINGES**

To use the glass syringe, fill the syringe with milk formula and then fit the teat over the end until the tip of the syringe is near the section where the teat goes to a point. When fitting the teat, it is important to keep your finger on the glass plunger so that you do not lose any milk from the syringe. Once filled, place a syringe cap at the end to prevent the milk from leaking.

Place the syringe into either a shallow dish of warm to hot water (a dish about 14cm long by 10cm wide and 4cm in depth is ideal) or a tall cup.

To hold the glass syringe, wrap your  $3^{rd}$ ,  $4^{th}$  and  $5^{th}$  fingers around the barrel of the syringe. Place your  $2^{nd}$  finger on the plunger and place your thumb on the top of the plunger on an angle. You will use your thumb and  $2^{nd}$  finger to control the flow of milk to your orphan. Each person will hold a glass syringe slightly differently. It is important for you to find a method that suits you and that allows you to hold and control the syringe effectively.

When your orphan starts to suck it will pull the plunger down to get the flow of milk that it desires. For joeys that drink too quickly you will need to use your thumb and 2<sup>nd</sup> finger to steady and slow the supply of milk. For orphans that drink but cannot suckle very hard, you can provide a VERY slow and steady supply of milk to your orphan ensuring that the orphan is swallowing the milk. Some may hold the milk in the mouth and end up inhaling it, which can lead to pneumonia.

Glass syringes are an item that many rehabilitators struggle to use initially and become frustrated with. You will need to persevere to master the technique but once you do, you will find that they provide a much more controlled flow of milk for difficult feeders.

#### PLASTIC SYRINGES

The method of using a plastic syringe is identical to that for using a glass syringe, however the plunger does not automatically depress when let go. As you will be controlling the flow at which the milk is dispelled it is important to ensure that you deliver the correct flow for your orphan. Controlling the flow at too slow a pace may result in the orphan taking in excess air which could result in bloat. The orphan will also tire more quickly and this may cause it unnecessary stress. Controlling the flow at too fast a pace may result in your orphan aspirating.

## What do I do after my orphan has finished feeding?

After your orphan has finished its bottle it is important to ensure that no milk remains around the orphan's mouth. Dampen a tissue with warm water and gently wipe the orphan's mouth paying particular attention to the corners. Ensure that no milk is left on the orphan's skin/fur.

Use this time to bond with your orphan. Using a clean warm damp tissue, gently wipe around the baby's face which simulates its mother cleaning it. This is an important bonding exercise and most thoroughly enjoy it.

#### When do I start to introduce solids to my orphan?

In the case of possums, you should start to offer fresh young gum tips to your orphan when they start to cut fur.

For macropod joeys, you should start to offer dirt once their eyes are open and ears are up, and dirt, dried grass and roots when they are starting to cut fur.

Comprehensive information about introducing native or supplementary diet for each species is contained in the individual Wildcare training manuals. It is important that native diet is introduced at the correct stage of development.

#### What about hygiene?

Before preparing milk, formula or feeding your orphan, ensure that you thoroughly wash your hands in an antibacterial hand-wash solution. This will help prevent your orphan being exposed to bacteria that may lead to health complications.

#### What about sunlight?

It is important that all orphans have some exposure to sunlight each day (at least 20 minutes per day). This is required from the just-furring stage onwards although some larger species such as kangaroos will allow unfurred joeys to exit the pouch and have a short hop around.

Orphans that receive insufficient vitamin D can be prone to poor bone growth and development. This can become a problem as they get older, particularly for the larger species such as kangaroos when their bones break for no apparent reason. While this can be caused by a calcium deficiency, it can also be a result of a lack of exposure to sunlight. In the wild you will often see some portion of the joey hanging out of the pouch while they are catching the sun's rays. Always supervise pouch bound joeys when they are outdoors and do not allow them to overheat.





Top left: Common Brushtail Possum being fed with a 10mL bottle and small mammal teat.
Photo courtesy of Helen Bradley.

Top right: Common Brushtail Possum being fed with a 10mL syringe and large syringe teat.
Photo courtesy of Tina Davidson.

Photo Right: Antechinus young being fed with a 1mL syringe and cannula.

Photo courtesy of Karen Scott.

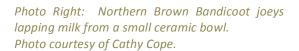
Below Right: Red-necked Wallaby joey feeding from a bottle and teat standing up. Photo courtesy of Karen Hooke.

Below right: Red-necked Wallaby joey feeding with a bottle and teat.











#### What is meant by "toileting"?

In the wild, young baby mammals do not urinate and defecate by themselves. Their mother gently stimulates their cloaca by licking the area until they pass urine and faeces. We need to imitate this in care so that they do not develop any health complications.

#### What do I use?

There are a variety of things that you can use to toilet your orphaned mammal. What you choose will depend upon the size of your orphan. The most commonly used products are soft, facial tissues. Soft toilet tissue can also be used.

For small mammals, such as gliders, antechinus etc., you can use cotton wool balls, or make-up pads or even cotton tips.

#### How do I toilet my orphan?

Dip the tissue (or alternative) in warm water so that it is damp (not dripping wet). Gently, stimulate the cloaca by rubbing the moist tissue on and around it very gently. You should find that the cloaca will start to "pulsate". Do not rub vigorously as this can result in the cloaca becoming inflamed and can result in prolapse. Most orphaned mammals will urinate first and then pass faeces. Some orphans will not pass faeces each time.

#### When do I toilet my orphan?

You need to toilet your orphan at each feed. You can toilet your orphan either before you feed or after. Some orphans feed better if toileted before a feed whilst others are too hungry and will not sit quietly in order to be toileted. Joeys that tire easily during their feed can be fed until they tire, toileted (while keeping the milk warm) and then offered the remainder of their milk feed.

Most orphaned mammals quickly get into a routine of being toileted and are usually quite relaxed whilst being toileted. If your orphan flinches or appears uncomfortable when being toileted contact your Species Coordinator immediately as there may be an underlying reason for this.

#### Why is it important to monitor my orphan's urine and faeces?

A diligent wildlife rehabilitator should be very familiar with their orphan's urine and faeces in so far as what it looks like (e.g. colour, firmness), its odour and how frequently the orphan urinates and defecates. Often if something is wrong, the urine and faeces will be the first to reflect this. Any change can indicate a health problem and you should consult your Species Coordinator and an experienced wildlife veterinarian promptly.





Photos Above: Bandicoot (left) and koala (right) being toileted.

Each species has a preferred way of being held to be toileted. Koalas and possums prefer to be toileted in a more upright position as opposed to macropods that will lay on their back with their feet up, similar to the bandicoot above.

Photos courtesy of Karen Scott.

## Should I give my orphan a "dummy"?

A "dummy" is simply a teat with no hole in it. It provides comfort to the joey inbetween feeds.

Some species of orphaned mammals do like to have a "dummy". Flying foxes for example, are prone to suck on other orphans' body parts, such as wings and ears and can do serious damage if the issue is not addressed. Using a dummy for orphaned flying foxes is highly recommended.

Possums and gliders generally do not take to using a dummy. Some macropod joeys can develop a habit of sucking body parts, such as the end of their tail, their grooming toes and even their pouch or scrotum.

If the sucking does not cause any damage (e.g. ulceration, inflammation), then you will just need to closely monitor the situation. In extreme cases though where the behavior is causing ulceration, it needs to be addressed promptly. With the exception of flying foxes, from past experience introducing a dummy is generally fruitless.

If you have a joey that has developed a sucking problem, speak with your Species Coordinator for advice as it is generally a management issue (such as stress).



Photo Right: Grey-headed Flying Fox pup with a dummy.
Photo courtesy of Bats Qld.

# How do I handle my pouched orphaned joey?

For younger possum and macropod joeys that are in a pouch, cradle one hand under the pouch and use your other hand to hold the top of the pouch. Do not encourage your joey to venture from its pouch until it is ready to do so.

For other small mammals, such as gliders, bandicoots or native rodents, hold them in the palm of your hand so that their full weight is supported.

# How do I handle my possum joey when it is a little older?

For older possums that have ventured from their pouch environment, cradle one hand under their bottom and use your other hand to hold them around their chest. Your second hand around their chest is to provide support only, do not lift their body weight in this manner as you can easily injure their fragile ribs.







Photo Top Left: Common Ringtail Possum being cradled gently in the hand. Photo courtesy of Helen Bradley.

Photo Top Right: Juvenile Common Brushtail Possum being gently held around the chest and supported from beneath. Photo courtesy of Wildcare Australia Inc.

Photo Bottom Let: Common Brushtail Possum secured in pouch liners and being well supported.

#### How do I handle my macropod joey when it is a little older?

Macropod joeys that have ventured from their pouch environment, should always be fully supported under their back and hind legs. Never pick them up around the ribs. As the bulk of the weight of a macropod is in their lower body, picking them up incorrectly will make them feel very insecure and may result in damage to their ribs and/or spine. Macropod joeys should always be encouraged to venture back into their pouch by themselves - holding the pouch and encouraging them to dive in by gently placing your hand at the base of their tail and tipping them forward, trains them to do it themselves.

Photos Top Right and Bottom Right: Correct method of holding macropod joeys. Remember that their ribs are very fragile and should be fully supported.

Photos courtesy of Wildcare Australia Inc.

Photo Bottom Left: Larger joeys (such as the Red Kangaroo below) can be lifted by the base of their tail which is an extension of their spine. This does not cause pain to the joey.

Photo courtesy of Karen Scott.







#### How do I sex my orphan?

All marsupials can be sexed from a few weeks of age.

Males have a small scrotum which in furred joeys is often hidden in their soft fur. The penis of a male joey is tucked inside the cloaca. In possum joeys, the male's penis is rarely noticed. In macropod joeys the penis is often noticed during toileting and then more often as it emerges from the pouch.

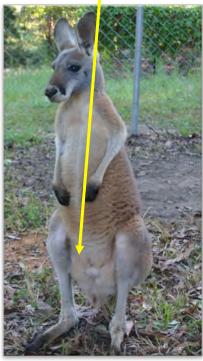
Female marsupials can be identified by the tiny pouch on their belly. In furred joeys, this is sometimes not clearly visible but a close inspection of the lower belly area will reveal the pouch opening.



(Left Top and Bottom) Brushtail Possum and Red Kangaroo – both males. You can see the scrotum directly above their cloaca.

(Below Right) Adult female Eastern Grey kangaroo. You will notice that her pouch is loose as she had an at-foot joey.

Photos courtesy of Karen Hooke and Karen Scott.





#### Why is it so important that I weigh my orphan?

You will need to weigh your orphan regularly so that you can ensure that it is gaining adequate weight. When using Wombaroo milk formulas, it is important that you regularly weigh your orphan so that you can ensure that you are feeding the correct volume of milk.

#### How do I weigh my orphan?

When weighing your orphan always aim to do so quickly and efficiently so as to minimise any unnecessary stress on your orphan.

The most practical time to weigh your joey is when they are due for a pouch change. Gently place the orphan (which should be in its pouch) on the scales and calculate the weight. Place the joey into the next clean pouch. You will then need to subtract the weight of the dirty pouch to calculate the net weight of your orphan.

Some rehabilitators pre-weigh their pouches and write the weight on the pouch with a laundry marker.

#### How often do I need to weigh my orphan?

You should weigh your orphan at least once a week. For smaller mammals, many rehabilitators weigh their orphan every 2 to 3 days to ensure that it is putting on weight.

If your orphan is debilitated, or failing to feed correctly, then you should weigh the orphan on a daily basis.

Once they are in pre-release facilities it is often difficult (and stressful) to weigh them so weighing every two weeks is acceptable.

#### What do I do if my orphan is putting on little or no weight?

Contact your Species Coordinator as soon as possible. Failure to put on weight could be an indication that something is wrong with your orphan.

## How do I know if my orphan is putting on enough weight?

As a general rule, your orphan should gain ~10% of its body weight each week. A 12-15% body weight increase is ideal.

Use the various Wildcare Progress Charts and Wombaroo information booklets as a guide to ensure that your orphan is gaining adequate weight.

Weight gain in orphans will fluctuate to some degree. Newly arrived animals may have poor weight gain for the first week or so but then should catch up quickly.

When you contact your Species Coordinator to provide regular updates of your orphan's progress, let them know what weight gain the animal has made. Make sure that you are recording your weights on your animal's progress sheets.

# How do I weigh really tiny mammals like Feathertail Gliders or Antechinus?

If you are intending to care for very small orphans, such as gliders and dasyurids, it is recommended that you purchase a set of jewellery scales. These scales weigh in increments of 0.1g or 0.01g.



Photo Top: Red-necked Pademelon being weighed in its pouches.

Photo courtesy of Penelope Hacker.

Photo Right: Short-beaked Echidna being weighed on jewellery scales.

Photo courtesy of Karen Scott.



# **Teddy Bears**

Teddy bears are often used by carers to provide comfort to joeys. They are commonly used for arboreal species such as koalas, possums and flying foxes. When choosing a 'teddy' for your joey, chose one that is comparative in size to the joey itself. The teddy should be placed with the joey in its pouch. It is a good idea to have a few teddys as they will need to be washed regularly.

Flying foxes are provided with a "mummy roll" which can consist of a rolled-up facecloth or a stuffed child's sock. These can then be hung from the bat's branches and clothes' airer to simulate them clinging to their mother.

If you are not sure whether to use a teddy with your joey, speak with your Species Coordinator.

Photos Right Top and Bottom: Orphaned koala joeys seek much comfortable from teddy bears. Photo courtesy of Karen Scott.

Photo Bottom Left: Common Brushtail Possum joeys with teddy. Photo courtesy of Helen Bradley.







# Record Keeping

#### How should I record information about my orphan?

Wildcare has developed standard Rescue and Examination Forms for use by its rehabilitators. A copy of this form is provided with these workshop notes and can also be downloaded from the Wildcare website. Alternatively, you can devise your own progress chart or keep a diary to suit your particular animal.

# What sort of information do I need to record when I first receive my orphan?

When you first receive your orphan, there are certain things that you should make a note of, such as:

- The date the orphan came into care
- The date you received the orphan
- The orphan's identification number
- The orphan's species
- The orphan's age
- Where the orphan was found and a contact name and phone number if possible
- The circumstances in which the orphan came into care e.g. road trauma / dog attack
- Measurements such as tail and foot length (for macropods) and forearm measurements (for flying foxes)

## What sort of information should I regularly keep a note of?

There are a number of things that you should make a regular note of on your Animal Progress Chart, such as:

- The weight of your orphan
- The number of feeds your orphan is on
- The volume of milk that the orphan is offered and the volume that it consumes
- The colour/consistency of its faeces and/or urine
- Visual characteristics such as when the orphan's eyes open, when the ears unfold, when fur starts to appear, when it first ventures out of its pouch
- Details of any veterinary care that it receives
- Details of any medications that the orphan is prescribed

#### Why is it important to keep records of my orphan's progress?

There are a number of good reasons why it is important to keep full and proper records of your animal's progress such as:

- You can refer back to your notes in the future if you have another animal of the same species, or experience a similar problem with another animal
- A copy of the history of the animal is available to the next rehabilitator when it is passed on for pre-release purposes
- If your orphan needs veterinary care you will be able to provide the vet with an accurate account of symptoms and dates where appropriate
- By collating the records from numerous rehabilitators Wildcare is able to prepare and review Progress Charts for various species for use by other wildlife rehabilitators

# Common Injuries and Diseases



Photo Above: Orphaned Koala joey. Courtesy of Karen Scott.

This section deals with common injuries, diseases and conditions. For more detailed information regarding first aid of wildlife, please refer to the Wildcare training notes Rescue and First Aid for Wildlife.

#### How do I know if my orphan is unwell?

It is important that you are very observant of your orphan's normal behaviour. A diligent wildlife rehabilitator will be able to pick up on even the slightest change in their orphan such as:

- not drinking well (e.g. refusing a feed or not consuming their normal amount)
- lethargy
- dull eyes
- increased respiratory rate or effort
- increased or decreased urination or defecation
- change in the texture, colour or smell of your orphan's urine or faeces
- failure to put on weight
- something that is just "off" in their behavior.

If you think that your orphan is sick you should adopt the following approach:

- Define the problem and write it down (e.g. the joey has diarrhoea, inappetence, weight loss)
- Examine the joey systematically from head to toe, noting down any abnormalities. You can use the Rescue and Examination Record Form for this purpose also.
- Seek the advice of your Species Coordinator and/or veterinarian as soon as possible. Do not delay in seeking help as these animals can deteriorate very quickly.

Remember – we have all had animals that have deteriorated in health for various reasons. There is no shame in seeking advice from someone more experienced. It is better to be honest and upfront rather than risk the health of your animal.

These notes provide only a very brief outline of some of the more common injuries, diseases and conditions seen in orphaned mammals.

These notes should by no means be used by you as a means of diagnosing and treating your orphan.

We are very fortunate in South-east Queensland that we have many veterinarians that are available to assist wildlife rehabilitators with orphaned mammals when they are sick or injured.

It is important that you contact either your Species Coordinator and/or an experienced wildlife veterinarian should you suspect that your orphan is unwell. The

health of your orphaned mammal can decline rapidly and it is imperative that you seek appropriate help immediately.

For more information regarding each of these conditions, please refer to the *Rescue* and *First Aid for Wildlife* manual which outlines the definition, cause, recognition and standard treatment for each.

	Seen in orphaned mammals when first arriving into care. Can be seen after an animal has suffered injury or is debilitated by disease. Indicated by weakness, depression, pale mucous membrane, weak or
In ra Tr ap	apid heart rate.  Creat by keeping the animal warm and administering fluids (if appropriate).
Dehydration O	Contact your Species Coordinator and/or vet immediately.  Often seen in orphans when they first come into care or when orphans are not drinking adequate quantities of fluid.
Four Mines	Mouth and mucous membrane very dry and tacky Sunken eye(s)

Disease / Illness	Description
Diarrhoea	One of the most common illnesses seen in orphaned mammals.
	Often related to poor husbandry, poor hygiene, incorrect diet, irregular feeds, too much milk etc.
	Can also be indicative of other diseases such as yeast or bacterial infection, coccidiosis and bacterial enteritis.
	Consult with your vet who will test faeces for accurate diagnosis.
	Refer to the Rescue and First Aid for Wildlife manual for instructions on how to collect a faecal sample.
Candida	Commonly referred to as yeast infection or thrush.
	Often caused by stress, poor hygiene or after use of antibiotics.
	Symptoms include diarrhoea with strong yeast-like smell, ulcers or white plaques present in the mouth which causes difficulty in suckling
	Consult with your vet who will confirm diagnosis by doing a faecal test.
	Refer to the Rescue and First Aid for Wildlife manual for instructions on how to collect a faecal sample.
Cloacal Prolapse	Usually associated with straining, diarrhoea and/or stress.
	Consult your vet immediately.
Bloat	Often seen in orphaned Ringtail Possums.
	Indicated by extended abdomen and signs of pain.
	The exact cause is unknown but many believe the diet is responsible.
	Contact your vet and Species Coordinator immediately.
Aspiration pneumonia	Caused by orphan inhaling milk when feeding. If you suspect that your orphan has aspirated milk contact your Species Coordinator as soon as possible and monitor the orphan closely.
	Consult your vet immediately if you notice the animal decline. The vet may prescribe antibiotics.
Pneumonia	Infection of the lungs.
	Symptoms include very subtle congestion-like lung sounds.
	Orphan may refuse bottle and may be snuffly or listless.
	Consult your vet immediately.
Myopathy	Most often seen in macropods.
(muscle disease)	When seen in orphaned joeys, usually caused by stress.
(masere disease)	Symptoms include floppy neck, dark coloured urine, stiffness of muscles.
	Can be diagnosed by urine-analysis.
	Contact your Coordinator or vet immediately.
Ringworm	Usually seen in macropods.
	Indicated by loss of fur in round-like shape. Animal will often lick at the area.
	Consult with your vet who will confirm diagnosis and appropriate treatment.
	Note that this is easily transferred to humans.

Disease / Illness	Description
Alopecia	Indicated by hair loss.
	May be associated with stress, being kept at too high a temperature or inappropriate milk formula.
	Consult your Coordinator and/or vet.
Dry cracked skin	Often seen on feet of macropod joeys.
	Prevention is better than cure in this case.
	Ensure that you regularly apply cream to your joey's feet.
	Consult with your Species Coordinator.
Hyperkeratosis	Severe dry skin in macropods can be an allergic reaction to certain milk formulas.
	Seek help from your Species Coordinator and an experienced wildlife veterinarian.
Hypoglycaemia	Results from orphan being allowed to become chilled.
(low blood glucose)	Suspect this in any orphan that has been out of its mother's pouch for any length of time in the cold. Can be indicated by the orphan being cold to touch, depressed, weak or moribund, muscular twitching, uncoordinated and/or seizures.
	Consult your vet immediately for treatment.
Hyperthermia	Results from orphan becoming too hot.
(high body	Macropod joeys that become too hot may lick their forearms to try to cool down.
temperature)	Remove the joey from any artificial warmth until the joey has returned to normal body temperature.
	Can sometimes result from being overheated accidentally while in care.
	Consult your Coordinator and/or vet immediately for treatment.
Hypothermia	Results from orphan becoming cold.
	Indicated by cold extremities and lethargy.
(low body	Warm the joey slowly.
temperature)	Consult your vet immediately for diagnosis and treatment.
Teething	Some orphans may experience pain when teething. Feel inside the mouth for teeth coming through. Indicated by the orphan's unwillingness to suckle.
	Consult your Species Coordinator or vet though to rule out anything more sinister. Offer hard things to chew such as bark.
Intestinal worms	Often seen as poor weight gain or pieces of tape worm in faeces.
	Diagnosed by faecal test by your vet.
	Consult with your vet for diagnosis and treatment.
Dermatitis	Usually seen in the Common Brushtail Possum.
	Indicated by loss of fur and inflamed skin.
	Consult your Species Coordinator or vet for diagnosis, prognosis and treatment.

Disease / Illness	Description
Coccidiosis	Usually seen in Eastern Grey Kangaroos.
	Always suspect coccidiosis in any grazing age Eastern Grey Kangaroo with gut pain or depression, even if there is no diarrhoea.
	Initially indicated by loss of appetite.
	Can result in death very quickly.
	Consult an experienced wildlife vet immediately for diagnosis and treatment. If detected early, the animal has a better chance of survival.
Fractured bones	Often associated with bruising.
	Consult your vet immediately for diagnosis (e.g. x-ray), prognosis and treatment.
Cuts, grazes, lesions	Wounds will need to be cleaned and antibiotics may need to be prescribed.
	Consult your vet as soon as possible.
Bite wounds	Often as a result of dog or cat attacks.
	Check for puncture wounds or bruising.
	Assume any orphan found in the mouth of a domestic animal has received some puncture wounds.
	Extensive internal damage may result with minimal or no external signs.
	Consult your vet immediately as antibiotics will need to be prescribed to prevent infection.
Burns	May be as result of fire, chimneys, barbeques etc.
	Indicated by singed furred or in extreme cases indicated by complete destruction of epidermis (skin).
	Consult your vet immediately for prognosis and treatment.
Poisoning	Ratsack is commonly ingested by possums in roof spaces.
	Indicated by foul smelling faeces, blood in urine and faeces. Bleeding can occur from all orifices.
	Consult a vet immediately.

## Bibliography / References

Strahan, R. (1995) *The Mammals of Australia*. Reed New Holland, Frenchs Forest NSW 2086

Tyndale-Biscoe, H. (2005) *Life of Marsupials* CSIRO, 150 Oxford Street Collingwood VIC 3066

(1997) Wombaroo – Food for Wildlife – Milk Replacers and Food Supplements booklet PO Box 151, Glen Osmond SA 5064

Jackson, S (ed). (2003) Australian *Mammals – Biology and Captive Management* CSIRO, 150 Oxford Street, Collingwood VIC 3066

Cronin, L. (2000). *Key Guide to Australia Mammals*. Envirobook, 37 Rose Street Annandale NSW 2038

Menkhorst, P and Knight, F. (2001) A Field Guide to the Mammals of Australia. Oxford University Press, 253 Normanby Road, South Melbourne.

Williams, A. & R. (1999) Caring for Kangaroos and Wallabies Simon & Schuster, 20 Barcoo Street, East Roseville NSW 2069

McCracken, H. (Undated). Husbandry and Veterinary Care of Orphaned Marsupial Pouch Young.

Royal Melbourne Zoological Gardens, PO Box 74 Parkville NSW 3052

# Recommended Reading and Reference Material

#### **BOOKS - NATURAL HISTORY**

#### 'KANGAROOS - BIOLOGY OF THE LARGEST MARSUPIALS'

Dawson, Terence J. Published by UNSW Press - Australian Natural History Series, 1998

#### 'POSSUMS - THE BRUSHTAILS, RINGTAILS AND GREATER GLIDER'

Kerle, Anne

Published by UNSW Press - Australian Natural History Series, 2001

#### 'GLIDERS OF AUSTRALIA - A NATURAL HISTORY

Lindenmayer, David Published by UNSW Press – Australian Natural History Series, 2002

#### 'FLYING FOXES - FRUIT AND BLOSSOM BATS OF AUSTRALIA'

Hall, Leslie and Richards, Greg Published by UNSW Press – Australian Natural History Series, 2000

#### 'LIFE OF MARSUPIALS'

Tyndale-Biscoe, Hugh Published by CSIRO Publishing, 2005

#### 'FAUNA OF AUSTRALIA - VOLUME 1B MAMMALIA'

Published by Australian Government Publishing Service, 1989

#### **BOOKS - CAPTIVE MANAGEMENT AND CARE**

## 'HUSBANDRY AND VETERINARY CARE OF ORPHANED MARSUPIAL POUCH YOUNG'

McCracken, Helen Published by Royal Melbourne Zoological Gardens, Undated

#### 'CARING FOR AUSTRALIAN WILDLIFE'

White, Sharon Published by Australian Geographic, 1997

#### 'CARING FOR KANGAROOS AND WALLABIES'

Williams, Anne and Ray Published by Kangaroo Press, 1999

#### 'CARING FOR POSSUMS'

Smith, Barbara Published by Kangaroo Press, 1995

#### 'AUSTRALIAN MAMMALS - BIOLOGY AND CAPTIVE MANAGEMENT'

Jackson, Stephen Published by CSIRO Publishing, 2003

#### 'CARE AND HANDLING OF AUSTRALIAN NATIVE WILDLIFE'

Hand, Suzanne J. Published by Surrey Beatty & Sons Pty Limited, 1997

#### 'CARE OF AUSTRALIAN WILDLIFE'

Walraven, Erna Published by New Holland Publishers (Australia), 1999

## Photo Credits

Thank you to the following people who have generously contributed photographs.

Karen Scott Gail Gipp Bats Qld (Flying Foxes & Microbats) Inc.

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Penelope Hacker Robyn Cox www.greenleafimages.com.au

Australia Zoo Wildlife Hospital

## **Appendices**

#### Easy Reference Sheets

Tina Davidson

• Use of Protexin in Hand-raised Marsupial Joeys

Helen Bradley

- Wildlife Supplies
- Making Joey Pouches
- · Harvesting Browse and Fruit for Wildlife

#### Rescue and Examination Record Forms

- Possums
- Gliders
- Macropods
- Small Mammals
- Koalas
- Echidnas

#### Easy Reference Chart - Sterilising Procedures

#### Wombaroo Handy Reference Charts

- o Possum < 0.8
- o Possum >0.8
- o Kangaroo < 0.4
- o Kangaroo 0.4
- o Kangaroo 0.6
- o Kangaroo > 0.7

Wombaroo Milk Replacers and Food Supplements for Native Animals booklet

## **Easy Reference Sheet**

## Use of Protexin® in Hand-raised Marsupial Joeys

#### Introduction

Protexin® is a multi-strain probiotic containing live beneficial bacteria developed specifically for animals which aids in improving intestinal microbial balance.

Protexin® has been used by our orphaned koala carers for many years with apparent good success. Carers believe that it has aided in maintaining a balanced digestive system, particularly during times where a joey is more likely to encounter gut flora disturbances. Over recent years, mammal carers hand-raising orphaned macropods, possums and gliders have also had good success with using the product.

It is well recognised that stress can have a significant impact on an animal's health. We believe that adding Protexin® to their diet can help to minimise disruption to the normal intestinal balance. Wildlife carers believe that it has also contributed towards improving the overall health of compromised individuals.

There are different types of Protexin® available, the one commonly used by wildlife carers is the Protexin® Soluble (orange label).



#### **Dose Rate**

The following dosage information is adapted from the Protexin® datasheet (as attached). This is a guide only.

Protexin® Soluble (Orange label product)

riotexiii solable (Grange label product)				
Species	Individual Dose - Per animal per day			
	Maintenance Dose	Stress Dose		
Small orphaned joeys (pouch young)	0.5g per animal per day equivalent to	1g per animal per day equivalent to		
(Antechinus, bandicoots, gliders, and other small mammal species)	1/8 teaspoon per animal per day.	¼ teaspoon per animal per day.		
Orphaned joeys (pouch young and	1g per animal per day equivalent to	2g per animal per day equivalent to		
pouch emergence)	¼ teaspoon per animal per day.	½ teaspoon per animal per day.		
(Macropods, possums, gliders, koalas)				
Sub-adult and adult mammals	1g – 2g per animal per day equivalent to	2g – 4g per animal per day equivalent to		
(Adult possums, sub-adult/adult koalas, pre- release macropods)	¼ to ½ teaspoon per animal per day.	½ to 1 teaspoon per animal per day.		

It is important to note that the recommended dose rate is based on a measure **PER ANIMAL PER DAY**. The dose is **not** based on the quantity of milk consumed. Larger animals (e.g. adult possums, pre-release macropod joeys, sub-adult/adult koalas) can be given a higher dose, which would be comparable to the manufacturer's recommendation for small to larger dogs (as per attached datasheet).

#### **Calculating a Daily Dose**

To correctly administer according to the manufacturer's guidelines:-

- For milk-fed joeys: Prepare the daily quota of milk and add the Protexin® dose as outlined above. Dividing the milk between the feeds over a 24-hour period will ensure that the dose is administered over the entire day.

  For example if a joey is taking 20mLs milk per day, add ¼ teaspoon of Protexin®. As the joey grows, increase the milk amount but do not increase the amount of Protexin® (unless you are administering the Stress dose).
- For weaned animals: Add the Protexin® dose to the supplementary food ensuring that the full amount will be consumed by the animal.

If you are unsure about how to calculate the dose required, please contact your relevant Species Coordinator.

#### **Storage**

Protexin® should be stored in an airtight container in the refrigerator. The manufacturer states that if kept refrigerated, the product can be used for 12 months past the expiry/best before date.





## PROTEXIN

#### PROTEXIN® IS A MULTI-STRAIN PROBIOTIC CONTAINING LIVE BENEFICIAL BACTERIA.

**PRESENTATION**: There are different types of **PROTEXIN**<sup>®</sup>:

- In feed formula containing 60 million colony forming units (CFU)/g

PROTEXIN® POWDER
PROTEXIN® SOLUBLE
PROTEXIN® PASTE - Water soluble formula containing 180 million CFU/g - Oral paste formula containing 180 million CFU/2 PROTEXIN® LIQUID - Oil based formula containing 180 million CFU/mL

ACTIVE CONSTITUENTS: Each g or mL contains: Lactobacillus acidophilus, Lactobacillus delbrueckii subspecies bulgaricus, Lactobacillus plantarum, Lactobacillus rhamnosus; Bifidobacterium bifidum; Enterococcus faecium; Streptococcus salivarius subspecies thermophilus.

PROPERTIES: PROTEXIN® is a blend of live viable microbes which benefits the host animal by improving the intestinal microbial balance. Everyday use of PROTEXIN® helps maintain a balanced digestive system, thus optimising digestion of feed and enhancing your animals' health, naturally. These microbes are safe, non-toxic and residue free.

PROTEXIN® may be used during periods of stress (stresses disrupt the normal intestinal balance), e.g. overcrowding, pregnancy and lactation, scouring and diarrhoea, temperature extremes, transportation, training and exercise, and medication; and following animal husbandry procedures or practices such as antibiotic use, birth, castration, debeaking/dehorning, diet changes, loss of appetite, surgery, vaccination, weaning and worming. PROTEXIN® is compatible with feed ingredients including anthelmintics, coccidiostats, minerals and vitamins, and some antibiotics.

#### Indications for use (Australia):

- An aid during periods of intestinal dysfunction in all animals, including treatment and control of scouring or diarrhoea, exclusion and suppression of pathogens such as *E. coli, Salmonella* spp. and *Aeromonas* spp.
- Post-antibiotic therapy in all animals for the re-establishment of gut microflora following antibiotic usage.
- Improved weight gains and feed conversion in growing pigs and cattle.
- Productivity improvements and reduced mortality in poultry.
- Aids in the establishment of gastrointestinal microflora of physiologically immature animals, e.g. day old chicks, neonatal calves, pigs, foals, lambs and kids, puppies and kittens.

#### Indications for use (New Zealand):

- An aid during periods of intestinal dysfunction in all animals.
- Post-antibiotic therapy in all animals for the re-establishment of gut microflora following antibiotic use.
- Improved weight gains and feed conversion in growing pigs and cattle.
- Productivity improvements and reduced mortality in poultry.
- Aids in the establishment of gastrointestinal microflora of physiologically immature animals, e.g. day old chicks, neonatal calves, pigs, foals, lambs and kids, puppies and kittens.

#### DOSAGE AND ADMINISTRATION:

(Australia)

RESTRAINT: PROTEXIN® should not be used in conjunction with Penicillins, Cephalosporins, Tetracyclines, Avoparcin, Gentomycin, Lincomycin, Streptomycin, Tiamulin or Tylosin, but may be used immediately following these antibiotics.

(New Zealand)
RESTRAINT: Using concurrently with some antibiotics may compromise beneficial effects. PROTEXIN® efficacy may be reduced if used in conjunction with some antibiotics. Please contact International Animal Health Products for advice regarding the use of PROTEXIN® in conjunction with antibiotics.

#### (Australia & New Zealand)

**Individual Dose:** Use at stress levels for the first 5 days then at the maintenance dose level. In-Feed: Refer to label for instructions.

PRODUCT ▶	P. POWDER		P. SOLUBLE**		P. PASTE	P. LIQU	IID	
SPECIES	INDIVIDUAL DOSE IN I (per head per day)		IN FEED*	INDIVIDUAL DOSE (per head per day)		INDIVIDUAL DOSE (per head per day)	INDIVIDUA (per head pe	
	Maintenance	Stress	(kg/tonne)	Maintenance	Stress	Stress	Maintenance	Stress
HORSES:	10 g	20 g	1.0	10 g	20 g	10-20 g	10 mL	20 mL
FOALS/PONIES:	5 g	10 g	2.0	5 g	10 g	5-10 g	5 mL	10 mL
CATTLE:	2 g	4 g	0.5-1.0	2 g	4 g	2-4 g	2 mL	4 mL
CALVES:	1 g	2 g	0.4	1 g	2 g	1-2 g	1 mL	2 mL
SHEEP/GOATS:	2 g	4 g	1.2	2 g	4 g	2-4 g	2 mL	4 mL
LAMBS/KIDS:	1 g	2 g	1.4	1 g	2 g	1-2 g	1 mL	2 mL
PIGS:	1-2 g	2-4 g	0.5-0.6	2 g	4 g	2-4 g	2 mL	4 mL
PIGLETS:	1 g	2 g	1.4	1 g	2 g	1-2 g	1 mL	2 mL
DOGS:	1-3 g	2-6 g	1.5	1-3 g	2-6 g	1-3 g to 2-6 g	1-3 mL	2-6 mL*
PUPS/KITTENS:	1 g	2 g	1.0-3.0	1 g		1-2 g	1 mL	2 mL
CATS:	1 g	2 g	1.5	1 g	2 g 2 g	1-3 g to 2-6 g	1 mL	2 mL
POULTRY:								
CHICKS				1 g/.				
BROILERS/LAYERS			0.5-1.5	500 g/5				
CAGED BIRDS:				1 g/.	L**		1 mL/500 g	g feed

♦ (Small-2 g, Medium-4 g, Large-6 g). \*Use as a guide only. Rates may vary depending on daily feed intakes. \*\*Add P. Soluble to drinking water - make fresh daily. For other animals contact International Animal Health Products. NOTE: A level measure holds around 2 g (small), 25 g (large) (P. POWDER, P. SOLUBLE) & the finger pump delivers 1.5 mL (P. LIQUID).

WITHHOLDING PERIODS: MEAT: NIL; MILK: NIL; EGGS: NIL

TRADE ADVICE: EXPORT SLAUGHTER INTERVAL (ESI): ESI not required (Australia)

POISONS SCHEDULE: EXEMPT (Australia)

**REGULATORY STATUS:** Australia: AUSTRALIAN PESTICIDES & VETERINARY MEDICINES AUTHORITY

New Zealand: EXEMPT

PROTEXIN® POWDER: PROTEXIN® SOLUBLE: PROTEXIN® LIQUID: PACK SIZES: 125 g, 250 g, 1 kg, 5 kg, 20 kg, 25 kg 125 g, 250 g, 500 g, 2.5 kg, 25 kg PROTEXIN® PASTE: 30 g, 100 g (syringe) 125 mL, 250 mL, 1 L, 5 L, 25 L

Australia-Wide Toll Free: 1800 801 201	New Zealand Toll Free: 0800 424 999 (0800 IAH 999)
Email: info@iahp.com.au	Website: www.iahp.com.au

<sup>®</sup> The Australia/World symbol is a registered trademark of International Animal Health Products P/L.

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## **Easy Reference Sheet**

## Wildlife Supplies

## **General Wildlife Foods and Supplements**

	• •
Wildcare Australia Inc Email: shop@wildcare.org.au	Wildcare uniforms, merchandise and training manuals.  Possum boxes, Snugglesafe heating disks, indoor/outdoor thermometers, pouch liners, feather pouches, large macropod rescue bags.
<b>Currumbin Wildlife Hospital</b> 27 Millers Drive, Currumbin Phone: 5534 0813	Most wildlife foods and supplements held in stock for purchase at Hospital Reception.  Can place bulk orders with them by telephoning ahead to the Reception staff.
Australian Wildlife Supplies www.wildlifesupplies.com.au	A wide variety of products for birds, mammals.  Milk replacers, teats, supplements and general rehab equipment.  Mention that you are a wildlife carer for a discount on some products.
Wildlife Supplies for Sale www.wildlifesupplies.org	A variety of bottles and teats for orphaned mammals.
Vet Products Direct www.vetproductsdirect.com	A wide variety of products for birds and wildlife products, milk replacers.  Consider joining their Club to access discounted prices.
GeckoDan www.geckodan.com	Reptile and bird products and supplements. Pop-up mesh enclosures.
Local Pet & Produce Stores	Check your local pet and produce stores as often these are cheaper than larger pet stores and can order items in for you (and you support a local small business!).  Mention you are a wildlife volunteer and many will provide you with a discount.

#### Live and Frozen Foods

Tips:

- Purchase live food in bulk quantities
- Purchase a bulk quantity and set up a breeding colony very easy to set up and maintain
- Split a large live food order between multiple carers
- Check local pet shops some of them offer "royalty reward cards" for the sale of live food.

Livefoods Unlimited www.livefoods.com.au	Crickets, wood cockroaches, giant mealworms, reptile equipment and books Mention you are a wildlife carer and they will generally give a discount on bulk live food purchases.
Pisces Enterprises Pty Ltd www.piscesenterprises.com/cms/	Crickets, mealworms wood cockroaches, earthworms, silkworms, fly pupae, snails.  Frozen mice, rats, rabbits and quails  ** Pet wholesaler but will sell bulk orders directly to wildlife carers.
Aquatic Flora and Fauna https://www.whitepages.com.au/aquatic- flora-fauna-11884374/beerwah-qld- 11884375B	Telephone: 5494 0900 Good supplier for mealworms Located at Beerwah, Sunshine Coast
The ARCade www.frogs.org.au	Frozen crickets, fly pupae, gents. Live crickets, fly pupae, woodies, mealworms, gents. Frozen mice, rats, crickets, maggots and pupae.

## **ICU / Brooders**

Bellsouth Poultry Equipment	Sells Rcom Brooder ICU
	https://eshop.bellsouth.com.au/epages/bellsouth.sf/en_AU/?ObjectPath=/Shops/b
	ellsouth/Categories/Incubators/ICU
Top Knot Poultry Supplies	Sells egg incubators and brooders/ICU
	www.tkpoultrysupplies.com.au
WA Poultry Equipment	Sells Brinsea/Vetario brooders/ICU
	www.wapoultryequipment.net.au



## Cages, aviaries, transport cages etc.

0 /	
Gumtree www.gumtree.com.au	Free to advertise – good for picking up second hand cages and aviaries.
eBay www.ebay.com.au	Lots of second hand cages and aviaries for sale. You can search via location to find ones that are close to your location.
Online Discount Stores	www.dealsdirect.com.au www.oo.com.au www.crazysales.com.au
Contact your Coordinator	If you need cages etc, let your Wildcare Species Coordinator know as we often have cages donated that are distributed to carers.
Buy Swap Sell groups	Search for local "Buy Swap Sell" groups in your region.

#### **Pouches**

Wildcare Australia Inc.	We usually have a supply of donated rescue pouches as well as good quality pouches for carers. Also stock feather pouches and warm outer pouches.
STAR Stitchers for Tamborine	Volunteers that make pouches, rescue bags etc for wildlife carers.
Animal Rescues	Will supply licensed wildlife carers throughout Australia.  https://www.facebook.com/groups/433287593542166/

#### Books

**ABK Publications** 

www.birdkeeper.com.au www.reptilepublications.com.au

eBay

www.ebay.com.au

**Andrew Isles** 

www.andrewisles.com

**Lifeline Bookfests** 

#### www.facebook.com/LifelineBookfestQLD/

**Book Depository** 

www.bookdepository.co.uk

## **Other Tips**

- When purchasing more expensive equipment (such as aviaries etc), make sure that you tell the supplier that you are a volunteer wildlife carer – they will often give discounts to volunteers.
- Utilise your local Council funding opportunities. Brisbane, Logan and Redland Councils all offer funding to wildlife carers to help with the costs associated with rescuing and rehabilitating wildlife.
- "Grow your Own" vegetables or ask your family and friends to grow them for you great for wildlife that are fed green vegetables such as spinach, lettuce etc.
- Use natural diet wherever possible. Grass and browse is much cheaper than fruit, vegetables and supplements (and better for your wildlife!)
- Buy in bulk where you can to reduce cost.
- Put up a sign at your workplace asking for the donation of cages, pet carry cages, linen etc. You will be amazed at the things that people have stored in their garages collecting dust that they are happy to donate to a good cause.
- Read instructions on products properly. Don't waste products by using more than the required amount. This is very relevant for concentrated products such as F10® and many vitamins and food supplements.
- Utilise the Wildcare Facebook pages to organise car-pooling to workshops and for sharing with other carers "windfalls" such as out of date products or specials at various stores.
- Use second-hand doonas and quilts (natural materials only) to make warm outer pouches for orphaned joeys.
- Start planting more native trees now it doesn't take long for them to be big enough to be able to harvest browse for wildlife in care.
- Contact your local community garden and/or permaculture group. These community groups offer great educational workshops on growing plants and fruit/vegetables.



wildcare caringfor ourwildlife

## **Easy Reference Sheet**

## Making Pouches for Orphaned Joeys

Version 2.1: Updated January 2020

#### What is a joey and why do they need pouches?

The term 'joey' refers to the baby of any marsupial. Baby possums, gliders, kangaroos, wallabies, koalas, wombats and bandicoots are all referred to as 'joeys'. When hand-raising orphaned joeys we try to imitate the way their mother would care for them, which includes providing them with a warm and secure pouch in which the joey will live until it is old enough (...and brave enough!) to start to venture away from its safety.

#### **About these instructions**

There are various patterns and instructions available online for joey pouches. We have created these instructions based on preferences from our own wildlife carers. If you are making pouches for another wildlife group or carer, we would suggest you check with them first if they have any specific preferences.

Making joey pouches is a great way to not only help your local wildlife, but for less-experienced sewers, they are a fantastic project to improve your sewing skills. They are easy to make and will give you plenty of practice! Because we often have people with varying sewing knowledge and experience making pouches, we have developed these instructions to cater for everyone. Experienced sewers will be able to skip through to the specifics, whilst less-experienced sewers will benefit from the step-by-step instructions with accompanying photos.

#### **Fabric choices**

Below are some guidelines for selecting fabric to make joey pouches:-

- Fabric must be made from natural fibres such as 100% cotton.
- Cotton jersey (t-shirt/knit fabric) and flannelette are the most preferred fabrics as these are warm and soft.
- Cotton sheets are also good choices, particularly during summer months. Cotton sheets that have a very small percentage of polyester are okay.
- Do not use non-natural (synthetic) fabrics as they do not "breathe" and can cause the joeys to overheat.
- Unfurred joeys have delicate skin so the fabric needs to be soft so that it doesn't cause irritation.
- New fabrics are preferred but not essential. Good quality second-hand fabrics sourced from bed linen can be used (e.g. flannelette sheets) but please ensure that they are in good, usable condition. Sheets that are well worn may rip easily once an active joey is wrigging around!
- Just like any other baby, our marsupial joeys like to suckle, sometimes on their pouch, so materials that do not shed any lint, or pill, or have any loose threads are essential.
- There is no preference for specific colours or fabric designs/patterns our joeys don't mind if the fabric is a slightly "ugly"!
- If using new fabric, there is no need to pre-wash the fabric or to wash the pouches before sending. Our carers will wash before using.
- If using second-hand fabrics, please pre-wash the fabric.

#### What you will need

- Suitable fabric as per above
- Sewing machine (hand-sewn pouches are not suitable sorry)
- Basic sewing notions (ruler/tape measure, scissors, thread, pins/Wonder Clips)
- Iron (no one likes ironing ... but it really makes a difference to the quality of your finished pouch)
- Optional Cutting tools (cutting mat, ruler and rotary cutter)
- Optional Overlocker (serger) only required for Pouch C and beneficial for Pouches D and E.



#### **Pouch sizes**

Different species require different size pouches. Small species such as gliders will need much smaller pouches than larger species. Some, like kangaroos and wallabies, stay in their pouches for much longer than others so they require a larger range of pouch sizes.

We have listed below a guide on cutting your fabric, which should result in the finished pouch sizes listed. Measurements in both metric and imperial are included.

Please don't stress if your pouches end up being slightly different in size – joeys come in all sizes! Make the most of the size of your fabric to prevent wastage.

#### Metric measurements

	Cut fabric to size	Finished size of pouch	Suitable for:
	Sizes include seam allowance of ~1cm.		
	If cutting on the fold, divide the depth by 2.		
	12cm wide x 35cm deep **	10cm wide x 15cm deep	Gliders, Antechinus (unfurred)
=	17cm wide x 45cm deep	15cm wide x 20cm deep	Gliders (all ages)
Small			Koalas (unfurred)
S			Possums (unfurred)
			Bandicoots, Antechinus, Native Rodents
	22cm wide x 55cm deep	20cm wide x 25cm deep	Koalas (furred)
Ē			Possums (furred)
Medium			Kangaroos and wallabies (unfurred)
ž	27cm wide x 65cm deep	25cm wide x 30cm deep	Koalas (furred)
			Kangaroos and wallabies (furred)
Large	37cm wide x 85cm deep	35cm wide x 40cm deep	Kangaroos and wallabies (furred)
La	54cm wide x 135cm deep	50cm wide x 65cm deep	Kangaroos and wallabies (furred)

<sup>\*\*</sup> Make with a curved bottom

#### Imperial measurements

	Cut fabric to size	Finished size of pouch	Suitable for:				
	Sizes include seam allowance of 1/4" – 1/2"						
	If cutting on the fold, divide the depth by 2.						
	5" wide x 13.5" deep **	4" wide x 6" deep	Gliders, Antechinus (unfurred)				
=	7" wide x 17.5" deep	6" wide x 8" deep	Gliders (all ages)				
Small			Koalas (unfurred)				
S			Possums (unfurred)				
			Bandicoots, Antechinus, Native Rodents				
	9" wide x 21.5" deep	8" wide x 10" deep	Koalas (furred)				
돌			Possums (furred)				
Medium			Kangaroos and wallabies (unfurred)				
ž	11" wide x 25.5" deep	10" wide x 12" deep	Koalas (furred)				
			Kangaroos and wallabies (furred)				
ge	15" wide x 33.5" deep	14" wide x 16" deep	Kangaroos and wallabies (furred)				
Large	21" wide x 53.5" deep	20" wide x 26" deep	Kangaroos and wallabies (furred)				

<sup>\*\*</sup> Make with a curved bottom



#### 5 different styles of pouches

These instructions include details on making the following variations of pouches:-

- A. Pouch with French seams and straight sides and bottom (preferred option)
- B. Pouch with French seams and straight sides and a curved bottom
- C. Pouch with sewn and over-locked straight seams
- D. Double pouch fleece outer pouch with a fixed inner pouch (option 1 folded at top) (preferred option)
- E. Double pouch fleece outer pouch with a fixed inner pouch (option 2 flush top)

We suggest reading through the instructions before starting and decide which style of pouch you would like to make. You can then print out just the relevant pages for that style of pouch.



#### Straight or curved bottom – does it matter?

Some wildlife carers prefer pouches with curved bottoms. Some carers feel that joeys can get 'stuck' in the corners of square/rectangular pouches. The only joeys at risk of doing so would be the smaller species such as tiny gliders and antechinus. Making the smallest pouch sizes with curved bottoms would prevent this from occurring.

Some carers believe that the curved bottoms are essential for larger species. Most of our carers don't mind either way and many actually prefer the straight bottoms as it provides a bit of extra wriggle room for active joeys. Many joeys, such as koalas, have a little teddy bear in their pouch with them as well for comfort so the extra room of the square bottom helps. Joeys lay in all sorts of weird positions – upside down, on their side and snuggled up amongst their siblings.

If you are making hanging bags for kangaroos and wallabies, it is important that those are curved but these instructions do not cover those types of bags.



#### How many pouches do we need?

Pouches need to be changed regularly (sometimes as often as each feed), so each joey will need at least 30 pouches. Most carers will have at least a few joeys in care at any one time, so that's a lot of pouches! Carers are pretty busy people so having sufficient pouches that they don't have to wash every day is a huge help to them.

The donation of even just a few pouches is more than welcome!

The need for pouches is always great and any assistance that you can provide to our volunteers is greatly appreciated. Having a joey in care not only takes time with chores such as feeding (sometimes up to eight times a day - through both the day and night) but also cleaning, food preparation and collecting natural food for older joeys. Most of our wildlife carers have more than one joey in care, which also greatly increases their workload and most volunteer wildlife carers work full time in other areas of employment.

#### Where can I send pouches?

Completed pouches can be posted to Wildcare for distribution.

Please include a note with your name and postal address, so that we can let you know the pouches have arrived.

#### Our postal address is:

Wildcare Australia Inc PO Box 2379 Nerang, Queensland, 4211 Australia

#### Sending via courier:

Wildcare Australia (Att: Karen) c/- First Mortgage Investments 11 West Street Burleigh Heads, Queensland, 4220 If you would like a printed copy of these instructions posted to you, please feel free to email <a href="mailto:karen@wildcare.org.au">karen@wildcare.org.au</a> and we will post you a copy. (Australia only)

We are happy to provide a printed copy even if you are making pouches for another wildlife group!

If you are sending a parcel or box of pouches within Australia, it may be more economical to use a parcel delivery service such as Sendle where the parcel is collected from you and delivered to us directly. Their parcel prices are often cheaper than Australia Post. <a href="https://www.sendle.com/">https://www.sendle.com/</a>

If you are sending from overseas, please investigate the shipping charges before sewing, as international postal charges to Australia are very high. We cannot assist with shipping costs.

#### **Needing more information?**

If you have any questions about making joey pouches, please don't hesitate to contact me. I am never too busy to talk sewing!

Karen Scott Email - <u>Karen@wildcare.org.au</u> Mobile 0400 165 462

#### Thank you!

On behalf of all of our volunteer wildlife carers, thank you for taking an interest in caring for our precious little wildlife!



#### Pouch A - Pouch with French seams (straight sides and bottom)

Note: We have used a contrasting thread colour in the diagrams to make it easier to see. Most sewers would pick a thread colour to match the fabric.

#### Pouch A - Step 1 - Cut your fabric

#### Cut your fabric as per the measurements on the previous pages.

It is much easier to fold your fabric with right sides (the pretty sides) together. That will give you a nice folded edge along the bottom that won't need to be stitched.

The pouch in the diagram is a medium-sized pouch cut around 20cm wide x 25cm deep on the fold (so ~50cm in total length).

You will achieve a much nicer finish if your fabric is flat before cutting. If it isn't, give it a quick iron before cutting.

Fold

#### Pouch A - Step 2 - Hem the top

Fold the top edges over ~1cm (¼") and then fold again. Give the hem a good press with a hot iron to hold in place. Fold towards the wrong side of the fabric.

#### Stitch along the edge of the hem to secure.

Make sure that you use a reverse stitch at the start and finish.





#### Pouch A - Step 3 - Stitch the sides

#### With the right sides of the fabric together, fold in half.

Make sure that the folded hems at the top match up evenly. You can pin the fabric together to keep it in place before sewing if required, but if the fabric is nicely ironed, this generally isn't required for smaller pouches. For the larger sizes, pinning is recommended.

Using a ~1cm (½") seam allowance, stitch down each side of the pouch. Make sure that you do a reverse stitch at the start and finish to secure the seam.





#### Pouch A - Step 4 - Trim the sides

Using a ruler, cutting mat and rotary cutter, trim the seam allowance to around 0.5cm (1/8"). If you don't have a rotary cutter, use scissors. You need to trim the seam on both sides.

If you don't have a fold on the bottom and have a stitched seam on the bottom as well, you will need to trim that also. Trimming the edge helps to make the next step easier and creates a neat 'french seam'.







#### Pouch A - Step 5 - Turn and press

Turn the pouch out so that the right sides are facing outwards.

Using a pointed object (e.g. chop stick), poke the corners out to make them sit square.

Give the pouch a good press with an iron and make sure that the seams are flush on the sides.





#### Pouch A - Step 6 - Final seam

To finish the French seam, sew a ~1cm (¼") seam long each side.

Doing this will fully encase the raw edge of the inside seam. If you have ironed the pouch, you will be able to feel the edge of the seam inside and use that as a guide to ensure that the seam is fully enclosed. Once stitched, the inside of the pouch should have no raw/exposed edges.











### Pouch B - Pouch with French seams (straight sides and curved bottom)

#### Pouch B - Step 1 - Cut your fabric

Refer to the instructions for Pouch A above.

It is easier to cut the fabric in a rectangular shape to start with.

#### Pouch B - Step 2 - Hem the top

Refer to the instructions for Pouch A above.

#### Pouch B - Step 3 - Create the curved bottom

#### Draw a curve towards the bottom of the pouch.

Use a plate as a guide to create an even, neat curve.





#### Pouch B - Step 4 - Sew the side and bottom seam

Using a ~1cm (½") seam allowance, sew down the right side of the pouch and then follow your drawn line around the curve and then back up the left side of the pouch.

If you aren't confident sewing curves, slow down your machine.
This makes it easier to stay on the drawn line.
Sewing curves this way (before cutting out), gives you a little more control to help guide the fabric as you stitch around the curve.
You can see I went off track a little bit on the left hand side - but near enough is close enough!

Make sure that you use a reverse stitch when you start and finish.





#### Pouch B - Step 5 - Trim your edges

Trim your side seams down to around 0.5cm (1/8"). Refer to Step 4 in Pouch A instructions.

Trim the curved bottom with scissors to the same measurements.



#### Pouch B - Step 6 - Turn and press

Turn the pouch out so that the right sides are facing outwards.

Using a pointed object (e.g. chop stick) to push out the seam around the curved bottom to make it sit correctly.

Give the pouch a good press with an iron and make sure that the seams are flush on the sides.



#### Pouch B - Step 7 - Final seam

To finish the French seam, sew a ~1cm (¼") seam long each side.

Doing this will fully encase the raw edge of the inside seam.

If you have ironed the pouch, you will be able to feel the edge of the seam inside and use that as a guide to ensure that the seam is fully enclosed. Once stitched, the inside of the pouch should have no raw/exposed edges.



### And you're done!!!



#### Pouch C - Pouch with overlocked seams (straight sides and bottom)

Note – this is our least preferred method as the overlocked edges can still cause a hazard for small joeys that may get their claws caught.

Even with the overlocked edges on the outside of the pouch, joeys offer squirm their way out of the pouch and into the next layer of pouches.

#### Pouch C - Step 1 - Cut your fabric

Refer to the instructions for Pouch A above.



#### Pouch C - Step 2 - Stitch the side seams

#### With the wrong sides of the fabric together, fold in half.

You can pin the fabric together to keep it in place before sewing if required but if the fabric is nicely ironed, this generally isn't required for smaller pouches. For the larger sizes, pinning is recommended.

Using a ~1cm (½") seam allowance, stitch down each side of the pouch. Make sure that you do a reverse stitch at the start and finish to secure the seam.



#### Pouch C - Step 3 – Overlock the seams

Use an overlocker (serger) to overlock along each edge. Trim a little off the seam allowance as you overlock to achieve a neat finish.

Leave a small section of thread tails at the start and finish of the overlocked edge to prevent it unraveling (circled in red).

To ensure that the pouches last longer, we prefer that the edges are both sewn <u>and</u> overlocked.







#### Pouch C - Step 4 - Turn inside out and hem the top

Turn the pouch inside out and fold the top of the pouch over  $^{\sim}1$ cm ( $%^{\prime\prime}$ ) and then fold again.

Give the hem a good press with a hot iron to hold in place.

You need to fold towards the wrong side of the fabric.

#### Stitch along the edge of the hem to secure.

This will secure the open overlocked tails at the top of the pouch in the side seams. Make sure that you use a reverse stitch at the start and finish.





#### Pouch C - Step 5 – Secure the bottom overlocked tails

On the bottom of each side, fold the overlocked tail threads up and using your sewing machine, sew a few stitches back and forth to secure the threads. This will prevent them from unraveling.



### And you're done!!!





### Pouch D – Double pouch – Fleece outer & fixed inner pouch (folded at top)

#### Pouch D - Step 1 - Cut your fabric

Double pouches are made from an 'outer pouch' and a pouch insert, which are sewn together. Tracksuit fleece is ideal for these pouches. It washes well and 'breathes' more than other synthetic fleeces to prevent the joey overheating.

Cut your fleece fabric as per the measurements on the previous pages. Grey fleece is used in the photo example.

Cut your pouch insert to the width as the fleece pouch BUT MAKE THE LENGTH AROUND ~7CM (3") LONGER.

Pink flannelette is used in the photo example.

It is much easier to fold your fabric with right sides (the pretty side) together. That will give you a nice folded edge along the bottom that won't need to be stitched. You will achieve a much nicer finish if your fabric is flat before cutting. If it isn't, give it a quick iron before cutting.



#### Pouch D - Step 2 - Stitch the side seams

#### Place the fabric with right sides together and the fold at the bottom.

You can pin the fabric together to keep it in place before sewing if required but if the fabric is nicely ironed, this generally isn't required for smaller pouches. For the larger sizes, pinning is recommended.

Using a ~1cm ( $\frac{1}{4}$ ") seam allowance, stitch down each side of both the outer and inner pouches.

Make sure that you do a reverse stitch at the start and finish to secure the seam.



#### Pouch D - Step 3 - Overlock edges

#### Overlock both sides of each pouch.

Trim a small amount off the seam allowance as you overlock.

If you don't have an overlocker, you can use the overcast stitch on your sewing machine. Refer to your machine's manual.







#### Pouch D - Step 4 - Turn your pouches

Turn your fleece pouch the right way out.

Exposed seams will be on the inside.

#### Leave the pouch insert inside-out.

Exposed seams will be on the outside.

Make sure that the pouch insert is sitting evenly in the fleece pouch and that the inside bottom corners meet up.





#### Pouch D - Step 5 - Fold the top of the pouch insert

Fold the pouch insert over the top of the fleece pouch.

Press the pouch with a hot iron making sure that the fleece is sitting neatly underneath the crease. It is important that the fleece is sitting correctly. If it isn't, the next step will not work correctly.



#### Pouch D - Step 6 - Stitch the pouch insert to the outer fleece pouch

## Run a line of stitching about $^{\circ}$ 0.7cm ( $\frac{1}{2}$ ") under the fold at the top.

This top stitch should secure the pouch insert to the fleece, if they are lined up correctly.

If your sewing machine has the ability to remove the cover to expose the 'free-arm', use this feature as it will make stitching much easier.





#### Pouch D - Step 7 - Fold and stitch the lower part of the pouch insert

Tuck the bottom section of the pouch insert up underneath ensuring that it is evenly spaced in line with the top stitching that you just sewed.

Press into place with the iron.



Run another row of top-stitching along the bottom edge of the fold.



## And you're done!!!



### Pouch E – Double pouch – Fleece outer and fixed pouch insert (flush top)

#### Pouch E - Step 1 - Cut your fabric

Double pouches are made from an 'outer pouch' and a pouch insert, which are sewn together. Tracksuit fleece is ideal for these pouches. It washes well and 'breathes' more than other synthetic fleeces to prevent the joey overheating.

Cut both your fleece fabric and the pouch insert as per the measurements on the previous pages.

Note – both outer and insert fabrics will be the same size. Grey fleece used in the photo example is the outer pouch. Pink flannelette used is the pouch insert.

It is much easier to fold your fabric with right sides (the pretty side) together. That will give you a nice folded edge along the bottom that won't need to be stitched. You will achieve a much nicer finish if your fabric is flat before cutting. If it isn't, give it a quick iron before cutting.



#### Pouch E - Step 2 - Stitch the side seams

#### Place the fabric with right sides together and the fold at the bottom.

You can pin the fabric together to keep it in place before sewing if required but if the fabric is nicely ironed, this generally isn't required for smaller pouches. For the larger sizes, pinning is recommended.

Using a ~1cm ( $\frac{1}{4}$ ") seam allowance, stitch down each side of both the outer pouch and pouch insert.

Make sure that you do a reverse stitch at the start and finish to secure the seam.



#### Pouch E - Step 3 - Overlock edges

#### Overlock both sides of each pouch.

Trim a small amount off the seam allowance as you go.

If you don't have an overlocker, you can use the overcast stitch on your sewing machine. Refer to your machine's manual.





#### Pouch E - Step 4 - Turn your pouches

Turn your pouch insert the right way out.

Exposed seams will be on the inside.

Leave the outer fleece pouch inside out.

Exposed seams will be on the outside.

Make sure that the side seams of each pouch meet.

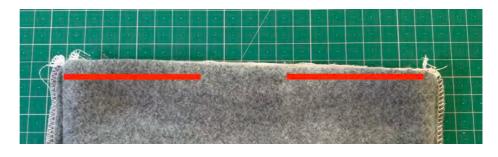
Push the pouch insert down into the fleece pouch making sure that the pouch insert is sitting evenly in the fleece pouch and that the inside bottom corners meet up. If done correctly, the top edges should be flush as per the photo below.





Pouch E - Step 5 - Stitch the pouches together

Pin the pouches together, making sure that the side seams meet.



Run a line of stitching around 1cm (¼") from the top edge. The stitching will run all the way around the pouch leaving a gap of around 2" for turning.





#### Pouch E - Step 6 - Turn pouches out and press

Using the 2" opening in the stitching, turn the pouches out the right way.

Use a pointed object (e.g. chop stick), to push the corners of both the pouch insert and fleece pouch out so that they are square.

You will end up with the opening in the pouch, which will be stitched closed in the next step.



#### Give both pouches a quick press with the iron.

It is worthwhile at this point to press the pouch insert neatly above the opening so that it is nice and straight.



Push the pouch insert into the fleece pouch and push the corners down so that they meet. This should result in the top of the pouches being flush.

Use either pins or Wonder Clips to keep the opening in place before stitching in the next step.



#### Pouch E - Step 7 - Top stitch

Top stitch around the top edge of the pouch about 0.5cm (3/8") from the top Make sure that use a reverse stitch at the start/finish to secure the stitching. This should close the opening that you had pinned.



You can run another additional row of stitching around the top.



## And you're done!!!





#### And here are some of our joeys!



#### Oliver the koala joey

Oliver was found on his own at the base of a tree with no sign of his mother. He was extremely dehydrated but with specialised veterinary care and a dedicated wildlife carer, he gained strength quickly. Here he is snuggled up in several layers of pouches.

#### Miffy the Long-nosed Bandicoot

Miffy was orphaned when her mother was hit by a car.

She was so tiny when she came into care, her eyes hadn't even opened yet. Miffy was hand-raised and released back to a suitable bush habitat.



#### **Chrissie the Red-legged Pademelon**

Chrissie was orphaned as a result of road trauma but received the loving care of one of our volunteer wildlife carers who specialises in raising pademelon joeys. She was raised with several other pademelons and was released back to the wild.



## **Easy Reference Sheet**

## Browse Harvesting for Wildlife Carers

The collection of foliage (also commonly referred to as 'browse' or 'leaf') plays an essential part in the rehabilitation of many of our native wildlife.

In order for the animals in your care to gain the most nutritional value from what you collect, here are a few guidelines.

#### A few tips on leaf collection:

- Never pick leaf close to a road. Exhaust fumes and dust from roads settle on and are absorbed by leaves. Always walk 20-30m into the bush.
- Always use a sharp pair of secateurs when cutting branches (do not pull/rip branches). This will encourage regrowth and ensure the possibility of future harvesting.
- Cut branches at a 45° angle to encourage new growth.
- Cut branches with both new and old growth. Do not just cut the fresh tip section of the branch. All species will eat some older leaf and, at certain times, they will prefer the older leaf to the newer tip.
- Species such as possums, will relish the entire branch including the leaves, buds, flowers, fruits, seeds, and bark (for chewing and stripping).
- Harvest sustainably on a rotational basis, without jeopardising native regrowth itself (as it will one day be habitat
  for more animals). Only take the tops off regrowth (especially eucalypts) when they are growing underneath
  power lines or along easements, where they get regularly cleared by Council or Energex and will not be given the
  chance to mature into tall trees anyway. In areas where regrowth is trying to establish, only take small sections
  of side branches, so that the tree can continue to grow in a healthy form.
- Do not cut browse if plants and grasses in the area are wilting/dying. This may indicate that poisons have recently been sprayed in the area. Pay attention to your favourite leaf-cutting locations. If you notice Council working in the area, there is a chance that they could be spraying toxic substances to control weeds.
- Ensure that you are aware of plants that may be toxic to some wildlife. Toxic plants include: *Allamanda* spp., Agapanthus, Oleander, Lantana, Mother-of-Millions, plants in the family Araceae including *Alocasia* spp, *Dieffenbachia* spp., *Monstera* spp., *Philodendron* spp., Poinsettia, the nightshades, privets, lilies, daturas, Dutchman's pipe, Camphor Laurel and *Cestrum* spp. (Source: Wilson, Sally Some Plants are Poisonous. Reed, 1997. Toxic Plants and Animals: A Guide for Australia. Queensland Museum, 1987)
- To transport the branches home lay them on a clean sheet that is used for this purpose only. Possums and koalas particularly have an acute sense of smell and they always smell their food before taking a bite. If you put the branches on the car seat where your dog sat last week, chances are they will not touch it, because it smells of a predator.
- Try to cut early in the morning or late in the afternoon; avoid cutting in the middle of the day particularly during hot weather.
- In hot weather (if your car will accommodate it), place a bucket containing a small amount of water in your car so that you can place the branches straight into water. This will ensure that the browse stays fresh. The floor of your car between the back of the front seat and the back seat is a good place to wedge a bucket.
- Once you arrive home, arrange the branches in buckets filled with fresh water (roughly one quarter to one third of the depth of the bucket) and store it in a cool position out of the sun.
- Buckets that are used for browse should be kept solely for this purpose and marked LEAF ONLY to prevent them from being used by someone else in the household (usually the man in the house!)



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#### **Easy Reference Sheet**

Browse Harvesting for Wildlife Carers (continued)

- Ideally leaf should be picked fresh daily but in cooler weather it is sometimes possible to pick leaf for two days at a time. It is believed that toxin levels in many species increase as the leaf ages after being cut and you will find that beyond two to three days not all of your leaf tip will be eaten. Some species of leaf tends to keep fresher than others.
- When cutting and carrying leaf, make sure that you do not have insect repellent or strong perfume or moisturiser on your skin, as the smell may be transferred to the leaf. This could be toxic to your animals or at the very least, your animals will be unlikely to eat it.
- Do not cut too much leaf, as this is a waste of a precious resource.

#### Some safety considerations:-

There are some health and safety aspects that should be considered when cutting browse:-

- Always wear long pants and well-covered shoes when walking through bush
- If you will be walking a little distance from your car (and hence your mobile phone) take your phone with you
- If cutting in a remote area, always make sure that someone knows where you are
- Place a carabiner clip on your key ring and secure it to your pants to prevent losing your keys in the bush (or secure onto a lanyard around your neck)
- Keep a snake bite kit in your car
- Be aware that walking in the bush will expose you to creepy crawlies such as ticks and leeches. There are also a lot of bugs that live in and on the branches these are great for species such as gliders to nibble on but not so great when they nibble on you! Some have the potential to cause side-effects so always keep leaf well away from your face and neck.

#### Where can I cut leaf?

- You cannot cut browse from National Parks or conservation areas
- Under Council laws, it is illegal to harm or remove Council vegetation. Some wildlife carers have been caught doing this by Council workers and they could potentially face penalties.
- Be respectful do not cut from areas that are undergoing revegetation. Land care community volunteers spend hundreds of hours (and a lot of money) rejuvenating these areas. The harvesting of saplings causes irreversible damage to the long-term structure of the tree, which often results in them having to be removed and replaced.
- Check with your local Council as to whether they have 'fodder farms' specifically for wildlife carers. Many of the Councils in the South-east Queensland region have provided such facilities.

#### **Browse Harvesting Equipment**

If you are cutting a reasonable quantity of leaf, invest in a good pair of secateurs (they will last longer and you will generally be more comfortable). If you have trouble cutting strong branches, purchase a pair of secateurs with a 'ratchet' mechanism.

If you are cutting longer lengths of leaf (for pre-release stage and koalas) you may want to consider investing in a pair of ratchet-style telescopic cutters and/or extendable tree loppers.

References: Wildlife Habitat and Native Plant Identification (Lyons, R – Wildcare Australia Inc)

Possums of South-east Queensland (Hanger, E – Wildcare Australia Inc)
Contributors: Rachel Lyons, Eleanor Hanger and Karen Scott



# **Rescue Examination Record and Progress Chart - Possums**

Transferred

Date



RESCUE DETAILS																
Carers Name												Ca	rers	Telephone		
Species													Coc			
Age		Ba	by		Пл	ıven	ile 📗	Sub	-adult		Ac	dult Re	escu	e Date		
Sex	=		ale		=	ema								e Time		am/pm
- Con					<u> </u>											α, μ
CALLED DETAILS																
CALLER DETAILS		_														
Callers Name		4														
Callers Address																
Callers Telephone		4														
Exact Rescue Location	1	1														
Animal History																
eg road trauma/cat atta	ck															
INITIAL ASSESSMENT																
Demeanour		Τ	П	Brigh	t	П	Alert	Г	Depres	sed	Т	Moribund	Т	Distressed	ТГ	Other
General body condition	n	t	Ħ	Excel		┢	Good	Ħ	] Fair	564	F	Poor	┢	Very poor	╅	Emaciated
Fur condition		1	Ħ	Excel		┢	Good	Ħ	Fair		F	Poor	╁╞	Very poor		
Breathing		+	Ħ	Norm		H	Rapid	H	Slow		F	Laboured	╁늗	Open-mouthed	Т	Noisy
Mobility		+	Ħ	Norm		┢	Other -	_	_ 310W		_	Labourca		j Open-moutneu		] 14013y
Obvious injuries,		+	<u> </u>	NOITI	ıaı	<u> </u>	J Other -									
discharges or condition	nc															
Result of initial	7113	+	$\overline{}$	Imme	diata	ou+h	nanasia					Votorinary	accic	tance required		
assessment		-	+				ldlldSld				┾	Immediate				
		-	$\perp$		ires ca	re ,		,	ا د داد					ase		
Coordinator contacte	a		Ш	Yes -	on		/	(	date) at	[		am/pm				
THOROUGH PHYSICAL	ASSE	ESS	SME	NT												
Weight																
HEAD																
Symmetry				Norn	nal		Other -									
Eyes				Norn	nal		Other -									
Ears				Norn	nal		Other -									
Nostrils				Norn	nal		Other -									
Mouth				Norn	nal	E	Other -									
LIMBS																
Right fore limb and pa	w			Norn	nal		Other -									
Right rear limb and pa	w			Norn	nal		Other -									
Left fore limb and paw			T	Norn	nal	F	Other -									
Left rear limb and paw			Ī	Norn	nal	ĪĒ	Other -									
BODY							_									
Fur condition				Exce	lent		Good		Fair			Poor		Very Poor		
Body Condition			Ī	Exce		Ħ	Good		Fair		Ī	Poor	╅	Very Poor	ТГ	Emaciated
Cloaca/pouch/scrotun	n		F	Norn		Ħ	=	of r	ouch you	ıng	Ē	Other -		, ,		
Tail condition	-		F	Exce		Ħ	Good	1 .0 .	Fair	B	F	Poor		Very Poor		
Abdominal palpation			F	Norn		F	Other -	- 1					<u>                                   </u>	1 ,		
Mucous membrane			F	Norn		Ħ	Other -									
General findings or				110111	101		_ Ctrici									
comments																
comments																
VETERINARY EXAMIN	ATIO	V							-							
Date				/	/ :	20				Time	)					am/pm
Veterinarian Name			_			_			_							
Diagnostic Aids			L	X-ray	'S	L	Blood		Fae	ecal		U Other -				
Veterinary Diagnosis:																
Veterinary Prognosis:																
Treatment/Managem	ent															
FINAL OUTCOME																
Released			Da	te	/		/ 20 At	(loc	ation) -							
Euthanased		$\dashv$	Da		<del>,</del>				me) -							

To (name) -

# Animal Progress Record



DATE	DETAILS (weight, comments, medications, treatments etc.)

## Wildcare Australia Inc.

PO Box 2379, Nerang Mail Centre Qld 4211 Wildlife emergencies: 07 5527 2444 secretary@wildcare.org.au www.wildcare.org.au

# **Rescue Examination Record** and Progress Chart - Gliders

Transferred

Date



RESCUE DETAILS															
Carers Name											Ca	arers	i		
Species											ID	Cod	le		
Age	Пв	aby		Juve	enile	. ∏ Su	ıb-a	dult	$\Box$	Adu	lt R	escu	e Date		
Sex		/lale		Fem		_=	nkno						e Time		am/pm
- Con	<u> </u>					<u> </u>									α, μ
CALLED DETAILS															
CALLER DETAILS															
Callers Name															
Callers Address															
Callers Telephone															
Exact Rescue Location	1														
Animal History															
eg road trauma/cat atta	ck														
INITIAL ASSESSMENT															
Demeanour		ТГ	Bright		Т	Alert	Г	Depres	haz	Т	Moribund	Т	Distressed		Other
General body condition	nn .	╁╞	Excelle	nt	H	Good	┝	] Fair	sscu	H	Poor	╁┝	Very poor	╅┾	Emaciated
Fur condition	<i>,</i> ,,,	<del>├</del>	Excelle		F	Good	H	Fair		F	Poor	╁┾	Very poor		Linaciated
		╁╞	Norma		H		┢	Slow		┢	Laboured	╁╞	1		l Naiou
Breathing		<del>├</del>			⊨	Rapid Other -		_ 310W			Laboured		Open-mouthed		Noisy
Mobility		┞┕	Norma	31	L	Other -									
Obvious injuries,															
discharges or condition	ns	╁┲	1								1		kanan manuturah		
Result of initial		F	Immed			anasia				Ł			tance required		
assessment		╀	Requir		re .						] Immediate		ase		
Coordinator contacte	d	<u> </u> L	Yes - o	n		/	(	date) a	t		am/pm				
THOROUGH PHYSICAL	L ASSE	SSM	ENT												
Weight															
HEAD		•													
Symmetry			Norm	al		Other -									
Eyes		ΤĒ	Norm	al	T	Other -									
Ears		ΤĒ	Norm	al	Т	Other -									
Nostrils		ΤĒ	Norm	al	Ī	Other -									
Mouth		ΤĒ	Norm	al	Ī	Other -									
LIMBS															
Right fore limb and pa	W		Norm	al		Other -									
Right rear limb and pa		╅	Norm	al	Ē	Other -									
Left fore limb and paw		ΤĒ	Norm	al	Ħ	Other -									
Left rear limb and pay		ΤĒ	Norm		F	Other -									
BODY	-			<u></u>		• • • • • • • • • • • • • • • • • • • •									
Fur condition		ТГ	Excell	ent	Г	Good		Fair			Poor	Г	Very Poor		
Body Condition		╁	Excell		F	Good	- H	Fair		F	Poor	╁┢	Very Poor	ТГ	Emaciated
Cloaca/pouch/scrotun	n	╁┾	Norm		⊨	Evidence	of r		ιιnσ	누	Other -		1 10.71001		
Tail condition		╁	Excell		H	Good	, U, L	Fair	wiiğ	F	Poor		Very Poor		
Abdominal palpation		╁	Norm		H	Other -				_	1 1 001		j very roor		
Mucous membrane		╁╞	Norm		H	Other -									
General findings or		+-	_ NOITH	aı		Other -									
comments															
comments															
VETERINARY EXAMIN	ATION														
Date			/	/ 2	20				Time	)					am/pm
Veterinarian Name		1_	_												
Diagnostic Aids		<u> </u>	X-rays	;		Blood		Fae	ecal		U Other -				
Veterinary Diagnosis:															
Veterinary Prognosis:		L													
Treatment/Managem	ent														
			·												
FINAL OUTCOME															
Released		D	ate	/		′ 20 At	(loc	ation) -							
Euthanased		_	ate	/				me) -							

To (name) -

# Animal Progress Record



DATE	DETAILS (weight, comments, medications, treatments etc.)

## Wildcare Australia Inc.

PO Box 2379, Nerang Mail Centre Qld 4211 Wildlife emergencies: 07 5527 2444 secretary@wildcare.org.au www.wildcare.org.au

# Rescue Examination Record and Progress Chart - Macropods

Transferred

Date

/ 20

To (name) -



RESCUE DETAILS															
Carers Name											Caro	·c T	elephone		
Species											ID Co		elephone		
•	Пр	a bu		1 1	enile	П с	h a	JI+	lult				)ata		
Age		aby		Fen		Su	b-a	auit   Ad	luit		Resci				2 /
Sex	IV	lale		j Fem	iaie						Resci	ıe ı	ime		am/pm
CALLER DETAILS															
Callers Name															
Callers Address															
Callers Telephone															
<b>Exact Rescue Location</b>															
Animal History															
eg road trauma/cat attac	k														
INITIAL ASSESSMENT															
Demeanour			Bright			Alert	_	Depressed		Moribu	ınd	$\overline{}$	Distressed	_	Other
General body conditio	_	┾	Excelle	nt	H	Good	┢	Fair	눋	•	illu	+	Very poor	┾	
Fur (or skin) condition		┝	Excelle		늗	Good	-	Fair	늗	Poor Poor		+	Very poor		Emaciated
		┾	Norma		┾		┢		┢		امما	H		_	l Nata.
Breathing		누		-		Rapid		Slow		Labour	ea	Ш	Open-mouthed		Noisy
Mobility		L	Norma	II		Other -									
Obvious injuries,															
discharges or conditio	ns	_	٠.	ı				1	_	1					
Result of initial		누	Immed			anasia			<u> </u>				ance required		
assessment		_	Requir		re ,					Immed		elea	ise		
Coordinator contacted	l	L	Yes - o	n		/	((	date) at		am	ı/pm				
THOROUGH PHYSICAL	ASSES	SM	ENT												
Weight															
HEAD															
Symmetry			Norma	al		Other -									
Eyes		ĪĒ	Norma	al		Other -									
Ears			Norma	al		Other -									
Nostrils		ΙĒ	Norma	al		Other -									
Mouth		ΙĒ	Norma	al	Ī	Other -									
LIMBS															
Right arm and paw			Norma	al		Other -									
Right leg and paw		ΙĒ	Norma		Ī	Other -									
Left arm and paw		ΙĒ	Norma		Ħ	Other -									
Left leg and paw		ΙĒ	Norma		Ī	Other -									
BODY		<u> </u>				•									
Fur condition		ΙГ	Excelle	nt		Good	1	Fair	П	Poor		$\Box$	Very Poor		
Body Condition		ΤĦ	Excelle		$\vdash$	Good	+ 1	Fair	╁	Poor		Ħ	Very Poor	Г	Emaciated
Cloaca/pouch/scrotum	1	╁╴	Norma		$\vdash$		of n	ouch young	十	Other -	<u>_</u>	<u> </u>		_	,
Tail condition		╁╞	Excelle		$\vdash$	Good	P	Fair	F	Poor	- 1		Very Poor		
Abdominal palpation		╁╞	Norma		$\vdash$	Other -				,		<u> </u>			
Mucous membrane		╁╞	Norma		F	Other -									
General findings or		┞┖		<b>41</b>		Other									
comments															
Comments		-													
VETERINARY EXAMINA	ATION							1			1				,
Date		-	/	/ 2	20			Time	!						am/pm
Veterinarian Name		<b>├</b>	7	1		DI :	,	<u> </u>	- 1						
Diagnostic Aids		ļL	」X-rays			Blood		Faecal		☐ Oth	ner -				
Veterinary Diagnosis:															
Veterinary Prognosis:		_													
Treatment/Manageme	ent														
FINAL OUTCOME															
Released		D	ate	/		'20 At	(loc	ation) -							
Futhanased		_	ate	,				mel -							

## **Animal Progress Record**



DETAILS (weight, comments, medications, treatments etc.)

## Wildcare Australia Inc.

PO Box 2379, Nerang Mail Centre Qld 4211 Wildlife emergencies: 07 5527 2444 secretary@wildcare.org.au www.wildcare.org.au

# Rescue Examination Record and Progress Chart – Small Mammals

Transferred

Date



RESCUE DETAILS															
Carers Name											Care	ers	Telephone		
Species											ID C				
Age	Пва	aby		Juve	eni	le 🔲 :	Sub-	-adult	l Ad	du	lt Res	cue	e Date		
Sex	=	lale		Fem									e Time		am/pm
						-					1				, p
CALLED DETAILS															
CALLER DETAILS															
Callers Name															
Callers Address															
Callers Telephone															
Exact Rescue Location															
Animal History															
eg road trauma/cat attac	:K														
INITIAL ASSESSMENT															
Demeanour		Г	Bright			Alert	Т	Depressed	Г	Т	Moribund	Γ	Distressed	Т	Other
General body condition	n	┢	Excellent	T		Good	F	Fair	F	=	Poor	F	Very poor	┢	Emaciated
Fur condition		┢	Excellent			Good	┢	Fair	F	=	Poor	〒	Very poor		j zmadiatea
Breathing		┢	Normal	1		Rapid	F	Slow	F	╪	Laboured	F	Open-mouthed	Г	Noisy
Mobility		┢	Normal		=	Other -		3.011			Labourea	_	open mounicu		j 110.5y
Obvious injuries,		-	_ ivoimai			Other									
discharges or conditio	nc														
Result of initial	113	$\vdash$	Immediat	ום בו	th	anacia				٦,	Veterinary as	cic	tance required		
assessment		┢	Requires			anasia			논	_	Immediate re				
Coordinator contacted	1	┝	Yes - on	carc	/		- 1	date) at			am/pm	icc	130		
Coordinator Contacted			] 163 - 011		/	/		uatej at			aiii/piii				
THOROUGH PHYSICAL	ASSES	SM	ENT												
Weight															
HEAD															
Symmetry			Normal			Other -									
Eyes		Į E	Normal			Other -									
Ears			Normal			Other -									
Nostrils			Normal			Other -									
Mouth			Normal	] [		Other -									
LIMBS															
Right fore limb and pa	w		Normal			Other -									
Right rear limb and pa	W	ÌΕ	Normal	[		Other -									
Left fore limb and paw	,		Normal			Other -									
Left rear limb and paw	,		Normal			Other -									
BODY			<del>-</del>												
Fur condition			Excellent	: [[		Good		Fair		1	Poor		Very Poor		
Body Condition		ĪĒ	Excellent			Good	Ti	Fair	Ē	ī	Poor	Ī	Very Poor		Emaciated
Cloaca/pouch/scrotum	1	ΙĒ	Normal	Ti			of p	ouch young	Ē	=-	Other -		,		
Tail condition		ΤĒ	Excellent	<u> </u>	Ħ	Good	Τí	Fair	ī	=	Poor	Г	Very Poor		
Abdominal palpation		ΤĒ	Normal	┪	Ħ	Other -			_		<u> </u>	_	,·		
Mucous membrane		ΤĒ	Normal	Ì		Other -									
General findings or		T -													
comments															
		-													
VETERIAL BY EVALUATION															
VETERINARY EXAMINA	ATION			/ 20				T							,
Date		1	/ /	/ 20				Time							am/pm
Veterinarian Name		<u> </u>	٦	1 1					-		<b>–</b>				
Diagnostic Aids		╙	X-rays			Blood		Faecal		L	Other -				
Veterinary Diagnosis:		1													
Veterinary Prognosis:															
Treatment/Managem	ent														
FINAL OUTCOME															
Released		D	ate /		/	20 At	(loc	ation) -							
D Futbanacad		_	ato /				lna								

To (name) -

## **Animal Progress Record**



DETAILS (weight, comments, medications, treatments etc.)

## Wildcare Australia Inc.

PO Box 2379, Nerang Mail Centre Qld 4211 Wildlife emergencies: 07 5527 2444 secretary@wildcare.org.au www.wildcare.org.au

# **Rescue Examination Record** and Progress Chart - Koalas

Transferred

Date

/ 20

To (name) -



RESCUE DETAILS															
Carers Name											Τ,	Care	re		
Species												ID C			
•	Пр	a hv		П.	uven	ا ما:	٦ ,	ıb adıılt		٨٨					
Age	=	aby 1ale		=-	emal		ა	ıb-adult	ЦШ	Au			ue Date ue Time		am/nm
Sex	<u></u> □ №	iaie		r	етта	е						kesc	ue rime		am/pm
CALLER DETAILS		1													
Callers Name															
Callers Address															
Callers Telephone															
Exact Rescue Location															
Animal History															
eg road trauma/cat attac	k														
															_
INITIAL ASSESSMENT															
Demeanour		Г	Bright		Т	Alert	ТГ	Depres	sed	$\overline{\Box}$	Moribund	Г	Distressed	ТГ	Other
General body conditio	n	┢╞	Excell		┢	Good	╁┾	Fair	JCu	Ħ	Poor	┢	Very poor	╁┾	Emaciated
Fur condition	<u> </u>	┢	Excell		┢	Good	╁	] Fair		Ħ	Poor	┢	Very poor		Linaciatea
Breathing		┝	Norm		╁╞	Rapid	╁	Slow		ᅢ	Laboured	┝	Open-mouthed		Noisy
Mobility		┢╞	Norm		H	Other	_	] 310W		ш	Laboureu	<u> </u>	j Open-moutheu	1 -	j NOISY
Obvious injuries,		┞┕	NOITH	aı		Other									
discharges or condition	nc														
Result of initial	113	┢┲	Immo	diata	outh	anasia				$\overline{\Box}$	Votorinary	occic	tance required		
assessment		┝	Regui			aiiasia				+	Immediate				
		<del>├</del>			/ re			data) at		Ш		reiea	ise		
Coordinator contacted	<u> </u>	L	Yes - 0	on		/	(	date) at	<u> </u>		am/pm				
THOROUGH PHYSICAL	ASSES	SM	ENT												
Weight															
HEAD															
Symmetry			Norm	ıal		Other	•								
Eyes			Norm	ıal		Other -	-								
Ears			Norm	ıal		Other-	-								
Nostrils			Norm	ıal		Other	-								
Mouth			Norm	ıal		Other	•								
LIMBS															
Right fore limb and pay	N		Norm	ıal		Other -	-								
Right rear limb and pay	N		Norm	ıal		Other	-								
Left fore limb and paw			Norm	ıal		Other	-								
Left rear limb and paw			Norm			Other									
BODY															
Fur condition			Excel	lent		Good		Fair			Poor		Very Poor		
Body Condition		ΙĒ	Excel			Good		Fair			Poor		Very Poor		Emaciated
Cloaca/pouch/scrotum		ΤĒ	Norm	ıal		Eviden	ce of p	ouch you	ung		Other -				
Tail condition		ΙĒ	Excel	lent	ĪĒ	Good	Ti	Fair			Poor		Very Poor		
Abdominal palpation		ΙĒ	Norm			Other -	-						-		
Mucous membrane		Ī	Norm	ıal		Other -									
General findings or			_												
comments															
VETERINARY EXAMINA	MOLTA														
	ATION	T	,	, ,	20				T:						am/nm
Date Veterinarian Name		1	/	/ .	20				Time						am/pm
		+-	7 v "			Blood		Пган	ncal	I	Othor				
Diagnostic Aids		╀┺	_ X-ray	3	L	ыооа		Fae	cdl		U Other -				
Veterinary Diagnosis:		1													
Veterinary Prognosis:		<del>                                     </del>													
Treatment/Manageme	ent	<u> </u>													
FINAL OUTCOME															
Released		D	ate	/				ation) -						_	
☐ Futhanased		ח	ate	/		/ 20 F	lv (na	me) -							

## **Animal Progress Record**



DETAILS (weight, comments, medications, treatments etc.)

## Wildcare Australia Inc.

PO Box 2379, Nerang Mail Centre Qld 4211 Wildlife emergencies: 07 5527 2444 secretary@wildcare.org.au www.wildcare.org.au

# **Rescue Examination Record and Progress Chart - Echidnas**



RESCUE DETAILS																				
Carers Name															Ca	re	rs Telephone			
Species															ID	Co	ode			
Age		Bak	by		J	uve	nile		Su	b-adu	lt		] /	Adult	Re	esc	ue Date			
Sex	П	Ma	ıle		$\overline{\sqcap}$	ema	ale		Ur	know	'n				Re	esc	ue Time			am/pm
																				.,
CALLER DETAILS																				
Callers Name		Т																		
Callers Address		_																		
Callers Telephone																				
Exact Rescue Location		_																		
Animal History		_																		
eq road trauma/cat atta	ick																			
eg roda tradina/cat atta	ick																			
INITIAL ASSESSMENT	•																			
Demeanour				Brigh	t		Alert			Dep	ressed			Moribund			Distressed			Other
General body conditi	on			Excel	lent		Good	t		Fair				Poor			Very poor			Emaciated
Fur/spine condition				Excel	lent		Good	t		Fair				Poor			Very poor			Missing spines
Breathing				Norm	nal		Rapid	b		Slov	/			Laboured			Open-mouthed			Noisy
Mobility				Norn	nal		Othe	r-												
Obvious injuries,																				
discharges or conditi	ons																			
Result of initial				Imme	ediate	eut	hanasia							Veterinary	y ass	sist	ance required			
assessment				Requ	ires c	are								Immediate	e re	lea	se			
Coordinator contacte	ed			Yes -	on	/	/		((	date)	at			am/pr	m					
THOROUGH PHYSICA	L ASS	SESS	MEN	ΙΤ																
Weight							Se	dati	ve u	sed							Drug dose	Т		
HEAD							1 30	auti	VC U	Jeu							Di ug uose			
Symmetry			П	Norr	nal	ΤF	Othe	r -												
Eyes			Ħ	Norr	_	╁	Othe													
Ears			Ħ	Norr		╁	Othe													
Beak			Ħ	Norr		╁	Othe													
Mouth			Ħ	Norr	_	╁╴	Othe													
LIMBS																				
Right fore limb and pa	aw		П	Norr	nal	T	Othe	r-												
Right rear limb and pa			Ħ	Norr		╁	Othe													
Left fore limb and pay			Ħ	Norr	_	╁╞	Othe													
Left rear limb and pay			Ħ	Norr		╁	Othe													
BODY	-																			
Fur/spine condition			П	Exce	llent	T	Good	1	ТГ	Fa	ir		П	Poor		П	Very Poor	ТГ	$\overline{1}$	Missing spines
Body Condition			Ħ	Exce		╁	Good		╁	Fa			Ħ	Poor	Ti	Ħ	Very Poor	1 7	╡	Emaciated
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Comments																				
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Diagnostic Aids			Ш	X-ray	/S	<u> </u> L	Bloo	d		F	aecal			Other	-					
Veterinary Diagnosis																				
Veterinary Prognosis																				
Treatment/Managen	nent																			
FINAL OUTCOME																				
Released			Date	e	/		/ 20	At	(loc	ation)	-									
Euthanased			Date	е	/		/ 20			ne) -										
Transferred			Date		/		/ 20		•	ne) -										

## **Animal Progress Record**



DETAILS (weight, comments, medications, treatments etc.)

## Wildcare Australia Inc.

PO Box 2379, Nerang Mail Centre Qld 4211 Wildlife emergencies: 07 5527 2444 secretary@wildcare.org.au www.wildcare.org.au

## Sterilising Procedure





Rinse thoroughly under cold running water
Soak in cold tap water with dishwashing detergent  Use a good quality detergent  Ensure that all equipment is fully submersed  This will help lift milk residue from equipment
Wash in warm-hot water with dishwashing
detergent
<ul> <li>Use a small teat bottle brush to clean teats</li> <li>Ensure that all equipment is thoroughly cleaned prior to sterilizing</li> </ul>
Rinse thoroughly under running tap water
Make sure that all detergent residue is removed
Option A - Milton® Solution
Add 25mls of Milton® to 2 litres of water
Place all equipment in solution and ensure that all items are fully submersed
Keep equipment in solution for at least one hour
<ul> <li>Remove carefully from solution and rinse in warm pre-boiled water</li> <li>Allow to dry and store in a clean, dry container</li> </ul>
Option B - F10® Solution
Add 2mls of F10® to every 1 litre of water
Place all equipment in solution and ensure that all items are fully submersed
<ul> <li>Keep equipment in solution for at least 30 minutes</li> <li>Do not leave in solution for more than 2 hours</li> </ul>
Remove carefully from solution and rinse in warm pre-boiled water
Allow to dry and store in a clean, dry container
Steam Sterilise
Place all items in sterilizing unit
Place 50mls of water in bottle of unit
Microwave on high power for appropriate length of time:-
Up 850 wattage 8 minutes
850 – 1000 6 minutes
1100 + 4 minutes

## **Wombaroo Possum Milk Replacer <0.8**

### Easy Reference Chart

Stage	Stage of Development	Common Brushtail Possum	Short-eared Possum	Common Ringtail Possum
	Less than 80% of pouch life completed. Furless. Pink skin. Eyes closed. Ears drooped. Faeces: yellow custard to toothpaste consistency.	< 100 days < 150 grams	<100 days <150 grams	< 100 days < 80 grams

Note – the above table is a guide only. It does not take into account differences due to sex. It assumes that the joey is in good body condition and is not over or under weight.

< 0.8 Possum Milk			
160 grams r	nakes 1 litre		
16 grams ma	akes 100 mls		
Amount of	Amount of Milk		
milk required	Powder *		
20 mls	3.2 g		
30 mls	4.8 g		
40 mls	6.4 g		
50 mls 8 g			
60 mls	9.6 g		
70 mls	11.2 g		
80 mls	12.8 g		
90 mls 14.40 g			
100 mls	16 g		

#### To make milk formula

- Using the table above, weigh out the required amount of milk powder \*
- Add a small amount of warm pre-boiled water to the powder to make it into a thick paste consistency - mix with a spoon until all lumps are removed
- 3. Continue to add water until you <u>reach</u> the required amount of formula required
- 4. Mix well

**Example:-** To make 50mls of milk, weigh 8 grams of powder, add 10-15mls of water, mix well and then add more water until you reach 50mls of made-up formula.

#### <0.8 Possum Feed Guide

Weight	Feed	Weight	Feed
(g)	mLs per day	(g)	mLs per day
0.5 g	0.5	18 g	7
1.0 g	0.8	20 g	7
1.5 g	1.0	22 g	8
2.0 g	1.3	24 g	8
2.5 g	1.5	30 g	9
3.0 g	1.7	40 g	12
3.5 g	1.9	50 g	14
4.0 g	2.1	60 g	16
4.5 g	2.3	70 g	18
5 g	2.5	80 g	19
6 g	3	90 g	21
8 g	3	100 g	23
10 g	4	110 g	24
12 g	5	120 g	26
14 g	5	130 g	27
16 g	6	140 g	29

Make sure you weigh your joey regularly and adjust the amount of daily milk intake accordingly.

For more detailed information on making milk formula and using Wombaroo products, please refer to the Introduction to Caring for Orphaned Mammal notes.

Easy Reference Chart prepared by Wildcare Australia Inc from Wombaroo product information.

## **Wombaroo Possum Milk Replacer >0.8**

### Easy Reference Chart

Stage	Stage of Development	Common Brushtail Possum	Short-eared Possum	Common Ringtail Possum
	More than 80% of pouch life completed. Fur: short to dense, long. Spends time out of pouch. Faeces: toothpaste to soft then firm green pellets.	>100 days >150 grams	>100 days >150 grams	>100 days >80 grams

Note – the above table is a guide only. It does not take into account differences due to sex. It assumes that the joey is in good body condition and is not over or under weight.

> 0.8 Possum Milk			
250 grams r	250 grams makes 1 litre		
25 grams ma	akes 100 mls		
Amount of	Amount of Milk		
milk required	Powder *		
20 mls	5 g		
30 mls	7.5 g		
40 mls	10 g		
50 mls	12.5 g		
60 mls	15 g		
70 mls	17.5 g		
80 mls	20 g		
90 mls	22.5 g		
100 mls	25 g		

#### To make milk formula

- Using the table above, weigh out the required amount of milk powder \*
- Add a small amount of warm pre-boiled water to the powder to make it into a thick paste consistency - mix with a spoon until all lumps are removed
- 3. Continue to add water until you <u>reach</u> the required amount of formula required
- 4. Mix well

**Example:-** To make 50mls of milk, weigh 12-13 grams of powder, add 10-15mls of water, mix well and then add more water until you reach 50mls of made-up formula.

### >0.8 Possum Feed Guide

Weight	Feed	Weight	Feed
(g)	mLs per day	(g)	mLs per day
10 g	2	160 g	17
12 g	3	180 g	19
14 g	3	200 g	20
16 g	3	250 g	24
18 g	4	275 g	26
20 g	4	300 g	28
30 g	5	325 g	29
40 g	6	350 g	31
50 g	7	375 g	33
60 g	8	400 g	34
70 g	9	425 g	36
80 g	10	450 g	37
90 g	11	475 g	39
100 g	12	500 g	40
120 g	14	525 g	41
140 g	16	600 g	42

Make sure you weigh your joey regularly and adjust the amount of daily milk intake accordingly.

For more detailed information on making milk formula and using Wombaroo products, please refer to the Introduction to Caring for Orphaned Mammal notes.

Easy Reference Chart prepared by Wildcare Australia Inc from Wombaroo product information.

## Wombaroo Kangaroo Milk Replacer < 0.4

### **Easy Reference Chart**

Stage	Stage of Development	Red-Necked Wallaby	Swamp Wallaby	Eastern Grey Kangaroo
	For joeys with less than 40% of pouch life completed. Furless: Pink skin. Eyes closed. Ears down. Faeces: Yellow, custard consistency.	< 120 days < 200 grams	< 120 days < 200 grams	< 160 days < 960 grams

Note – the above table is a guide only. It does not take into account differences due to sex. It assumes that the joey is in good body condition and is not over or under weight.

< 0.4 Kangaroo Milk			
140 grams makes 1 litre			
14 grams ma	akes 100 mls		
Amount of	Amount of Milk		
milk required	Powder *		
20 mls	2.8 g		
30 mls	4.2 g		
40 mls	5.6 g		
50 mls	7 g		
60 mls	8.4 g		
70 mls	9.8 g		
8o mls	11.2 g		
90 mls	12.6 g		
100 mls	14 g		

#### To make milk formula

- Using the table above, weigh out the required amount of milk powder \*
- Add a small amount of warm pre-boiled water to the powder to make it into a thick paste consistency - mix with a spoon until all lumps are removed
- 3. Continue to add water until you <u>reach</u> the required amount of formula required
- 4. Mix well

**Example:** To make 50mls of milk, weigh 7 grams of powder, add 10-15mls of water, mix well and then add more water until you reach 50mls of made-up formula.

### < 0.4 Kangaroo Feed Guide

Weight	Feed	Weight	Feed
(g)	mLs per day	(g)	mLs per day
5 g	3	120 g	31
10 g	6	130 g	32
15 g	7	140 g	34
20 g	8	150 g	36
25 g	10	175 g	40
30 g	12	200 g	45
35 g	13	225 g	48
40 g	14	250 g	55
45 g	15	275 g	60
50 g	16	300 g	60
60 g	18	350 g	65
70 g	21	400 g	75
80 g	23	450 g	80
90 g	25	500 g	90
100 g	27	550 g	95
110 g	29	600 g	100

Make sure you weigh your joey regularly and adjust the amount of daily milk intake accordingly.

For more detailed information on making milk formula and using Wombaroo products, please refer to the Introduction to Caring for Orphaned Mammal notes.

Easy Reference Chart prepared by Wildcare Australia Inc from Wombaroo product information.

## Wombaroo Kangaroo Milk Replacer 0.4

### **Easy Reference Chart**

Stage	Stage of Development	Red-Necked Wallaby	Swamp Wallaby	Eastern Grey Kangaroo
	For joeys between 40% and 60% of pouch life completed. Furless: Dark skin. Eyes open. Ears nearly erect. Faeces: Yellow, toothpaste consistency.	120-150 days 200-450 g	120-150 days 200-450 g	160-200 days 960 – 1500 g

Note – the above table is a guide only. It does not take into account differences due to sex. It assumes that the joey is in good body condition and is not over or under weight.

0.4 Kangaroo Milk			
180 grams r	makes 1 litre		
18 grams ma	akes 100 mls		
Amount of	Amount of Milk		
milk required	Powder *		
20 mls	3.6 g		
30 mls	5.4 g		
40 mls	7.2 g		
50 mls	9 g		
60 mls	10.8 g		
70 mls	12.6 g		
80 mls	14.4 g		
90 mls	16 <b>.</b> 2 g		
100 mls	18 g		

#### To make milk formula

- Using the table above, weigh out the required amount of milk powder \*
- Add a small amount of warm pre-boiled water to the powder to make it into a thick paste consistency - mix with a spoon until all lumps are removed
- Continue to add water until you <u>reach</u> the required amount of formula required
- 4. Mix well

**Example:** To make 50mls of milk, weigh 9 grams of powder, add 10-15mls of water, mix well and then add more water until you reach 50mls of made-up formula.

## 0.4 Kangaroo Feed Guide

Weight	Feed	Weight	Feed
(g)	mLs per day	(g)	mLs per day
100 g	19	600 g	75
125 g	23	650 g	80
150 g	26	700 g	80
175 g	29	750 g	85
200 g	32	800 g	90
225 g	35	850 g	95
250 g	38	900 g	100
275 g	41	950 g	100
300 g	44	1000 g	105
325 g	46	1050 g	110
350 g	49	1100 g	115
375 g	50	1150 g	115
400 g	55	1200 g	120
450 g	60	1250 g	125
500 g	65	1300 g	130
550 g	70	1350 g	130

Make sure you weigh your joey regularly and adjust the amount of daily milk intake accordingly.

For more detailed information on making milk formula and using Wombaroo products, please refer to the Introduction to Caring for Orphaned Mammal notes.

Easy Reference Chart prepared by Wildcare Australia Inc from Wombaroo product information.

## **Wombaroo Kangaroo Milk Replacer 0.6**

### **Easy Reference Chart**

Stage	Stage of Development	Red-Necked Wallaby	Swamp Wallaby	Eastern Grey Kangaroo
	For joeys between 60% and 70% of pouch life completed. Fur: Fine and short. Ears erect. Faeces: Mustard toothpaste to soft green pellets.	150–210 days 450-1200 g	150-170 days 450-700 g	200-240 days 1500-2300 g

Note – the above table is a guide only. It does not take into account differences due to sex. It assumes that the joey is in good body condition and is not over or under weight.

o.6 Kangaroo Milk			
220 grams makes 1 litre			
22 grams ma	akes 100 mls		
Amount of	Amount of Milk		
milk required	Powder *		
25 mls 5.5 g			
50 mls 11 g			
75 mls	16.5 g		
100 mls	22 g		
125 mls	27.5 g		
150 mls 33 g			
175 mls 38.5 g			
200 mls 44 g			

#### To make milk formula

- Using the table above, weigh out the required amount of milk powder \*
- Add a small amount of warm pre-boiled water to the powder to make it into a thick paste consistency - mix with a spoon until all lumps are removed
- 3. Continue to add water until you <u>reach</u> the required amount of formula required
- 4. Mix well

**Example:**- To make 50mls of milk, weigh 11 grams of powder, add 10-15mls of water, mix well and then add more water until you reach 50mls of made-up formula.

## 0.6 Kangaroo Feed Guide

Weight	Feed	Weight	Feed
(g)	mLs per day	(g)	mLs per day
200 g	25	700 g	65
225 g	28	750 g	65
250 g	30	800 g	70
275 g	32	850 g	75
300 g	34	900 g	75
325 g	36	950 g	80
350 g	38	1000 g	85
375 g	40	1050 g	85
400 g	42	1100 g	90
425 g	44	1200 g	95
450 g	46	1300 g	100
475 g	48	1400 g	105
500 g	50	1500 g	110
550 g	55	1600 g	115
600 g	55	1700 g	120
650 g	60	1800 g	125

Make sure you weigh your joey regularly and adjust the amount of daily milk intake accordingly.

For more detailed information on making milk formula and using Wombaroo products, please refer to the Introduction to Caring for Orphaned Mammal notes.

Easy Reference Chart prepared by Wildcare Australia Inc from Wombaroo product information.

## Wombaroo Kangaroo Milk Replacer >0.7

### **Easy Reference Chart**

Stage	Stage of Development	Red-Necked Wallaby	Swamp Wallaby	Eastern Grey Kangaroo
	For joeys with greater than 70% of pouch life completed. Fur: Short to dense. Spends time out of pouch. Faeces: Soft to firm green pellets.	>210 days > 1200 g	>170 days >700 g	>250 days >2300 g

Note – the above table is a guide only. It does not take into account differences due to sex. It assumes that the joey is in good body condition and is not over or under weight.

<0.7 Kangaroo Milk			
250 grams makes 1 litre			
25 grams ma	akes 100 mls		
Amount of	Amount of Milk		
milk required	Powder *		
50 mls	12.5 g		
100 mls 25 g			
150 mls 37.5 g			
200 mls 50 g			
250 mls	62.5 g		
300 mls	75 g		
350 mls 87.5 g			
400 mls 100 g			
450 mls 112.5 g			
500 mls	125 g		

#### To make milk formula

- Using the table above, weigh out the required amount of milk powder \*
- Add a small amount of warm pre-boiled water to the powder to make it into a thick paste consistency - mix with a spoon until all lumps are removed
- Continue to add water until you <u>reach</u> the required amount of formula required
- 4. Mix well

**Example:-** To make 50mls of milk, weigh 12-13 grams of powder, add 10-15mls of water, mix well and then add more water until you reach 50mls of made-up formula.

## <0.7 Kangaroo Feed Guide

Weight	Feed	Weight	Feed
(g)	mLs per day	(g)	mLs per day
350 g	29	1000 g	65
375 g	31	1250 g	75
400 g	32	1500 g	85
425 g	34	1750 g	95
450 g	35	2000 g	105
475 g	37	2250 g	115
500 g	38	2500 g	125
550 g	41	2750 g	135
600 g	44	3000 g	145
650 g	46	3500 g	160
700 g	49	4000 g	175
750 g	50	4500 g	190
800 g	55	5000 g	205
850 g	57	5500 g	220
900 g	60	6000 g	235
950 g	62	6500 g	250

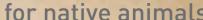
Make sure you weigh your joey regularly and adjust the amount of daily milk intake accordingly.

For more detailed information on making milk formula and using Wombaroo products, please refer to the Introduction to Caring for Orphaned Mammal notes.

Easy Reference Chart prepared by Wildcare Australia Inc from Wombaroo product information.

## WOMBAROO

MILK REPLACERS & **FOODSUPPLEMENTS** 











3rd Edition 2016

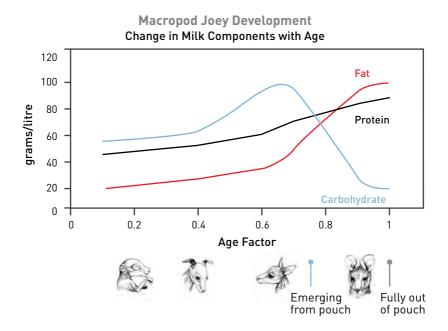
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#### **ABOUT MARSUPIAL MILK**

Milk provides the essential nutrients for growth and development of juvenile marsupials. Information on the nutritional composition of milks from a range of different species is sourced from both published data as well as private research undertaken by Wombaroo. This research shows that marsupial milk undergoes significant changes in composition (fat, protein & carbohydrate) over the period of lactation. The chart below shows the changes in milk components for a typical macropod (kangaroo) joey. Different species of marsupials (possums, wombats, koalas) have different compositional changes during lactation and therefore have different developmental charts.



The changes in milk composition cater for the widely differing nutritional requirements of the developing joey from furless "pinkie" to fully out-of-pouch. For example early lactation macropods obtain much of their energy from carbohydrate and cannot tolerate high fat levels. However later in lactation this situation is reversed, with milk becoming heavily concentrated with fat to provide additional energy. Protein levels also change to cater for the increased requirements for fur growth during mid lactation and the rapid growth rate seen around pouch emergence. For these reasons a single milk formula is not ideal for hand rearing any marsupial. Different Wombaroo milks are therefore formulated to provide the optimum nutrition at different stages of a joey's development.

The Wombaroo milk stages are related to the Age Factor (AF) of the joey, which is the age of a joey as a proportion of its total pouch life:

For example a Grey Kangaroo is normally fully out of the pouch at about 320 days. Therefore a Grey Kangaroo joey at 160 days has an Age Factor of 160/320 = 0.5. A joey at fully out of pouch age has completed 100% of its pouch life so it has an age factor of 1.0. By definition, a joey that spends any time in the pouch has an age factor of less than 1.0. Pouch emergence begins for most species of macropods at an Age Factor of around 0.7 to 0.8.

The concept of Age Factor helps us standardise the nutritional requirements for joeys from related species. Macropods develop at roughly the same rate when compared using Age Factor so that a Potoroo at 65 days, a Swamp Wallaby at 130 days, and a Grey Kangaroo at 160 days all have similar nutritional requirements (All have an Age Factor = 0.5).

The table below outlines the typical developmental "milestones" for macropods based on Age Factor (reproduced with permission from Helen George). This provides a useful guideline as to the expected development of a joey over time.

Age Factor	Stage of Development	Nutritional Considerations	
0 (birth)	Eyes closed; front legs developed; buds for hind legs.	Low energy milk, with a low fat content. Digestive system	
0.2	Eyes closed; ears folded flat on top of head; ear-canal closed; membrane joining lip; small hole at front of mouth for teat; hind legs formed.	is not well developed - milk contains easily digested carbohydrates and proteins. Immunoglobulins to boost	
0.3	Membrane between lips has disappeared; whiskers growing. Runny yellow faeces.	immune system. Limited gut flora.	
0.4	Eyes still closed; ears still flat but starting to become upright; animal fully formed.	Steadily increasing energy content of milk.	
0.5	Eyes now open; dark colouring on back of hands, bridge of nose, tips of ears; fur about to come through skin; poking head out from pouch occasionally; Faeces yellow custard to toothpaste consistency.	Protein contains sufficient levels of sulphur-containing amino acids (cysteine & methionine) for the onset of hair & nail growth.	
0.56	Fur colour visible under skin on entire body; Fur forming on bridge of nose and head.	Still limited gut flora.	

Age Factor	Stage of Development	Nutritional Considerations
0.6	Fur lengthening rapidly all over the body; fur appears last on belly/chest; leaning from mother's pouch and eating dirt to establish gut flora, starting to thermoregulate. Faeces darkening and forming.	Peak carbohydrate content in milk with high levels of associated digestive enzymes. Able to handle higher fat levels in milk.
0.7	Joey grazing from pouch making use of green feed; secondary coat appearing, the animal looks like a miniature adult. Faeces soft to firm green pellets.	High energy milk with a high fat content - coincides with increased activity levels of joey.
0.8	Joey starting to emerge from the pouch; spends longer and longer periods outside the pouch; feeding, urinating, defecating outside the pouch.	Sharp fall in carbohydrate content of milk with decrease in associated gut enzymes. Increasing levels of
0.9	First incisor teeth erupting through gum; full length fur growth.	"body-building" proteins (caseins, α-globulins) to coincide with peak
1.0	Joey fully emerged from the pouch; still drinking milk; solid food plays a large part in the diet.	growth rate. Gut flora developed for digestion of solid food.

#### WHAT'S IN WOMBAROO

Wombaroo contains a blend of protein, carbohydrate, fat, vitamins and minerals formulated to match as closely as possible the composition of natural mother's milk.

**PROTEIN** is a recombination of bovine milk protein fractions to produce the optimum proportion of caseins and whey proteins, with a balanced amino acid profile. Essential amino acids have been fortified with extra lysine, cysteine & methionine the latter of which are particularly important for healthy hair growth.

**CARBOHYDRATE** is mainly in the form of glucose. Some formulations also contain maltodextrin made from the enzymatic digestion of starch, which is high in glucose-oligosaccharides and low in  $\alpha$ -limit dextrin. Our research has shown this to be a well-digested form of energy, particularly for early lactation marsupials when carbohydrate accounts for up to 40% of the milk's energy (Rich BG, 1993. Activities of intestinal disaccharidases in hand-reared macropods. Wildlife Diseases Association of Australasia. Mallacoota). All marsupial formulae are low in lactose and free galactose to minimize digestive upset.

**FAT** is a mix of milk fat solids, vegetable oils and fatty acid esters prepared from fish oil. These ingredients are blended to produce the optimum mix of saturated, monounsaturated and polyunsaturated fats and include the essential omega-3 fatty acids  $\alpha$ -linolenic acid (ALA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

VITAMIN and MINERAL composition data in marsupial milk is sparse. The addition of these micro-nutrients is based on best estimates obtained from those milks that have been analysed. The nutrients well quantified in marsupial milk include vitamin A, vitamin E, calcium, phosphorous, potassium, sodium, iron and copper. Where values are unknown we have added the full complement of vitamins and minerals in quantities that are acceptable by recognised animal husbandry standards. This includes vitamin D<sub>3</sub>, vitamin C, vitamin K<sub>1</sub>, thiamine, riboflavin, pyridoxine, niacin, pantothenic acid, folic acid, biotin, cyanocobalamin, choline, inositol, magnesium, zinc, manganese, iodine and selenium. See **Appendix 4** for further discussion about calcium levels and the incidence of bone fractures in joeys.

#### HOW TO USE WOMBAROO

Use Wombaroo as a complete food for rearing orphaned joeys or as supporting nutrition for debilitated or convalescing animals. Maternal milk supplies immunoglobulins throughout much of a marsupial's lactation, providing immunity to diseases and intestinal protection due to its many antimicrobial properties. Success in hand rearing joeys may be improved if Impact Colostrum Supplement is added to Wombaroo milk to help boost the immune system (page 11).

#### Using Wombaroo milk for marsupials is a three-step process.

- Step 1 Determine the Age Factor of the joey in care.
- Step 2 Select the correct Wombaroo milk replacer for that age factor.
- Step 3 Feed the correct volume of milk replacer based on the body weight of the animal.

#### **Age Determination**

Accurate age determination means that the correct formula for the stage of development can be fed. Joeys can be aged according to their physical characteristics (eg hair growth, body measurements, consistency of faeces). The developmental milestones outlined for macropods in the table on pages 2 and 3 may be a useful guide. This booklet provides growth charts for some of the common species that come into care, which can be used as a guideline for feeding joeys. Contact Wombaroo or visit www.wombaroo.com.au for growth information of any other species not listed in the booklet.



Body weight should not be used to estimate age as this can be highly misleading due to large variations between individuals, malnourishment or dehydration.

#### **Using the Growth Charts**

It is important to note that the growth charts are only a guide and do not take into account differences due to sex, geographical variation and health condition of the joey. Estimate the animal's age from the body measurements given for that species (see **Appendix 5**). Where available, head length is the most accurate indicator of age, followed by foot and tail lengths. Often measurements do not exactly correlate, so use the average age indicated by the measurements on the chart.



#### The estimated age determines the stage of Wombaroo milk to feed.

Based on the estimated age, the charts provide a typical body weight for that age. This is a guideline only and may be subject to a high degree of variation between individuals. However comparing the joey's actual weight to that presented on the chart may provide an indication as to the condition of the joey. For example in drought conditions it is not unusual for joeys to be up to 50% underweight compared to normal years.



#### The joey's actual body weight determines the daily feed volume.

Feed according to the joey's actual body weight, as this gives the correct feed volume for your particular joey. Individual growth rates can vary substantially from the growth charts, so some animals won't match up with the charts. However if you are concerned that an animal is failing to thrive, underweight or malnourished it is always useful to seek veterinary advice. Further information on underweight or malnourished joeys is provided in **Appendix 2**.

#### Making Up Milk

Wombaroo should be made up according to the directions on the pack. Different formulae are made up at different concentrations of solids per litre of milk. For example Kangaroo Milk Replacer >0.7 formula is made up at 250g of powder per litre of prepared milk. This means that about 800mL of water is added to 250g of powder to make up 1 litre of formula. Do not simply add 1 litre of water to the 250g of powder as this will produce more than 1 litre of milk and result in a diluted formula.



## Wombaroo milk powders have different densities and should be weighed when preparing milk.

If weighing out milk powder is not possible then use the enclosed scoop to measure out small quantities of milk powder in accordance with the directions on the pack. Note that using the scoop is less accurate, so wherever possible we still recommend to weigh out the powder.

Even if only feeding small quantities, it is preferable to make up milk in larger volumes (i.e. a litre at a time) as this is more accurate to measure out and mix up. Once made up, milk can be stored frozen in smaller quantities (e.g. in ice cube trays or freezer bags). These smaller quantities can then be thawed, remixed and used as required with minimal wastage. Do not re-freeze thawed milk. Prepared milk can be stored in a refrigerator for a day or frozen for up to 2 weeks.







## When making up milk use pre-boiled water, as this sterilises the water and reduces microbial contamination.

Use warm water (about 50°C), too cold and the powder won't disperse properly and too hot can curdle the milk proteins and destroy some nutrients. Some formulae are particularly high in fat so are best mixed with an electric whisk to prevent separation. Milk may not make up properly if there are contaminants in water (eg tank water), or if the powder has been exposed to heat, moisture, light or is out of date. Refer to **Appendix 1** about storage of milk powders.

#### **Feeding**

Milk should be warmed to about 30°C and fed using a bottle and teat. Your Wombaroo stockist can supply 100ml graduated plastic bottles and a suitable latex teat from our range of shapes (see page 45 for the range of Wombaroo teats available).

Tables of suggested feed volumes are supplied with each packet of milk replacer. Feed volumes have been carefully calculated using a mathematical relationship between body weight and daily energy requirement. This relationship is not linear, so feeding a straight percentage of body weight is not accurate. Often new carers are told rules of thumb like "Feed 15% of body weight per day." This simple rule eventually produces feed volumes that are grossly inaccurate and can be detrimental to the health of the animal. Depending on the species and stage of lactation, the feed volume can range from 4% to 70% of body weight per day. Overfeeding may cause diarrhoea.

Do not concentrate or dilute Wombaroo milk replacers by making them up to volumes other than that indicated on the packet directions. This will change the osmolarity of the milk solution and may lead to malabsorbtion of nutrients from the gut. Avoid introducing additional nutrients to the milk (other than Impact Colostrum Supplement) as this may unbalance the nutrient profile of the Wombaroo.

#### **Feeding Frequency**

Young joeys suckle small volumes of milk frequently and can only cope with large, infrequent feeds as they become older. As a rule, it is preferable to feed a little often rather than a lot infrequently. Husbandry guidelines for macropods are as follows:

Age Factor	Milk Feeds per day	Faecal Consistency	Housing Temperature
<0.4	12-8	Thin Custard	34-36°C
0.4	8-6	Thick Custard to Toothpaste	32-34°C
0.6	5-4	Toothpaste to Soft Pellets	28-30°C
>0.7	4-3	Soft to Firm Pellets	20-25°C
1.0 to weaning	2-1	Firm Pellets	Ambient

**Source:** Vogelnest, L & R Woods (Eds.). (2008). Medicine of Australian mammals. CSIRO PUBLISHING. p 22.

Feeding frequency is also dependent on the species' biology. For example, once left in the burrow, young wombats and echidnas are naturally fed larger volumes but less frequently. If unsure, consult an experienced carer about the husbandry requirements of the species in question.

#### **Growth Rate**

Weigh joeys regularly. Consistency in growth rate is a good measure of adequate nutrition. Animals have an optimum, or ideal, growth rate that allows development to occur in a controlled fashion. Overfeeding, leading to an excessive growth rate may lead to obesity and possible skeletal deformities. Underfeeding, causing sub-optimal growth rate may lead to poor development and a more disease prone animal. A continuing decline in growth rate could indicate the onset of disease or malnutrition in young animals. See **Appendix 2** for more information on treating underweight or malnourished joeys.

#### **Transition of Milk**

Milk transition refers to when a joey is changed from one Wombaroo milk stage to the next. This transition is necessary to cater for the changing nutritional requirements of joeys as they grow. It is important to transition joeys at the correct age to ensure they are getting the proper nutrition for their stage of development. We recommend to transition from one milk stage to the next gradually over a period of about 10 to 20 days (depending on species and age). This is outlined in the various growth charts presented for individual species. The gradual transition of milk formulas reduces the likelihood of digestive upset for the joey.



## For example to transition a 950g Eastern Grey Kangaroo from 0.4 to 0.6 formula over a 10 day period:

Start	100mL 0.4 Kangaroo Milk Replacer
Day 1-3	Mix 75mL 0.4 formula with 25mL of 0.6 formula
Day 4-6	Mix 50mL 0.4 formula with 50mL of 0.6 formula
Day 7-9	Mix 25mL 0.4 formula with 75mL of 0.6 formula
Finish	100mL 0.6 Kangaroo Milk Replacer

Note that the start and finish volumes are the same, and that simply the ratio of one milk to the other is changed throughout the transition. If an animal is not tolerating the transition well (e.g. diarrhoea), then go back to a higher proportion of the earlier stage milk, and progress through the transition more slowly.

Some developmental problems can be related to joeys not being transitioned at the correct age, or being left on a particular stage of milk for too long. For example the 0.6 Kangaroo stage only lasts for about 30 days for a Grey Kangaroo.

Even if a joey is significantly underweight for its age, it still needs to be transitioned to the next stage milk after the specified amount of time indicated in the growth chart. The reason for this is that changes in milk composition and digestive physiology still occur at the same age regardless of the joey's weight or body condition.

#### **Drinking Water**

When a joey first comes into care, it is important to provide sufficient rehydration fluids before feeding milk.

**Pouch-bound Joeys:** Having been properly rehydrated, the normal feed volume of Wombaroo milk adequately supplies the maintenance water requirements recommended for small mammals (see **Appendix 3**). Pouch-bound young with low activity levels, housed at the optimum temperature and humidity therefore do not usually require additional drinking water. However young joeys can dehydrate rapidly if not maintained under ideal conditions. If the joey is showing signs of dehydration (e.g. during hot weather, or due to diarrhoea), give extra drinks of water between feeds.

Emerging Joeys: Joeys begin to regulate their own water intake once they start to emerge from the pouch. Offer small drinks of water between feeds once they begin emerging and ensure drinking water is always easily accessible when joeys are fully out of pouch. Joeys should also have access to fresh grass and browse at this stage, and this can be sprayed with water to mimic dew that provides a natural source of moisture to grazing animals.



If providing drinking water, do not add large volumes of extra water into the milk, as this dilutes energy intake and may reduce absorption of nutrients. If possible, give drinking water separately, between milk feeds

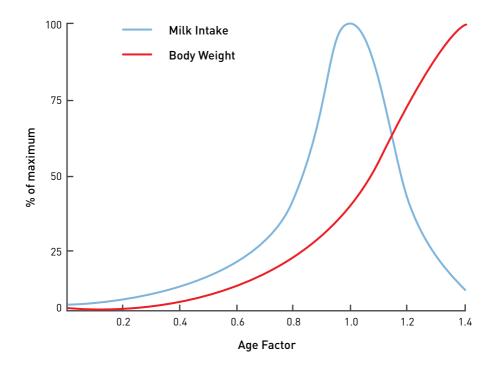
See Appendix 3 for more detailed information on Dehydration & Drinking Water.

#### Weaning

Once a joey leaves the pouch it begins to eat more solid food and becomes less reliant on milk. The amount of milk fed until fully weaned depends on the amount and nutritional value of other food eaten.

A typical milk intake curve for the Tammar Wallaby is shown on the following page (Merchant 1989). It is expected that most marsupials would have a similar shaped milk production curve. The key points are:

- 1. Maximum milk intake occurs at full pouch emergence (Age Factor = 1.0).
- 2. Milk intake drops rapidly after pouch emergence, as the joey weans on to solid food.
- **3.** Joey is weaned at an age factor of about 1.4.



Using the above guideline, it is expected that joeys are usually weaned at an Age Factor of around 1.3 -1.5 times the joey's pouch life. For example a Grey Kangaroo with a pouch life of 320 days would be fully weaned by about 1.4x320 = 450 days. Sick or malnourished joeys may need to be weaned later than healthier ones. However the continued feeding of large volumes of milk after pouch emergence should be discouraged as this makes weaning a more difficult and prolonged process. Since sexual maturity and/or dispersal of young occurs shortly after weaning in many species, it is important that hand-reared animals are weaned at a similar time to mother-reared young.

Animals destined for release should be weaned on to solid foods that form part of their natural diet in the wild. For grazers and browsers maintained in captivity such as kangaroos, wallabies and wombats, **Wombaroo Kangaroo Pellets** (page 38) can be used as an ideal supplement for weaning joeys.

#### Reference

Merchant JC (1989). Lactation in macropodid marsupials. In Kangaroos, Wallabies and Rat-Kangaroos (eds G Grigg et al) p362.

#### **Impact Colostrum Supplement**

	Impact Colostrum Supplement	Analy	sis
IMPACT 0 mag and	Contains high levels of immunoglobulins and antibacterials including lactoferrin, lysozyme and lactoperoxidase that may provide immunity and intestinal protection to young animals.  Feed to newborn eutherians in the first 48 hours after birth or as an adjunct to milk replacers for marsupial ineys up until weaning.	Protein	60%
		Fat	6%
		Carbohydrate	20%
		Immunoglobulin	75g/kg
		Lactoferrin	2g/kg
		Lactoperoxidase	100,000 iu/kg

#### **Immunity in Marsupials**

Young marsupials receive immune protection from immunoglobulins present in their mother's milk. Evidence suggests that there are low levels of immunoglobulins in the milk throughout much of lactation, with a spike around the time of first pouch emergence, when the young are first exposed to new pathogens in the environment. Therefore the period available for immune transfer from the milk is much longer in marsupials than the short colostrum phase seen in most other mammals. However when orphaned joeys come into care, immunity derived from the mother's milk can deplete significantly after 7 days and may be completely gone by 4-6 weeks. This may be a significant contributing factor to disease in hand-reared joeys. There is strong evidence that the antimicrobial proteins in bovine colostrum are effective against a number of common pathogens across a range of species, and there is long-standing anecdotal support for its beneficial effect in marsupial joeys.

#### **Using Impact for Marsupials**

**Impact** is ideally fed to pouch-bound marsupials within a week of first coming into care, particularly for those animals with a compromised immune system. **Impact** may be fed as either a concentrated 5-day course or a less-concentrated maintenance dose.

**Concentrated 5-day course:** Determine the required amount of **Impact** powder for body weight and mix directly into the daily volume of milk. Repeat this procedure for up to 5 days, every 4 to 6 weeks, as necessary. Use when animals initially come into care, for sick or stressed animals, or just prior to first pouch emergence (Age Factor of 0.6).

**Maintenance dose:** Add 1g of **Impact** powder per 100mL of milk fed, repeated daily, as required. Use as a preventative measure to provide a constant low-dose of immunoglobulins during care.

#### Milk for Kangaroos

Suitable for all species of macropods including kangaroos, wallabies, pademelons, bettongs & potoroos.



Kangaroo Milk Replacer <0.4	Analysis			
For joeys with less than	Solids	140g/litre		
40% of pouch life completed. Furless. Pink skin. Eyes closed. Ears down.	Protein	36%		
	Fat	14%		
Faeces: Yellow custard consistency.	Carbohydrate	41%		
Pack size: 140g, 700g.	Energy	2.6MJ/litre		



Kangaroo Milk Replacer 0.4	Analysis			
For joeys with 40% of pouch	Solids	180g/litre		
life completed. Furless. Darkening skin. Eyes nearly open or just opened. Ears nearly erect Faeces: Yellow toothpaste. Pack Size: 180g, 900g, 5kg.	Protein	34%		
	Fat	22%		
	Carbohydrate	36%		
	Energy	3.6MJ/litre		



Kangaroo Milk Replacer 0.6	Analysis		
For joeys with 60% of pouch	Solids	220g/litre	
life completed. Fur: Fine to short. Ears Erect. Faeces: Mustard toothpaste to soft green pellets. Pack size: 220g, 1.1kg, 5kg, 10kg.	Protein	32%	
	Fat	28%	
	Carbohydrate	32%	
	Energy	4.7MJ/litre	



Kangaroo Milk Replacer >0.7	Analysis			
For joeys with greater than	Solids	250g/litre		
70% of pouch life completed.	Protein	30%		
Spends time out of pouch.	Fat	42%		
Faeces: Soft to firm green pellets.  Pack size:	Carbohydrate	14%		
250g, 1.25kg, 5kg, 10kg, 20kg.	Energy	6.1MJ/litre		

### Red Kangaroo (Macropus rufus)

Milk	Age (days)	Tail (mm)	Foot (mm)	Head (mm)	Weight (g)	Feed (ml/day)	Notes
	50	48	25	32	40	12	
	60	59	31	37	65	17	
<0.4	70	70	39	42	95	23	
	80	84	48	46	125	28	
	90	98	57	51	180	36	
	92	101	59	52	192	36	27mL <0.4 + 9ml 0.4
Transition	95	105	62	53	210	36	18mL <0.4 + 18ml 0.4
	98	109	65	55	228	36	9mL <0.4 + 27ml 0.4
	100	112	67	56	240	36	
	110	128	77	60	315	47	
0.4	120	145	89	65	405	55	Eyes opening
	130	162	102	69	510	64	
	135	171	109	74	570	68	
	137	175	111	75	594	68	50mL 0.4 + 18ml 0.6
Transition	140	181	115	76	630	68	34mL 0.4 + 34ml 0.6
	142	185	118	78	658	68	18mL 0.4 + 50ml 0.6
	145	192	122	79	705	68	
0.6	150	203	128	83	785	73	
	160	226	142	88	970	85	Fine hair covering
	162	231	145	89	1016	85	65mL 0.6 + 20ml >0.7
Transition	165	238	149	90	1085	85	40mL 0.6 + 45ml >0.7
	168	245	153	92	1154	85	20mL 0.6 + 65ml >0.7
	170	250	156	93	1200	85	
	180	275	169	97	1450	100	Emerging from pouch
	190	302	180	102	1800	120	
0.7	200	330	191	107	2250	140	
>0.7	210	360	202	111	2750	155	
	220	393	211	116	3375	175	
	230	430	220	121	4100	205	
	240	467	227	125	4900	240	Fully out of pouch
	250	Growth ra	te now abou	ut 75g per d	lay	240	Feed volume now depends on
	270					180	amount of solids consumed
14/	290					120	Gradually increase solid
Weaning	310		Not '	Valid		80	food and reduce milk intake
	330					40	until fully weaned
	350					0	Fully weaned

#### Eastern Grey Kangaroo (Macropus giganteus)\*

Milk	Age (days)	Tail (mm)	Foot (mm)	Head (mm)	Weight (g)	Feed (ml/day)	Notes
	60	47	28	36	45	13	Whiskers visible
70	70	58	34	40	65	17	
	80	69	41	45	90	22	
<0.4	90	80	49	50	115	26	
	100	94	57	55	145	31	Eyelashes visible
	110	108	65	59	195	38	
	120	123	74	64	260	48	
	122	126	76	65	274	48	36mL <0.4 + 12ml 0.4
Transition	125	131	79	67	296	48	24mL <0.4 + 24ml 0.4
	128	136	81	68	319	48	12mL <0.4 + 36ml 0.4
	130	139	83	69	335	48	
	140	156	93	73	420	57	
0.4	150	172	103	77	525	65	
0.4	160	191	113	81	640	75	Eyes open
	170	209	123	85	780	90	
	180	228	133	88	950	100	Fine fur visible on head
	182	232	135	89	990	100	75mL 0.4 + 25ml 0.6
Transition	185	238	138	90	1050	100	50mL 0.4 + 50ml 0.6
	188	244	141	91	1110	100	25mL 0.4 + 75ml 0.6
	190	248	143	92	1150	100	
0.6	200	268	153	96	1350	110	
	210	288	163	99	1550	120	Fine fur covering body
	212	292	165	100	1600	120	90mL 0.6 + 30ml >0.7
Transition	215	298	168	101	1675	120	60mL 0.6 + 60ml >0.7
	218	305	171	102	1750	120	30mL 0.6 + 90ml >0.7
	220	309	173	103	1800	120	
	230	329	183	106	2070	135	
	240	350	194	109	2350	145	
	250	371	204	112	2700	155	Emerging from pouch
	260	392	214	115	3150	165	
>0.7	270	414	224	118	3600	185	
	280	436	234	121	4100	200	Incisors through gums
	290	458	244	123	4600	220	
	300	480	254	126	5100	240	
	310	495	259	128	5600	250	
	320	510	264	130	6100	260	Fully out of pouch
	330	Growth rat	te now abou	ut 50g per d	lay	240	Feed volume now depends on
	360					180	amount of solids consumed
Weaning	390		NIa+	Valid		120	Gradually increase solid
	420		JON	vallu	60	food and reduce milk intake	
	450				0	Fully weaned	

<sup>\*</sup>Note: Smaller animals (eg females) may better follow the growth curve of the Western Grey Kangaroo.

#### Western Grey Kangaroo (Macropus fuliginosus)\*

	Age	Tail	Foot	Head	Weight	Feed	
Milk	(days)	(mm)	(mm)	(mm)	(g)	(ml/day)	Notes
	60	44	26	34	40	12	Whiskers visible
	70	53	32	39	58	16	
	80	63	38	43	77	20	
<0.4	90	74	45	47	100	23	
	100	86	52	51	125	28	Eyelashes visible
	110	99	59	55	160	33	
	120	112	67	59	205	40	
	122	115	69	60	215	40	30mL <0.4 + 10ml 0.4
Transition	125	119	71	61	230	40	20mL <0.4 + 20ml 0.4
	128	123	73	62	245	40	10mL <0.4 + 30ml 0.4
	130	126	75	63	255	40	
	140	141	84	67	310	46	
0,	150	157	93	71	380	53	
0.4	160	174	102	75	460	61	Eyes open
	170	191	111	79	560	68	
	180	208	120	82	680	80	Fine fur visible on head
	182	212	122	83	712	80	60mL 0.4 + 20ml 0.6
Transition	185	217	125	84	760	80	40mL 0.4 + 40ml 0.6
	188	222	127	84	808	80	20mL 0.4 + 60ml 0.6
	190	226	129	85	840	80	
0.6	200	244	139	88	1000	90	
	210	263	148	91	1160	100	Fine fur covering body
	212	267	150	92	1190	100	75mL 0.6 + 25ml >0.7
Transition	215	273	153	93	1250	100	50mL 0.6 + 50ml >0.7
	218	278	155	93	1310	100	25mL 0.6 + 75ml >0.7
	220	282	157	94	1350	100	
	230	302	167	97	1550	110	
	240	322	176	100	1770	120	
	250	342	185	103	2050	130	Emerging from pouch
	260	362	195	106	2400	145	
>0.7	270	383	204	109	2800	155	
	280	406	214	112	3250	170	
	290	428	224	114	3700	190	
	300	446	232	116	4200	210	
	310	455	235	118	4700	230	
	320	463	237	120	5200	240	Fully out of pouch
	330	Growth rat	e now abou	ut 40-50g p	er day	240	Feed volume now depends on
	360				,	180	amount of solids consumed
Weaning	390					120	Gradually increase solid
3	420		Not '	Valid		60	food and reduce milk intak
	450					0	Fully weaned
*NI-+-	400					-t C V	

<sup>\*</sup>Note: Larger animals (eg males) may better follow the growth curve of the Eastern Grey Kangaroo. WA animals (subspecies ocydromus) may grow more slowly and reach developmental milestones later than indicated on the chart.

### Euro (Macropus robustus erubescens)\*

Milk	Age (days)	Tail (mm)	Foot (mm)	Weight (g)	Feed (mL/day)	Notes
	50	43	22	22	7	
	60	51	27	39	12	Whiskers present
<0.4	70	61	33	56	15	
	80	72	40	82	20	
	90	86	48	115	26	
	92	89	50	122	26	20mL <0.4 + 6ml 0.4
Transition	95	94	52	133	26	13mL <0.4 + 13ml 0.4
	98	99	54	145	26	6mL <0.4 + 20ml 0.4
	100	102	56	155	26	
	110	120	65	205	32	
0.4	120	140	74	260	38	Eyes opening
	130	160	84	320	47	
	135	170	90	350	50	Fine fur visible on head
	137	174	92	365	50	40mL 0.4 + 10ml 0.6
Transition	140	180	95	388	50	25mL 0.4 + 25ml 0.6
	142	184	97	403	50	10mL 0.4 + 40ml 0.6
	145	191	101	425	50	
0.6	150	202	107	465	52	
	160	225	120	550	60	Fine hair covering
	162	230	122	579	60	45mL 0.6 + 15ml >0.7
Transition	165	238	126	623	60	30mL 0.6 + 30ml >0.7
	168	245	129	666	60	15mL 0.6 + 45ml >0.7
	170	250	131	695	60	
	180	275	143	840	65	
	190	303	155	1080	80	Emerging from pouch
0.7	200	332	166	1400	100	
>0.7	210	358	174	1800	120	
	220	385	182	2200	140	
	230	402	186	2610	150	
	240	420	191	3020	160	Fully out of pouch
	250	Growth rate	now about 40	-50g per day	160	Feed volume now depends on
	270				140	amount of solids consumed
\A/	290				100	Gradually increase solid
Weaning	310		Not Valid		60	food and reduce milk intake
	330				30	until fully weaned
	350				0	Fully weaned

<sup>\*</sup> Note: Some animals may better match the Common Wallaroo growth curve.

# Common Wallaroo (Macropus robustus robustus)\*

Milk	Age (days)	Tail (mm)	Foot (mm)	Weight (g)	Feed (mL/day)	Notes	
	60	54	29	42	12		
	70	66	35	60	16	Whiskers present	
<0.4	80	78	41	84	21	Williskers present	
V0.4	90	90	48	112	25		
	95	96	53	128	28		
	97	99	55	137	28	21mL <0.4 + 7ml 0.4	
Transition	100	104	57	150	28	14mL <0.4 + 14ml 0.4	
II diisitioii	102	107	59	159	28	7mL <0.4 + 21ml 0.4	
	105	113	62	173	28	7111E <0.4 + 21111t 0.4	
	110	122	68	200	32		
	120	141	79	255	37		
0.4	130	162	91	320	47	Eyes opening	
	140	186	103	390	55	Lyes opening	
	150	210	117	475	60	Fine fur visible on head	
	152	215	120	495	60	45mL 0.4 + 15ml 0.6	
Transition	155	223	124	525	60	30mL 0.4 + 30ml 0.6	
Hansidon	158	230	129	555	60	15mL 0.4 + 45ml 0.6	
	160	235	131	575	60	131112 0.4 + 431111 0.0	
0.6	170	263	145	685	66		
0.6	175	280	152	745	70	Fine fur covering body	
	177	287	155	770	70	50mL 0.6 + 20ml >0.7	
Transition	180	297	159	810	70	35mL 0.6 + 35ml >0.7	
Iransition	182	303	161	840	70		
	185	313	164	885	70	20mL 0.6 + 50ml >0.7	
	190	328	169	960	75		
						F	
	200	359	178	1200	85	Emerging from pouch	
>0.7	210	391	187	1520	105 125		
>0.7	220	418	196	1880			
	230	445	203	2280	140		
	240	466	208	2680	155		
	250	486	212	3090	165	E II I . C I	
	260	505	216	3500	180	Fully out of pouch	
	270	Growth rate	now about 40	-bug per day	180	Feed volume now depends on amount of solids consumed	
	290	-			140	amount of Solius consumed	
Weaning	310	-	NI CALLS		100	Gradually increase solid	
	330		Not Valid		60	food and reduce milk intake until fully weaned	
	350				30	,	
	370				0	Fully weaned	

<sup>\*</sup> Note: Some animals may better match the Euro growth curve.

# Agile Wallaby (Macropus agilis)

Milk	Age (days)	Tail (mm)	Foot (mm)	Weight (g)	Feed (mL/day)	Notes
	50	48	22	28	9	
.0.7	60	60	27	40	12	Whiskers present
<0.4	70	72	32	62	16	
	80	84	40	85	21	
	82	87	42	90	22	16mL <0.4 + 6ml 0.4
Transition	85	90	45	100	22	11mL <0.4 + 11ml 0.4
	88	94	47	110	22	6mL <0.4 + 16ml 0.4
	90	97	49	120	22	
0.4	100	112	59	170	29	
0.4	110	129	70	235	35	
	120	148	82	320	48	Eyes opening
	122	152	84	335	48	36mL 0.4 + 12ml 0.6
Transition	125	158	88	365	48	24mL 0.4 + 24ml 0.6
	128	164	92	400	48	12mL 0.4 + 36ml 0.6
	130	168	94	420	48	Lower Incisor through gums
0.6	140	192	106	540	60	
	150	218	120	685	65	Fine hair covering
	152	224	122	715	65	50mL 0.6 +15ml >0.7
Transition	155	232	126	765	65	30mL 0.6 + 35ml >0.7
	158	241	130	815	65	15mL 0.6 + 50ml >0.7
	160	247	132	850	65	
	170	280	142	1050	80	Upper incisor through gums
	180	315	150	1300	95	
>0.7	190	351	157	1550	110	Emerging from pouch
>0.7	200	384	164	1800	120	
	210	418	170	2050	130	
	220	450	176	2300	140	Fully out of pouch
	230	478	181	2550	150	
	250	Growth rate	now about 2	25g per day	120	Feed volume now depends on
	270				90	amount of solids consumed
Weaning	290		NI=+ \/=1: 1		60	Gradually increase solid food
	310		Not Valid		30	and reduce milk intake
	330				0	Fully weaned

# Red-Necked or Bennett's Wallaby (Macropus rufogriseus)

Milk	Age (days)	Tail (mm)	Foot (mm)	Weight (g)	Feed (mL/day)	Notes
	60	48	23	50	14	Whiskers present
	70	59	28	65	17	
<0.4	80	69	33	85	21	
<0.4	90	80	38	105	24	
	100	90	44	130	28	
	110	101	51	160	32	
	112	104	53	170	32	24mL <0.4 + 8ml 0.4
Transition	115	108	55	185	32	16mL <0.4 + 16ml 0.4
	118	112	57	200	32	8mL <0.4 + 24ml 0.4
	120	115	59	210	32	
	130	128	67	260	38	
0.4	140	142	75	320	47	Eyes opening
	150	158	83	390	55	
	160	177	92	470	60	
	162	181	93	488	60	45mL 0.4 + 15ml 0.6
Transition	165	187	96	515	60	30mL 0.4 + 30ml 0.6
	168	192	98	542	60	15mL 0.4 + 45ml 0.6
	170	196	100	560	60	First incisors through gums
0.6	180	217	110	660	65	
	190	239	120	780	72	Fine hair covering
	192	243	122	808	72	54mL 0.6 + 18ml >0.7
Transition	195	250	125	853	72	36mL 0.6 + 36ml >0.7
	198	258	128	898	72	18mL 0.6 + 54ml >0.7
	200	263	130	930	72	
	210	289	140	1100	80	
	220	319	148	1310	95	Emerging from pouch
	230	350	156	1540	105	
>0.7	240	378	163	1770	120	
	250	403	168	2000	130	
	260	415	174	2250	140	
	270	428	179	2500	150	
	280	440	183	2750	155	Fully out of pouch
	290	Growth rate	now about 2	25g per day	140	Feed volume now depends on
	310				100	amount of solids consumed
Weaning	330		N		60	Gradually increase solid food
	350		Not Valid		30	and reduce milk intake.
	370				0	Fully weaned

# Swamp Wallaby (Wallabia bicolor)

Milk	Age (days)	Foot (mm)	Head (mm)	Weight (g)	Feed (mL/day)	Notes
	60	23	32	40	12	
	70	27	36	50	14	
<0.4	80	32	40	65	17	
	90	37	44	90	22	
	100	42	48	115	24	
	102	43	49	119	24	18mL <0.4 + 6ml 0.4
Transition	105	45	50	126	24	12mL <0.4 + 12ml 0.4
	108	47	51	136	24	6mL <0.4 + 18ml 0.4
	110	48	52	145	24	
	120	56	56	190	31	
0.4	130	65	60	240	36	Eyes opening
	140	74	64	300	45	
	150	82	68	370	50	
	152	84	69	380	50	40mL 0.4 + 10ml 0.6
Transition	155	86	70	405	50	25mL 0.4 + 25ml 0.6
	158	88	71	430	50	10mL 0.4 + 40ml 0.6
	160	90	72	450	50	
0.6	170	99	76	550	60	
	180	106	79	670	65	Fine hair covering
	182	107	80	695	65	50mL 0.6 + 15ml >0.7
Transition	185	109	81	735	65	30mL 0.6 + 35ml >0.7
	188	111	81	785	65	15mL 0.6 + 50ml >0.7
	190	112	82	820	65	
	200	119	84	1000	75	
	210	125	86	1180	85	Emerging from pouch
>0.7	220	131	88	1370	100	
>0.7	230	137	90	1580	110	
	240	142	92	1830	120	
	250	145	94	2100	135	
	260	148	96	2350	145	Fully out of pouch
	270	Growth rate	now about 2	25g per day	125	Feed volume now depends on
	280				100	amount of solids consumed
Weaning	300		NI=+ \/=1: 1		60	Gradually increase solid food
	320		Not Valid		30	and reduce milk intake.
	340				0	Fully weaned

### Tasmanian Pademelon (Thylogale billardierii)

Milk	Age (days)	Tail (mm)	Foot (mm)	Head (mm)	Weight (g)	Feed (mL/day)	Notes
	40	29	22	23	38	12	
<0.4	50	35	26	26	46	13	Whiskers present
<0.4	60	41	31	30	55	15	
	70	48	36	33	65	16	
	72	50	37	34	68	16	12mL <0.4 + 4ml 0.4
Transition	75	52	38	35	73	16	8mL <0.4 + 8ml 0.4
	78	54	40	36	77	16	4mL <0.4 + 12ml 0.4
	80	56	41	37	80	16	
0.4	90	64	46	40	95	19	Lower incisors first visible
0.4	100	73	51	44	115	21	
	110	82	55	47	138	24	Eyes opening
	112	84	56	48	144	24	18mL 0.4 + 6ml 0.6
Transition	115	87	57	49	153	24	12mL 0.4 + 12ml 0.6
	118	90	59	50	163	24	6mL 0.4 + 18ml 0.6
	120	92	60	51	170	24	
0.6	130	103	65	54	218	28	
	140	114	70	58	270	32	Fine hair growth
	142	116	71	58	282	32	24mL 0.6 + 8ml >0.7
Transition	145	119	72	59	303	32	16mL 0.6 + 16ml >0.7
	148	123	74	60	325	32	8mL 0.6 + 24ml >0.7
	150	125	75	61	340	32	
	160	137	80	65	430	39	First emerging from pouch
>0.7	170	150	85	68	540	46	
>0.7	180	163	90	72	680	55	
	190	176	95	75	850	65	
	200	189	100	79	1030	75	Fully emerged from pouch
	210	Growth ra	te now abo	ut 15-20g	per day	65	Feed volume now depends on
	230					45	amount of solids consumed
Weaning	250		Not.	Valid		30	Gradually increase solid food
	270		NOU	vallu		15	and reduce milk intake
	290					0	Fully weaned (approx 2.2 -3.0kg)

### **Other Growth Charts**

Growth charts are available for a range of other macropod species including Whiptail, Tammar & Parma Wallaby, Brush-tailed, Unadorned & Yellow-footed Rock-wallaby, Red-necked and Red-Legged Pademelon, Quokka, Long-nosed & Long-footed Potoroo, Rufous, Northern, Tasmanian & Brush-tailed Bettong (Woylie). Contact Wombaroo or visit www.wombaroo.com.au for further information.

# Red-legged Pademelon (Thylogale stigmatica)\*

Milk	Age (days)	Tail (mm)	Foot (mm)	Head (mm)	Weight (g)	Feed (ml/day)	Notes
	40	28	21	21	36	11	
<0.4	50	35	26	25	43	13	
<0.4	60	43	32	29	52	14	Whiskers present
	70	56	37	32	62	16	
	72	59	38	33	65	16	12mL <0.4 + 4ml 0.4
Transition	75	63	39	34	70	16	8mL <0.4 + 8ml 0.4
	78	67	41	35	75	16	4mL <0.4 + 12ml 0.4
	80	70	42	36	79	16	
0.7	90	83	47	40	102	19	
0.4	100	96	53	44	125	22	Eyes opening
	105	103	55	46	137	24	
	108	107	57	47	144	24	18mL 0.4 + 6ml 0.6
Transition	110	110	58	47	149	24	12mL 0.4 + 12ml 0.6
	113	114	60	49	157	24	6mL 0.4 + 18ml 0.6
	115	117	61	49	163	24	Skin Darkening
0.6	120	123	63	51	178	26	
	130	137	69	55	210	28	Very Fine Hair Growth
	132	139	70	56	218	28	21mL 0.6 + 7ml >0.7
Transition	135	144	71	57	230	28	14mL 0.6 + 14ml >0.7
	138	148	73	58	244	28	7mL 0.6 + 21ml >0.7
	140	150	74	59	255	28	
	150	164	79	62	300	30	Emerging from pouch
. 0.7	160	177	84	66	350	33	
>0.7	170	189	90	70	410	38	
	180	200	95	74	480	42	
	190	210	100	77	560	48	Fully emerged from pouch
	200	Growtl	n rate now a	about 15g p	er day	45	Milk volume now depends on
	210					40	amount of solids consumed
\\/i-	220					30	Gradually increase solid
Weaning	240		Not '	Valid		15	food and reduce milk intake until fully weaned
	260					0	Fully weaned (approx 1.5 -2.5kg)

<sup>\*</sup> May also be used as a guideline for Red-necked Pademelon (Thylogale thetis)

# Whiptail Wallaby (Macropus parryi)

Milk	Age (days)	Tail (mm)	Foot (mm)	Head (mm)	Weight (g)	Feed (ml/day)	Notes
	60	48	25	30	30	9	
	70	59	30	34	40	12	
<0.4	80	72	36	38	55	15	Whiskers present
	90	86	42	41	75	19	
	100	101	49	45	95	22	
	102	104	50	46	100	22	16mL <0.4 + 6ml 0.4
Transition	105	109	53	47	109	22	11mL <0.4 + 11ml 0.4
	108	113	55	48	119	22	6mL <0.4 + 16ml 0.4
	110	116	56	49	125	22	
	120	134	64	53	170	28	
0.4	130	153	72	56	220	34	Eyes opening
	140	173	81	60	280	40	
	150	194	90	64	350	50	
	152	199	92	65	368	50	40mL 0.4 + 10ml 0.6
Transition	155	206	96	66	395	50	25mL 0.4 + 35ml 0.6
	158	212	99	67	422	50	10mL 0.4 + 40ml 0.6
	160	217	101	68	440	50	
0.6	170	241	112	71	540	60	
	180	266	123	75	640	65	Fine hair covering
	182	271	125	76	660	65	50mL 0.6 + 15ml >0.7
Transition	185	279	129	77	690	65	30mL 0.6 + 35ml >0.7
	188	286	132	78	726	65	15mL 0.6 + 50ml >0.7
	190	291	134	79	750	65	
	200	317	145	83	880	70	
	210	345	158	86	1030	75	Emerging from pouch
. 0.7	220	375	171	90	1200	85	
>0.7	230	405	185	93	1450	100	
	240	437	199	96	1700	115	
	250	470	213	99	1950	130	
	260	503	227	102	2200	140	Fully out of pouch
	270	Growtl	n rate now	about 25g p	er day	130	Feed volume now depends on
	290					100	amount of solids consumed
14/	310					75	Gradually increase solid
Weaning	330		Not'	Valid		50	food and reduce milk intake
	350					25	
	370					0	Fully weaned

# Rufous Bettong (Aepyprymnus rufescens)

Milk	Age (days)	Tail (mm)	Foot (mm)	Weight (g)	Feed (mL/day)	Notes
0.4	55	60	30	40	10	Just releasing teat
0.4	60	66	34	48	12	
	62	69	36	52	12	9mL 0.4 + 3ml 0.6
Transition	65	74	38	58	12	6mL 0.4 + 6ml 0.6
	68	80	40	64	12	3mL 0.4 + 9ml 0.6
	70	84	42	68	12	
0.6	75	94	49	84	14	
	80	104	56	102	16	Eyes opening
	82	108	59	110	16	12mL 0.6 + 4ml >0.7
Transition	85	115	64	124	16	8mL 0.6 + 8ml >0.7
	88	123	68	138	16	4mL 0.6 + 12ml >0.7
	90	130	71	148	18	Fully furred
	95	148	80	180	20	Emerging from pouch
>0.7	100	168	88	215	24	
>0.7	105	190	96	265	27	
	110	215	103	330	32	
	115	240	110	400	37	Fully emerged from pouch
	120	Growth rate is	s now about 1	0-15g per day	36	Milk volume now depends on amount of milk consumed
Weaning	140		Not Valid		18	Gradually increase solid food and reduce milk intake until fully weaned
	160				0	Fully weaned (approx. 750g)

## Black-striped Wallaby (Macropus dorsalis)\*

Milk	Age (days)	Foot (mm)	Head (mm)	Weight (g)	Feed (mL/day)	Notes	
	60	24	33	35	11		
<0.4	70	28	37	45	13	Whiskers present	
	80	33	41	60	16		
	82	34	42	64	16	12mL <0.4 + 4ml 0.4	
Transition	85	36	43	71	16	8mL <0.4 + 8ml 0.4	
	88	38	44	78	16	4mL <0.4 + 12ml 0.4	
	90	39	45	83	16		
0 /	100	45	49	110	20		
0.4	110	52	53	140	24	Eyes opening	
	115	56	55	155	26		
	117	58	55	162	26	20mL 0.4 + 6ml 0.6	
Transition	120	60	57	174	26	13mL 0.4 + 13ml 0.6	
	123	63	58	186	26	6mL 0.4 + 20ml 0.6	
	125	64	58	195	26		
0.6	130	69	60	220	29		
	140	79	64	280	34	Fine hair covering	
	142	81	65	296	34	26mL 0.6 + 8ml >0.7	
Transition	145	84	66	320	34	17mL 0.6 + 17ml >0.7	
	148	87	67	344	34	8mL 0.6 + 26ml >0.7	
	150	89	67	360	34		
	160	99	71	460	40	Emerging from pouch	
	170	107	74	575	49		
>0.7	180	115	78	720	58		
	190	121	82	900	70		
	200	126	86	1100	80		
	210	131	90	1300	90	Fully out of pouch	
	230	Growth rat	e now about 2	20g per day	80	Feed volume now depends on	
	250				60	amount of solids consumed	
Weaning	270		NI=+ \/=1; I		40	Gradually increase solid	
	290		Not Valid		20	food and reduce milk intake	
	310				0	Fully weaned	

<sup>\*</sup> Males may be significantly larger than females, especially once emerged from the pouch.

# Brush-tailed Rock Wallaby (Petrogale penicillata)

Milk	Age (days)	Tail (mm)	Foot (mm)	Head (mm)	Weight (g)	Feed (mL/day)	Notes	
	50	47	19	29	20	7		
<0.4	60	55	23	33	29	9	Whiskers present	
	70	65	28	37	40	12		
	72	67	29	38	43	12	9mL <0.4 + 3ml 0.4	
Transition	75	70	31	39	47	12	3mL <0.4 + 6ml 0.4	
	78	73	32	40	51	12	6mL <0.4 + 9ml 0.4	
	80	75	33	41	54	12		
0.4	90	86	40	44	81	16		
0.4	100	100	46	48	118	21		
	110	115	53	51	166	27	Eyes opening	
	112	118	55	52	176	28	21mL 0.4 + 7ml 0.6	
Transition	115	124	57	53	193	28	14mL 0.4 + 14ml 0.6	
	118	130	59	54	211	28	7mL 0.4 + 21ml 0.6	
	120	134	61	54	224	29		
0.6	130	155	69	58	293	36		
	140	180	77	60	373	42	Fine hair covering	
	142	185	79	61	390	42	32mL 0.6 + 10ml >0.7	
Transition	145	193	81	62	417	42	22mL 0.6 + 22ml >0.7	
	148	200	83	63	444	42	10mL 0.6 + 32ml >0.7	
	150	205	84	63	464	42		
	160	232	90	66	565	48	Emerging from pouch	
>0.7	170	257	95	69	677	55		
>0.7	180	280	100	71	799	62		
	190	300	104	73	930	72		
	200	320	108	76	1071	80	Fully out of pouch	
	210	Growt	n rate now	about 15g p	er day	75	Feed volume now depends on	
	220					60	amount of solids consumed	
Weaning	230		NI - L	/_1:-		45	Gradually increase solid	
	240		Not '	valld		30	food and reduce milk intake	
	260					0	Fully weaned	

# Long-nosed Potoroo (Potorous tridactylus)

Milk	Age (days)	Tail (mm)	Foot (mm)	Head (mm)	Weight (g)	Feed (mL/day)	Notes
	55	35	20	33	23	6	Just releasing teat
0.4	60	40	22	35	25	7	Lower incisors erupting
0.4	65	45	24	38	27	7	
	70	50	27	40	30	8	
	72	53	28	41	32	8	6mL 0.4 + 2ml 0.6
Transition	75	56	30	43	36	8	4mL 0.4 + 4ml 0.6
	78	59	32	44	41	8	2mL 0.4 + 6ml 0.6
	80	62	34	45	45	9	
0.6	85	72	39	48	58	10	Eyes opening
	90	88	45	50	72	12	Lightly furred
	92	94	47	51	79	12	9mL 0.6 + 3ml >0.7
Transition	95	103	51	53	91	12	6mL 0.6 + 6ml >0.7
	98	114	55	54	102	12	3mL 0.6 + 9ml >0.7
	100	120	57	55	110	13	
	105	130	60	58	130	16	
	110	140	63	60	155	18	Emerging from pouch
>0.7	115	145	65	62	185	21	
	120	150	67	64	220	24	
	125	155	70	66	260	27	
	130	160	72	68	290	29	Fully emerged from pouch
	140	Growth	rate is nov	v about 5g <sub>l</sub>	per day	24	Milk volume now depends on
	150					16	amount of milk consumed
Weaning	160		Not '	Valid		8	Gradually increase solid food and reduce milk intake until fully weaned
	170					0	Fully weaned (approx. 500g)

## Carnivorous Marsupials, Bandicoots and Bilbies

The milk of carnivorous marsupials, bandicoots and bilbies undergoes similar nutritional changes as that which occurs in macropods. This involves a progressive increase in total solids, fat and protein from early to late lactation while carbohydrate increases in mid lactation and then declines to very low levels during late lactation.

It is not practical to produce a multi-stage milk replacer for these animals as most have short pouch lives and young that come into care tend to be at the late lactation stage. We recommended feeding them **Kangaroo Milk Replacer >0.7** as this is a suitable high energy formula which many carers will have on hand or find readily available.

Bandicoots are known to have particularly high levels of energy in their milk and are very fast-growing. To cater for this we recommend the addition of up to 10% additional fat in the form of **The Good Oil for Animals** ie 10ml per 100ml of >0.7 Kangaroo Milk Replacer (page 44). The Good Oil may also be beneficial for carnivorous marsupials such as antechinus, phascogales, quolls & devils as it contains elevated levels of essential fatty acids (EPA & DHA) which are thought to be present in the milk of these species. Depending on age, young Tasmanian Devil joeys may be started on either Kangaroo 0.4 or 0.6 formula and then transitioned on to the >0.7 as they get older.

Contact Wombaroo or visit **www.wombaroo.com.au** for further information on growth rates of different species of bandicoots and carnivorous marsupials.

### Feed Table Using Kangaroo > 0.7

Body Weight (g)	Feed Volume (ml/day)	Body Weight (g)	Feed Volume (ml/day)	Body Weight (g)	Feed Volume (ml/day)
1	0.4	30	5.5	175	20
2	0.7	40	6.8	200	22
3	1.0	50	8.0	250	26
4	1.2	60	9.2	300	30
5	1.4	70	10	350	33
7	1.8	80	11	400	37
10	2.4	90	12	450	40
15	3.3	100	13	500	44
20	4.0	125	16	550	47
25	4.8	150	18	600	50

### Milk for Possums

### Suitable for all species of possums & gliders.



Possum Milk Replacer <0.8	Analysis		
For joeys with less than 80% of pouch life completed.	Solids	160g/litre	
Furless. Pink skin.	Protein	34%	
Eyes closed to just opened. Ears drooped.	Fat	15%	
Faeces: Yellow custard to	Carbohydrate	39%	
toothpaste consistency. Pack size: 160g, 800g.	Energy	3.0MJ/litre	



Possum Milk Replacer >0.8	Analysis		
For joeys with greater than	Solids	250g/litre	
80% of pouch life completed.  Fur: Short soft to dense long.	Protein	32%	
Spends time out of pouch.	Fat	33%	
Faeces: Toothpaste to soft then firm green pellets.	Carbohydrate	26%	
Pack Size: 250g, 1.25kg, 5kg.	Energy	5.6MJ/litre	

### **Supplement Feeding Adult Possums and Gliders**

In the wild, omnivorous species such as brushtails, pygmy possums and sugar gliders obtain additional protein from browse, pollen and insects. In captivity, dietary protein may be enhanced by the addition of **Wombaroo High Protein Supplement** (see page 40) and **Wombaroo Small Carnivore Food** (see page 41). Strictly folivorous species such as Ringtails and Greater Gliders should be maintained predominantly on native browse (eg young eucalypt leaves). These specialist species obtain extra protein by consuming their own cecal pellets, and do not usually require supplementary foods.

## Common Ringtail Possum (Pseudocheirus peregrinus)\*

Milk	Age (days)	Tail (mm)	Head (mm)	Weight (g)	Feed (mL/day)	Notes
	60	75	25	35	9	
.0.0	70	90	28	38	10	
<0.8	80	105	32	42	10	
	90	120	35	52	12	Eyes opening
	92	123	35	54	12	9mL <0.8 + 3ml >0.8
Transition	95	128	36	57	12	6mL <0.8 + 6ml >0.8
	98	132	37	60	12	3mL <0.8 + 9ml >0.8
	100	135	38	62	12	
	110	150	41	74	12	Emerging from pouch
>0.8	120	165	45	90	14	
	130	180	48	110	16	Fully out of pouch
	140	195	51	135	18	
	160	Growth rate now about 3-6g per day		12	Eating significant leaf	
Weaning	180				0	Fully weaned (approx 310g)
	210		Not Valid			Release Age (approx 490g)

<sup>\*</sup>The Western Ringtail (Pseudocheirus occidentalis) has a shorter pouch life and faster growth rate, first emerging from the pouch at about 95 days (125g), fully out of the pouch around 104 days (130-150g), and weaning at a heavier weight (approx.550g).

## Common Brushtail Possum (Trichosurus vulpecula)

Milk	Age (days)	Tail (mm)	Foot (mm)	Head (mm)	Weight (g)	Feed (mL/day)	Notes
	80	67	21	36	42	10	
<0.8	90	82	26	41	58	13	
<0.8	100	98	30	45	80	17	Fine fur visible
	110	116	35	49	105	20	Eyes opening
	112	120	36	50	112	20	15mL <0.8 + 5ml >0.8
Transition	115	125	38	51	125	20	10mL <0.8 + 10ml >0.8
	118	131	40	53	140	20	15mL <0.8 + 5ml >0.8
	120	135	41	54	150	20	Emerging from pouch
>0.8	130	155	47	58	210	26	Fully Furred
>0.8	140	168	52	61	290	32	
	150	181	56	64	390	40	Fully out of pouch
	160	Growth rat	e now about	7-15 g per	day	40	Feed volume now depends on
	180					20	amount of solids consumed
Weaning	200		Not'	Valid		0	Fully weaned
	250						Release Age

## Sugar Glider (Petaurus breviceps)

Milk	Age (days)	Head (mm)	Leg (mm)	Weight (g)	Feed (mL/day)	Notes
<0.8	40	17	12	3	1.4	Pink skin, eyeslits present
<0.8	50	21	15	6	2.4	Skin Darkening
	52	21	16	7	3	2mL <0.8 + 1ml >0.8
Transition	55	22	18	9	3	1.5mL <0.8 + 1.5ml >0.8
	58	23	19	10	3	1mL <0.8 + 2ml >0.8
	60	23	20	12	3	Emerging from pouch, finely furred
	70	26	25	22	5	Eyes opening, fully furred
>0.8	80	29	30	33	7	Fully out of puch (left in nest)
>0.8	90	32	35	44	8	
	100	35	39	54	9	Emerging from nest
	120	Growth rate	now around	l 1g per day	0	Fully weaned (approx 75-90g)

## Squirrel Glider (Petaurus norfolcensis)

Milk	Age (days)	Head (mm)	Leg (mm)	Weight (g)	Feed (mL/day)	Notes
	40	18	11	4	1.8	Pink skin, eyeslits present
<0.8	50	20	14	8	3	
	60	24	18	16	5	Skin darkening
	62	25	19	18	5	3.5mL <0.8 + 1.5ml >0.8
Transition	65	26	20	21	5	2.5mL <0.8 + 2.5ml >0.8
	68	27	21	23	5	1.5mL <0.8 + 3.5ml >0.8
	70	27	22	25	5	Emerging from pouch, finely furred
	80	30	27	40	8	Eyes opening, fully furred
>0.8	90	33	32	55	10	Fully out of pouch (left in nest)
>0.8	100	36	36	71	11	
	110	39	40	85	13	Emerging from nest
	130	Growth rate	now around	1.5g per day	0	Fully weaned (approx 90-135g)

### Other Growth Charts

Growth charts are available for several other possum species including Mountain/ Short-eared Brushtail (Bobuck), Herbert River Ringtail, Mountain Pygmy Possum and Feathertail Glider. Contact Wombaroo or visit **www.wombaroo.com.au** for further information.

## Milk for Wombats



Wombat Milk Replacer <0.4	Analysis		
For joeys with less than 40% of pouch life completed.	Solids	140g/litre	
Furless. Pink skin.	Protein	36%	
Eyes closed. Ears drooped to erect.	Fat	14%	
Faeces: Yellow custard to toothpaste consistency.	Carbohydrate	39%	
Pack size: 140g, 700g.	Energy	2.6MJ/litre	



Wombat Milk Replacer 0.4	Analysis		
For joeys with 40% of pouch life completed.	Solids	190g/litre	
Furless to fine fur.	Protein	34%	
Eyes just open. Ears erect.	Fat	22%	
Faeces: toothpaste consistency.	Carbohydrate	33%	
Pack Size: 190g, 950g, 5kg.	Energy	3.8MJ/litre	



Wombat Milk Replacer >0.6	Analysis		
For joeys with greater than 60% of pouch life completed.	Solids	250g/litre	
Fur: Short to dense long fur.	Protein	32%	
Spends time out of pouch. Faeces: Toothpaste to soft	Fat	42%	
then firm green pellets.  Pack size:	Carbohydrate	14%	
250g, 1.25kg, 5kg, 10kg, 20kg.	Energy	6.1MJ/litre	

# Southern Hairy-Nosed Wombat (Lasiorhinus latifrons)

Milk	Age (days)	Head (mm)	Weight (g)	Feed (mL/day)	Notes
	60	29	42	12	
	<0.4 80	33	60	16	
<0.4		37	78	20	
	90	41	104	23	
	100	44	132	28	Incisors present, eyelashes growing
	102	45	138	28	21mL <0.4 + 7ml 0.4
Transition	105	46	146	28	14mL <0.4 + 14ml 0.4
	108	48	154	28	7mL <0.4 + 21ml 0.4
	110	48	161	28	
	120	52	200	29	Eyes opening
0.4	130	56	255	34	
	140	60	330	42	
	150	64	410	50	Fine fur visible
	155	66	450	50	40mL 0.4 + 10ml 0.6
Transition	160	68	500	50	25mL 0.4 + 25ml 0.6
	165	70	560	50	10mL 0.4 + 40ml 0.6
	170	72	620	50	
	180	76	750	60	
	190	80	880	70	
	200	84	1025	80	Emerging from pouch
	210	88	1200	90	Thick Fur
>0.6	220	92	1380	100	
	230	96	1600	110	
	240	100	1900	120	
	250	103	2250	135	
	260	107	2600	150	
	270	111	2950	160	Fully emerged from pouch
	280	Growth rate n	iow about	160	Feed volume now depends on
	290	35g per day		150	amount of solids consumed
Weaning	310			100	Gradually increase solid food
	330			50	and reduce milk intake
	350			0	Fully weaned (approx 6-7 kg)

## Common Wombat (Vombatus ursinus)

Milk	Age (days)	BodyLength (mm)	Weight (g)	Feed (mL/day)	Notes
	60	110	45	13	
	70	125	65	17	
<0.4	80	138	85	21	
<0.4	90	150	120	27	
	100	157	180	36	
	110	163	270	50	Incisors present, eyelashes growing
	112	164	290	50	35mL <0.4 + 15ml 0.4
Transition	115	166	320	50	25mL <0.4 + 25ml 0.4
	118	168	355	50	15mL <0.4 + 35ml 0.4
	120	169	380	50	
	130	175	510	60	Eyes opening
0.4	140	182	650	70	
	150	188	800	85	
	160	195	960	100	Fine fur visible
	165	198	1050	100	75mL 0.4 + 25ml 0.6
Transition	170	201	1140	100	50mL 0.4 + 50ml 0.6
	175	205	1240	100	25mL 0.4 + 75ml 0.6
	180	208	1340	100	
	190	214	1580	110	
	200	221	1880	120	
	210	228	2200	135	
	220	234	2520	150	Emerging from pouch
>0.6	230	241	2880	155	Thick Fur
>0.6	240	247	3260	175	
	250	254	3660	190	
	260	260	4060	200	
	270	267	4500	220	
	280	273	4950	240	
	290	280	5400	250	Fully emerged
	300	Growth rate n	ow about	240	Feed volume now depends on
	320	40g per day		180	amount of solids consumed
Weaning	340			120	Gradually increase solid
	360			60	food and reduce milk intake
	380			0	Fully weaned (approx 8-10 kg)

### Milk for Koalas



Koala Milk Replacer Early Lactation	Ana	lysis
For joeys less than 160 days old.	Solids	220g/litre
Furless to fine fur. Eyes closed to just open.	Protein	22%
	Fat	35%
	Carbohydrate	30%
Pack size: 180g, 900g.	Energy	5.0MJ/litre



Koala Milk Replacer Late Lactation	Ana	lysis
For joeys older than 180 days until weaning. Emerging or fully-emerged with short to dense long fur. Teeth erupted and nibbling on leaves. Leaf represents an increasing part of the diet from 270 days. Pack size: 240q, 1.2kq, 5kq & 10kq.	Solids	320g/litre
	Protein	32%
	Fat	43%
	Carbohydrate	14%
	Energy	7.8MJ/litre

### Age Estimation

Age estimation of koalas is based on head length, from tip of nose to nuchal crest at rear of skull (best measured with vernier calipers). Regional and sex differences present considerable variation in koala body weight and growth rate. Presented here are two average growth charts, one for smaller animals (typical of northern or QLD animals), the other for larger animals (typical of southern or Victorian animals). If a particular animal does not fit one chart then it may fall between the charts, or outside either chart.

### Feed Guidelines

Select the correct Wombaroo formula for age and feed milk volume according to body weight. Weigh joeys regularly to monitor growth. Leaf should be offered from 6 months (180 days) of age. From about 10 months (300 days), if eating sufficient leaf and gaining weight, milk volume can be gradually reduced until fully weaned at 1 year of age. At this stage at least 10% body weight in leaves should be consumed per day.

## Koala (Phascolarctos cinereus adustus) -Smaller or Northern Animals

Milk	Age (days)	Head Length (mm)	Body Weight (g)	Feed Volume (mL/day)	Notes
	60	27	42	6	
	70	30	46	7	
	80	33	51	7	
	90	36	60	8	
	100	39	72	9	First Fur
Early Lactation	110	42	88	11	
Education	120	44	109	13	
	130	47	135	15	
	140	49	167	17	
	150	52	200	20	Eyes open, head appears out of pouch
	160	54	233	22	
	165	55	250	22	17ml Early + 5ml Late
Transition	170	56	266	22	11ml Early + 11ml Late
	175	57	283	22	5ml Early + 17ml Late
	180	59	300	22	Fully-furred, front teeth erupted. Nibbling leaves
	190	61	340	23	Should be receiving pap from a healthy adult animal
	200	65	390	25	
	210	68	450	28	Adult-type fur. Carried on mother's front
	220	71	530	32	
	230	73	610	35	
Late	240	75	700	40	
Lactation	250	77	820	44	Fully-emerged. Carried on mother's back
	260	79	950	49	
	270	82	1100	55	Milk volume now depends on amount of leaf eaten
	290	86	1450	70	100g of leaf per day
	310	90	1750	80	
	330	93	2050	50	Start weaning, 200g of leaf per day
	350	97	2250	25	
	370	100	2400	0	Fully weaned, 250g of leaf per day

## Koala (Phascolarctos cinereus victor) – Larger or Southern Animals

Milk	Age (days)	Head Length (mm)	Body Weight (g)	Feed Volume (mL/day)	Notes
	60	28	45	6	
	70	31	50	7	
	80	35	60	8	
	90	37	70	9	
	100	40	100	12	First Fur
Early Lactation	110	43	130	14	
Education	120	46	160	17	
	130	48	190	19	
	140	51	220	21	
	150	54	250	23	Eyes open, head appears out of pouch
	160	56	310	27	
	165	58	345	28	21ml Early + 7ml Late
Transition	170	59	380	28	14ml Early + 14ml Late
	175	60	415	28	7ml Early + 21ml Late
	180	61	450	28	Fully-furred, front teeth erupted Nibbling leaves
	190	64	520	31	Should be receiving pap from a healthy adult animal
	200	67	600	35	
	210	70	700	40	Adult-type fur. Carried on mother's front.
	220	73	820	44	
	230	76	950	49	
Late	240	78	1100	55	
Lactation	250	80	1230	60	Fully-emerged. Carried on mother's back
	260	82	1360	64	
	270	84	1500	70	Milk volume now depends on amount of leaf eaten
	290	88	1900	83	150g of leaf per day
	310	93	2250	95	
	330	97	2600	60	Start weaning, 250g of leaf per day
	350	101	2900	30	
	370	104	3200	0	Fully weaned, 300g of leaf per day

### Milk for Echidna

### Also used for Platypus.



Echidna Milk Replacer Early Lactation	Analysis		
For young less than 30 days old.	Solids	210g/litre	
Furless. Pinkish-grey skin.	Protein	34%	
Eyes closed. Pouch bound.	Fat	38%	
Faeces: Custard to toothpaste consistency.	Carbohydrate	16%	
Pack size: 210g	Energy	4.9MJ/litre	



Ī	Echidna Milk Replacer	A 12.0	lveie
	Late Lactation .	Anal	lysis
	For young greater than 50 days old.	Solids	360g/litre
	Fur: By 60 days finely furred with spines emerging.	Protein	32%
k		Fat	42%
6	Faeces: Toothpaste to soft then firm pellets.	Carbohydrate	13%
,	Pack size: 250g, 1.25kg	Energy	8.8MJ/litre

### Age Estimation

Individual echidnas show considerable variation in body weight and growth rate with age. Echidna young leave the pouch at similar ages (around 45-60 days) but at very different sizes. Offspring of larger females tend to have a faster growth rate and are heavier at than those of smaller females. The following growth chart therefore provides two columns of weight for age, one for smaller animals, the other for larger animals. If a particular animal does not fit one weight range then it may fall between the columns, or outside either weight range.

### **Feeding Guidelines**

Echidna can suckle vigorously and the high nutrient content of the milk means that young are fed infrequently. In the wild burrow young (>50 days) are only suckled by their mother approximately once every 5 days. (Rismiller PD and McKelvey MW, 2009. Activity and behaviour of lactating echidnas. Aust J Zoology.)

Digestion of milk is slow so the contents of the stomach need to be fully emptied before the next feed. For Early Lactation Echidnas we recommend to feed every 36 hours, and for Late Lactation Echidnas the feed intervals should be at least 2 days apart. This time frame may be further extended as the animal gets older.

### Short-Beaked Echidna (Tachyglossus aculeatus)

			Small Animals		Large Animals		
Milk	Age (days)	Body Length (mm)	Weight (g)	Feed <sup>1</sup> (mL/day)	Weight (g)	Feed <sup>1</sup> (mL/day)	Notes
	10	55	7	6	10	7	
	15	70	20	9	25	10	
Early	20	85	39	12	45	12	
	25	100	60	14	65	14	
	30	115	82	15	95	16	
	35	129	104	20	130	20	15mL Early + 5ml Late
Transition	40	143	126	20	168	20	10mL Early + 10ml Late
	45	157	148	20	208	20	5mL Early + 15ml Late
	50	170	170	20	250	23	Fine fur/spines may be present
	60		215	22	345	26	Emerged from pouch
	80		305	25	540	31	
Late	100	Not	395	28	750	35	
	120	Valid	485	30	970	39	Introduce Solid Food
	150		620	32	1300	43	Start Weaning
	180		755	35	1670	48	Fully weaned (180-210 days) <sup>2</sup>

#### Notes

- 1. Feed is given as average daily volume, so multiply this number by the number of days between each feed.
- 2. Tasmanian animals tend to have a faster growth rate and wean earlier (around 150 days).

### Weaning

Echidnas should be fully weaned at about 6 to 7 months of age and the body weight at this time may be anywhere from 700g to 2kg. Prior to weaning solid food may be introduced into the diet. Start by mixing small amounts of **Wombaroo Small Carnivore Food** into the milk. Over the next month, slowly increase the amount of solids while decreasing the amount of milk. During this time the mix should change in consistency from a thin porridge to a thick paste. This will prepare the young for introduction to the adult diet.

### **Introducing Adult Diet**

Mix about 9 parts of **Wombaroo Small Carnivore Food** (page 41) with 1 part of finely crushed termite mound or similar soil material, including some termites if possible. Slowly mix with water to the desired consistency.

### MILK FOR EUTHERIAN MAMMALS

Eutherian mammals develop their young in the womb and give birth to more highly advanced young than marsupials. The young are initially nourished with colostrum to provide immunity, which then develops into full milk within about 48 hours of birth. Milk composition does not change significantly during lactation, so a single species-specific formula is suitable for hand-rearing. All of the domesticated, feral and exotic mammals found in Australia are eutherians. The most commonly encountered native eutherians are flying foxes, insectivorous bats and native rodents. Wombaroo makes a range of specific milk replacers to cater for most species of eutherian mammals including Dog, Cat, Rabbit, Guinea Pig, Horse, Sheep, Alpaca, Pig & Deer, plus a range of specialty formulas used by zoos and wildlife parks.







### Milk for Native Rodents

We recommend **Wombaroo Dog Milk Replacer** for native rodents. It has a protein, fat and energy content reasonably similar to that of rodent milk and has been used successfully to rear a number of native species including Hopping Mice, Bush Rats and Water Rats.

## Feed Table Using Wombaroo Dog Milk Replacer For Native Rodents

Body Weight (g)	Feed Volume (ml/day)	Body Weight (g)	Feed Volume (ml/day)	Body Weight (g)	Feed Volume (ml/day)
1	0.9	6	3.1	20	6.9
2	1.5	8	3.8	30	9.1
3	1.9	10	4.4	40	11
4	2.4	15	5.7	50	13

## Milk for Flying Foxes (Fruit Bats)

WOMBAROO	Flying Fox Milk Replacer	Analysis		
	A nutritionally balanced milk substitute for orphaned pups.	Solids	140g/litre	
	Contains calcium for bones and	Protein	27%	
	vitamin C for skin & joints. Neonates may benefit from	Fat	15%	
	receiving Impact Colostrum Supplement.	Carbohydrate	45%	
Francisco Maria Estracia	Pack size: 140g, 1kg, 5kg & 10kg.	Energy	2.6MJ/litre	

### Grey-Headed Flying Fox (Pteropus poliocephalus)\*

Age (days)	Arm (mm)	Leg (mm)	Weight (g)	Feed (mL/day)	Notes
2	59	31	75	27	5 Feeds per day
4	62	33	79	28	
8	67	36	88	30	
12	72	39	98	32	
16	77	41	108	35	
20	82	43	118	38	
24	86	45	128	40	
28	90	47	138	42	4 feeds per day
32	94	48	148	44	
36	98	49	159	46	
40	102	50	170	48	
44	105	51	181	50	Introduce pureed apple
48	108	52	192	52	
52	111	53	203	54	
56	114	54	214	57	Introduce diced fruit with High Protein Supplement
60	117	55	225	59	
66	121	56	243	45	Start Weaning - milk volume now depends on
72	125	57	261	30	amount of fruit eaten
78	128	58	279	15	
84	131	59	297	0	

<sup>\*</sup>May also be used for similar-sized species such as Black Flying Fox (P. Alecto).

### Weaning

When pups are about 6-7 weeks old introduce pureed apple between milk feeds. By 8-10 weeks they should be eating diced fruit (non-fibrous fruits such as apple or pear) coated with **Wombaroo High Protein Supplement**. Continue to increase solids and reduce the milk in the diet until they are fully weaned by about 12 weeks. At this stage young flying foxes should receive 20g (3 Wombaroo scoops) of High Protein Supplement over 300g of fresh cut fruit per animal.

### Milk for Insectivorous Bats (Microbats)

(	WOMBAROO
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Ĺ	BAT MILE BEPLACES

Bat Milk Replacer	Anal	ysis
A nutritionally balanced milk	Solids	330g/litre
substitute for orphaned pups. Elevated protein & energy content for rapid growth rate. Neonates may benefit from receiving Impact Colostrum Supplement.	Protein	34%
	Fat	43%
	Carbohydrate	13%
Pack size: 165g (makes 500ml).	Energy	8.0MJ/litre

## Gould's Wattled Bat (Chalinolobus gouldii)\*

Age (days)	Forearm (mm)	Weight (g)	Feed (mL/day)	Notes
1	21.0	3.0	1.0	Furless, 2 hourly feeds
3	24.0	3.5	1.1	Eyes Opening
5	26.0	4.0	1.2	3 hourly feeds
7	28.0	4.5	1.3	Fur growing on head & neck
9	29.5	5.2	1.4	Fur growing on belly
11	31.0	5.9	1.6	
14	33.0	7.0	1.8	Thickly-furred, 4 hourly feeds
17	35.0	8.5	2.1	
20	37.0	10.0	2.4	Introduce solid food (mealworms)
24	39.5	11.7	2.7	5 hourly feeds
28	41.5	13.1	2.8	
32	43.5	14.1	2.4	Gradually reduce milk intake and increase solid food
36	45.5	14.5	1.6	7 hourly feeds, start self-feeding
42	47.0	15.0	0.0	Fully Weaned (adult size)

<sup>\*</sup>Growth rate & developmental stages may be used as a guideline for other similar-sized species of microbat.

### Weaning

When pups are about 20 days old (fully-furred) they can be offered small mealworms with the heads removed and contents squeezed into the mouth. By about 28 days they should be able to eat whole mealworms, and milk volumes may be gradually reduced as insect consumption increases. Once self-feeding, bats may be encouraged to eat **Wombaroo Small Carnivore Food**, made up as a moist crumble, supplemented with a variety of live insects.

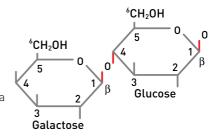
### Formula One Low Lactose Milk



Formula One	Analysis		
Low-lactose milk formula that can be used for a	Solids	125g/litre	
range of different species including puppies, kittens,	Protein	24%	
lambs, piglets, calves, foals, cria & marsupials. Use as an emergency milk replacer. Pack size: 65g (Shake 'n' Make), 500g, 1kg, 5kg, 10kg, 20kg.	Fat	30%	
	Carbohydrate	36%	
	Energy	2.8MJ/litre	

#### **About Low Lactose Milks**

Lactose is a disaccharide or "double sugar", made from the simple sugars galactose and glucose. It is the main carbohydrate present in the milk of cows, goats, horses & humans. However, many species have low levels of lactose in their milk, and do not digest it readily due to reduced activity of the enzyme lactase. The use of a low-lactose milk formula is therefore preferable to using cow's milk formulas, especially for those animals that suffer from lactose-induced diarrhoea.



Low-lactose milk products are normally prepared from cow's milk, but with the lactose broken down into its component sugars. This process does not alter the nature or composition of protein or fat in the milk, which can be quite inappropriate for other mammal species. For example, cow's milk contains deficient levels of whey protein, taurine, unsaturated fat & essential fatty acids compared to the milk of many other species.

**Formula One** is a superior low-lactose milk product because it is made from fortified ingredients to produce a milk that is low in lactose, but with an improved nutritional profile compared to cow's milk products.

We recommend to use Formula One as an emergency milk replacer for any species of animal until the correct species-specific Wombaroo milk can be administered.

Formula One is available in various pack sizes but includes a convenient Shake 'n' Make bottle which is pre-measured to make up 500mL of formula, so is ideal for emergency use.

## Wombaroo Kangaroo Pellets

KANGAROO	Wombaroo Kangaroo Pellets Analysis		ysis
PELLETS	kangaroos, wallables, wombats	Protein	14%
	and other native herbivores High in fibre & antioxidants. Low in starch & oxalates. Fortified with essential amino acids, fatty acids, vitamins and		5%
AV AN			22%
minerals.  Pack size: 5kg, 20kg.		Energy	9.0 MJ/kg

Australian herbivores have evolved to eat a wide range of native grasses, plants and foliage. This provides a naturally high fibre diet, rich in anti-oxidants. In captivity, these animals are often fed with pellets or muesli made from cereal grains with a high starch content. This can lead to dental problems (eg Lumpy Jaw) and poor digestive health.

### Wombaroo Kangaroo Pellets have the following benefits:

**High in Fibre:** The abrasive fibre and large pellet size promotes chewing action which helps maintain dental condition. The inclusion of soluble fibre (mannanoligosaccharides) promotes the growth of beneficial gut bacteria. The low starch content helps reduce the dental and digestive problems associated with excessive consumption of cereal grains.

**High in Antioxidants:** Animals kept in captivity are prone to stress, which can lead to disease, infections and a compromised immune system. Wombaroo Pellets are fortified with antioxidants including vitamin E, selenium and carotenoids to help eliminate the free radicals produced by oxidative stress.

**Low in Oxalates:** Some commercial ingredients and exotic plants contain high levels of oxalates e.g. lucerne, lupins and wheat bran. Oxalates can bind with dietary metals to form insoluble precipitates such as calcium oxalate crystals found in urinary tract stones. A low oxalate diet may therefore be beneficial for urinary tract health.

## **Directions for Feeding**

Feed **Wombaroo Kangaroo Pellets** as a supplement to pasture, hay and native browse. Water intake may increase when feeding pellets, so always ensure that fresh water is available. Introduce pellets gradually into the diet to avoid sudden digestive upset.



Avoid feeding large amounts of high-sugar fruit (e.g. apples & pears), high starch foods (e.g. grains, bread, potatoes) or high-oxalate fodder (e.g. lucerne). These items can effectively be replaced with **Wombaroo Kangaroo Pellets**.

Feed rate depends on body weight, body condition and quality of other foods consumed. The table below is based on the assumption that **Wombaroo Kangaroo Pellets** make-up 15% of the total dry matter intake of the diet. The remainder of the diet should consist of grass, hay, pasture & browse, and would vary depending on the individual species' requirements.

#### Feed Table - Wombaroo Kangaroo Pellets

Weight (kg)	Feed (g/day)	Weight (kg)	Feed (g/day)	Weight (kg)	Feed (g/day)	Weight (kg)	Feed (g/day)
0.5	5	6	35	16	75	45	160
1	10	8	40	20	85	50	175
2	15	10	45	25	100	55	190
3	20	15	50	30	120	60	200
4	25	15	60	35	135	65	210
5	30	15	70	40	150	70	220

<sup>1</sup> metric cup = approx. 120g of Wombaroo Pellets.

### Converting to Wombaroo Kangaroo Pellets

Captive animals may become accustomed to eating large amounts of inappropriate foods like cereal grains, fruits, vegetables or lucerne hay. When converting over to **Wombaroo Kangaroo Pellets** these foods should be removed from the diet. This will help encourage intake of the **Wombaroo Pellets**.

When converting animals on to pellets it is preferable that:

- Animals are in good body condition and housed in a low-stress environment
- Weather conditions are mild (avoid extremes in heat or cold)
- Good quality pasture, hay and browse is provided
- Plenty of fresh water is provided.

Older animals tend to become set in their ways and can be difficult to convert over to new food items. Young animals can be more easily weaned on to pellets.

### Pellets as a Weaning Food

Hand-reared joeys may be weaned on to pellets by soaking them in milk formula, initially making a sloppy mash. Gradually reduce the quantity of liquid as the joey weans on to the solid diet.

## **High Protein Supplement**

WOMBAROO
HIGH PROTEIN SUPPLEMENT

High Protein Supplement	Ana
Used to boost the protein content in the captive diet of	Protein
fruit, nectar and sap-eating animals including flying foxes, possums and sugar gliders.	Fat
Fortified with essential amino acids, fatty acids, vitamins &	Carbohydrate
minerals.  Pack size: 250g 1kg 5kg	Energy

#### Directions for Use

**Fruit-mix:** Disperse 15g (2 level scoops) of powder per 150g of fruit or vegetables.

Mix powder well with diced or pureed fruits and vegetables. A small amount of water may be added to moisten the mix. Prepare fresh daily.

**Liquid-mix:** Add 15g (2 level scoops) of powder to 40mL of warm water.



Analvsis

52%

12%

25%

17 MJ/kg

Mix powder well with the water. Pour liquid-mix over dry foods including semi-moist fruits, nuts, biscuits, pellets or kibble. Use at the rate of 10ml of **liquid-mix** per 25g of dried food. Store liquid-mix refrigerated for a day or frozen for up to 2 weeks.

**Frugivorous (Fruit-eating) Animals:** In captivity, animals are usually fed commercially grown fruits (e.g. apples & pears), which have a lower protein, vitamin & mineral content compared to many wild native fruits. To provide a balanced diet, any fruit & vegetables fed out should be supplemented with **High Protein Supplement.** 

**Possums & Gliders:** For species that eat fruit & vegetables in captivity, feed as per the **fruit-mix** directions. For animals offered dry or semi-moist foods, feed as per the **liquid-mix** directions. For insectivorous species (e.g. Sugar Gliders, Pygmy Possums) also include up to 20% of prepared **Wombaroo Small Carnivore Food** plus a variety of insects in their diet.

**Flying Foxes:** Disperse 15g (2 scoops) of powder over 300g of fresh cut apple per adult animal. Increase the amount to 20g (3 scoops) per animal when feeding pregnant or nursing females, juveniles and debilitated animals.

**Other Uses: High Protein Supplement** can be substituted for the high protein baby cereal used in many food recipes for animals and birds. Use only half the quantity of High Protein Supplement because of its superior protein quality and quantity.

### **Small Carnivore Food**



Analysis				
Protein	38%			
Fat	12%			
Carbohydrate	32%			
Energy	16 MJ/kg			

#### Directions for Use

Mix 15g (2 level scoops) of powder with 10ml of water.

Slowly add the water, while mixing to form a moist crumbly food. Do not make into a paste. To encourage intake mix in with live insects such as crickets, moths, cockroaches and mealworms. Store prepared food refrigerated for a day or frozen for up to 2 weeks.



**Dunnarts, Antechinus, Kowari & Quolls: Small Carnivore Food** can represent up to 80% of the total diet. Supplement with crickets, moths, grasshoppers, spiders and day old mice or chicks.

**Sugar Gliders, Pygmy Possums & Bandicoots:** These are omnivorous species and Small Carnivore Food can represent up to 20% of the total diet. Also feed **Wombaroo High Protein Supplement** dispersed over fruit.

**Echidna & Numbat:** Mix prepared **Small Carnivore Food** with about 10% crushed termite mound and some live termites. Extra water may be added to make into a liquid slurry.

**Hopping mice, Rats & Mice: Small Carnivore Food** can represent 10-20% of the total diet.

**Insectivorous Bats:** Feed as a maintenance diet while supplementing with moths, beetles and a few mealworms.

### **Feeding Live Food**

Live food is important nutritionally, but also helps maintain natural foraging behaviour in captive animals. There are considerable differences in composition between mature and immature (larval stage) of insects. Animals that prey on mature insects such as moths, beetles and crickets should not be fed large numbers of larval stage insects such as mealworms, as these contain higher levels of fat and can lead to obesity. The nutritional value of feeder insects may be improved by maintaining them on **Passwell Insect Booster.** 

## Reptile Supplement

	NOMBAROO
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	KERTILE SUPPLEMENT

Reptile Supplement	Analysis		
Balanced diet for captive reptiles including bearded dragons,	Protein	55%	
blue-tongued lizards, turtles and snakes.	Fat	14%	
Use to boost dietary protein, vitamin, calcium and mineral intake.	Carbohydrate	11%	
Pack size: 250g, 1kg, 5kg.	Energy	17 MJ/kg	

#### **Directions for Use**

**Meat-mix:** Mix 10g (1 level scoop) of powder with 20g minced meat, fish or hard-boiled egg.

Add extra water to moisten if necessary. Mix in live insects to encourage intake.

**Veg-mix:** Mix 10g (1 level scoop) of powder with 40g finely diced fruit or vegetables.

**Soft Pellets:** Mix 20g (2 level scoops) of powder to 12mL of warm water.

Slowly add the water and mix into a putty-like consistency. Break-off small pieces and roll into soft pellets for feeding. Drinking water should always be available.

**Liquid Slurry:** Add 10g (1 level scoop) of powder with 15mL of warm water.





Slowly add water and mix to make a slurry of the required consistency. Let the mix stand for 2 minutes to absorb all the water. If too thick, add a little more water and continue mixing. Feed at about 30°C using a syringe with large bore. Use as a force-feeding formula for sick or injured reptiles.

#### Feed Recommendations

**Turtles:** Feed a variety of live food supplemented with Meat-mix or Soft Pellets. Avoid contaminating the tank by removing any uneaten food. Do not overfeed.

**Bearded Dragons, Blue-tongued Lizards & Larger Skinks:** Feed a variety of live food and plant material supplemented with Veg-mix, Meat-mix or Soft Pellets.

**Goannas & Snakes:** Feed whole-body prey items stuffed with supplement at the rate of 5g per 50g carcass weight. Cavities in prey may be stuffed by preparing as a slurry and using a syringe.

### **Insect Booster**

NSECT BOOSTIII	Insect Booster	Analysis		
	value of feeder insects such as crickets, woodies and mealworms. Nutrients are incorporated into the insect's	Protein	13%	
		Fat	5%	
		Calcium	15%	
		Vitamin E	1600mg/kg	
		Vitamin D <sub>3</sub>	65μg/kg	

### **About Feeding Insects**

Insectivorous animals kept in captivity usually lack the diversity and quality of a natural diet in the wild. Feeder insects are often maintained on nutrient-poor substrates (e.g. bran) which can lead to dietary deficiency. Insects have no skeletal structure and are generally a poor source of calcium.

### **Improving Insect Nutrition**

By maintaining live feeder insects on **Insect Booster**, the nutritional value of the captive diet is enhanced, including a significantly higher calcium to phosphorus ratio, and elevated vitamin & mineral content. This is more effective than simply "qut-loading" insects raised on inadequate diets or dusting with calcium powder.

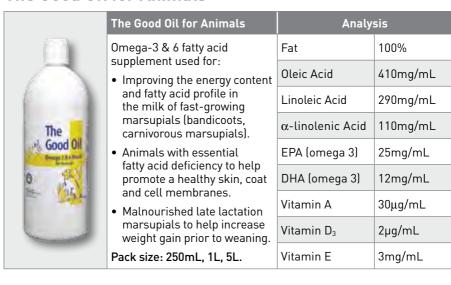
### **Directions for Use**

For best results, supply **Insect Booster** to the feeder insects for 7-14 days prior to feeding out to animals. This maximises the uptake of nutrients (e.g. calcium) into the body tissue of the insect. However, supplying **Insect Booster** to insects for as little as 2-3 days before feeding out will still have some nutritional benefit. Moisture should always be available to insects and can be supplied as a piece of wet sponge, fruit or vegetable.

**Adult Insects (including crickets & woodies):** Supply **Insect Booster** as a dry powder in a shallow bowl or plate.

**Juvenile Insects (e.g. mealworms & fly pupae):** Make a 50/50 mixture of **Insect Booster** with bran and supply as the substrate in which the pupae live.

### The Good Oil for Animals



**Dosage for Marsupials:** Use at the rate of up to 10mL added per 100mL of milk formula and mix in thoroughly. Introduce gradually to avoid digestive upset. Do not over-supplement, as this will dilute the concentration of other nutrients in the milk and lead to nutritional imbalance.

Note that all **Wombaroo** Milk formulas already contain sufficient fatty acid content for their target species. Supplementation with additional **Good Oil for Animals** is only recommended in the specific cases outlined above.

### HAND-REARING ACCESSORIES

### **Bottle and Teats**

**Teat Selection:** Teats should resemble mother's in shape and length for mouth comfort, fit and correct tooth eruption. Marsupial teats get longer as the joey grows, so progression to longer teats is important.

**Hole Size:** There is no hole in the teats, so the carer can make a hole to suit the age of the animal. Pierce the tip of the teat with a hot needle to make a hole about 1mm in diameter, or for large animals, cut a hole with scissors. If the hole is too small, excessive sucking will quickly weaken the tip and the end will blow out. If the hole is too large, excessive milk flow may increase the risk of the joey aspirating milk into the lungs. The hole should be large enough for milk to drip out slowly, when the bottle is inverted.

### **Bottle and Teats**

**Feeding Technique:** Small animals can be fed using a syringe with a teat pulled over the end to give greater control of milk flow with the plunger. Guidance should be obtained from experienced carers on correct feeding technique for different animals.

**Care & Storage:** Latex is a natural product, and degrades with use. Deterioration can be slowed by storing teats in an opaque, airtight container. Teats should be washed in warm soapy water immediately after use, dried and stored as above. Some carers sterilise by boiling or using infant sterilising solutions.

A range of latex teats are available with a sleeve to fit bottles with a neck diameter of 18-24mm. The 100 mL plastic bottle fit these teats and has graduations in mL.

STM Teat	MTM Teat	TM Teat	FM Teat	Во	ttle
Small in-pouch kangaroos, wallabies, possums.	In-pouch kangaroos, wallabies, koalas.	Out of pouch kangaroos and wallabies.	Out of pouch kangaroos, wombats, koalas.	100 ml Grad	uated Bottle.
SD Teat	LD Teat	C Teat	F Teat	P Teat	D Teat
Small dogs, possums, gliders.	Large dogs, possums, wombats, koalas.	Cats, rabbits, carnivorous marsupials.	Flying fox, some breeds of dog.	Small mammals, cats, rabbits.	Deer, 26mm sleeve to fit larger bottles.

## **Cosy Heat Pad**



### **Applications**

- Artificial pouches for orphaned marsupials: Place pad at back of pouch and put insulation between pad and animal.
- Birds & Animals: Place pad underneath or inside box or hospital cage.
- **Reptiles:** Place at one end of the enclosure so reptile can move on or off the heated area. Cover with layer of sand or flat rock.
- **Veterinarians:** use on operating tables and in recovery rooms.

#### **Directions for Use**

The **Cosy Heat Pad** works by gradually heating up the area under where the animal sits. The heater produces a temperature on the pad surface of about 15-20°C above room temperature.

### When room temperature is less than 10°C.

Animals should be as close as practicable to the pad surface.

### When room temperature exceeds 10°C.

Animals should be insulated from the pad surface with layers of woollen fabric or other insulating material. The thickness of insulation required will depend on the room temperature and should be adjusted so that the animal is comfortable.

Monitor the temperature where the animal rests with a thermometer. It should be between 25°C and 35°C, depending on the age and type of animal. Seek veterinary advice if unsure of your animal's needs.

### Heat stress can occur if the temperature is too high.

The device is fitted with a cut-off switch which limits the surface temperature of the pad, preventing excessively high temperatures, but it is still recommended to monitor temperature at all times.

### Cleaning

The outer PVC cover can be cleaned with a damp cloth or sponge. Unplug the device from the power outlet when cleaning. Do not immerse the pad in water.

#### **APPENDIX 1**

### Storage of Milk Powders & Food Products

Good storage conditions can help prevent spoilage of food products.

#### Moisture

Exposure to moisture and air can be a cause of microbial contamination. To avoid this, store dry powders in an air tight container once opened. Ensure hands and utensils are thoroughly washed and dried before using products.

#### **Temperature**

High temperatures can accelerate the oxidation of fats & oils, causing them to go rancid. This can create a noticeable change in texture, odour, colour, and taste. Prolonged exposure to hot conditions during shipping and storage may therefore reduce the shelf-life of the product.

#### "Best Before" Date

The products come with a "Best Before" of 18 months from manufacturing, so the fresher the product the better. Always check the best before date on the product before using. Over time nutrients such as vitamins & minerals can degrade, so we do not guarantee the nutritional composition beyond this date. While some products may still be usable after the best before date, this is done at the consumer's own risk.

### Storage of Dry Powders

- Store in a cool, dry place, below 30°C.
- Once opened, store in an air tight container.

It is usually not necessary to store powdered products in the refrigerator, unless conditions are particularly hot or humid (e.g. tropical climates). If storing in the refrigerator, ensure the product is kept in an air tight container to avoid condensation of water droplets into the powder.



We generally do not advise storing milk powder in the freezer, due to the formation of ice crystals within the milk powder. These can disrupt the emulsion of fat in the milk and cause lumpiness and separation when trying to reconstitute the milk powder in water.

### Storage of Reconstituted Milk & Foods

Once made up, milk and foods should be stored in the fridge for a day, or frozen for up to 2 weeks. When small quantities of milk are required, it is more convenient to make up larger batches (i.e. 500mL-1 Litre) and freeze-off into ice-cube trays. Once the ice-cubes have set, pop them out into an air-tight container, and keep stored in the freezer. The smaller quantities can then be thawed out as required. Do not refreeze thawed milk.

#### **APPENDIX 2**

### **Underweight or Malnourished Joeys**

Many joeys that come into care are malnourished or have a compromised immune system. Along with proper nutrition, these animals may require veterinary care such as fluid therapy and ongoing disease treatment. It is very difficult to achieve healthy weight gain in a joey with an untreated illness.



If a joey is severely underweight when it first comes into care, ensure that rehydration has been carried out before feeding milk.

Underweight or malnourished animals may benefit from a course of **Impact Colostrum Supplement** (see page 32). Colostrum contains high levels of immunoglobulins and antibacterials, which may aid immunity and intestinal protection which in turn can help with metabolism of nutrients.

Underweight joeys should still be aged accurately to ensure the correct stage of Wombaroo Milk is being administered. The growth of bones is not usually retarded unless nutrition is extremely restricted for a long period, so head, foot and tail measurements are still useful for age determination. However, body weight is quickly affected by poor nutrition, so should not be used for age estimation. Developmental milestones (e.g. eyes open, fur growth etc.) outlined on pages 2 and 3 may also be useful in age determination "by eye".



# Feed volume should initially be based on the actual body weight of the joey.

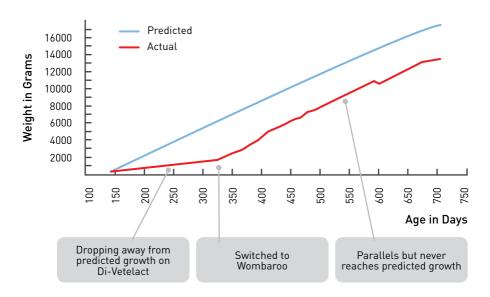
Once the joey is established on a consistent feeding regime, the daily feed volume may be gradually increased by upto 20% above the normal feed volume for that joey's weight. For example a 1kg Eastern Grey joey that would normally be on 100mL per day, may be increased to 120mL/day. This higher feed volume is designed to provide a controlled increase in daily energy intake so that an improvement in growth rate may be achieved. Take care not to increase the volume too fast or the animal may start to scour. If the animal has control of its bowels, even though the faeces are a little looser than normal then the increased feed volume is being tolerated. If it starts to scour uncontrollably, then the increase in volume has been too rapid.

Carers are sometimes reluctant to transition their joey to the next stage of Wombaroo because it is underweight. However joeys should be transitioned based on age as their digestive physiology develops regardless of their body weight. In fact, by holding it back on a formula designed for younger animals it may be missing out on essential nutrients required for its stage of development. An example of this is a kangaroo joey going from 0.6 formula to >0.7, which is a critical stage for increased growth and energy demands.

In practice, an underweight joey may not catch-up to its "theoretical" growth curve, especially if has been maintained on an unsuitable diet for a long period of time. Below is a chart showing the actual growth against the predicted theoretical growth for an Eastern Grey Kangaroo initially fed on a generic formula (Di-Vetelact™) then later switched to a specific formula suitable for its age and species (Wombaroo Kangaroo Milk Replacer >0.7). The change to Wombaroo arrests the decline in growth and then the animal parallels the expected growth line but doesn't catch up. In this circumstance an earlier switch to Wombaroo along with a controlled increase in feed volume may have been enough to close the gap.

### **Online Animal Record System**

**Animal Growth History** 



#### Reference

Chart reproduced with permission from Peter Richards (Long Grass Nature Refuge) from "Animal Husbandry Software for Australian Wildlife Carers." National Wildlife Rehabilitation Conference 2006.

#### **APPENDIX 3**

### **Dehydration & Drinking Water**

There is currently no published data on the water requirements of juvenile marsupials. However, since milk is the only source of water in the diet of pouch-bound marsupials, it is reasonable to assume that mother's milk adequately supplies the water requirements of young animals. For this reason, Wombaroo Milk Replacers are formulated to match the milk concentration and feed volumes that are naturally produced by lactating female marsupials. Mother-reared joeys do not usually receive additional water intake until they start emerging from the pouch. Conditions in the pouch are high in humidity and are at optimum temperature such that water losses from the joey are minimised.

### **Maintenance Water Requirements**

Animals have a "maintenance" water requirement which supplies their basic needs for normal biological activity. This varies depending on the species and the size of the animal. In clinical veterinary practice, maintenance fluid requirements in small animal patients are often defined as 60mL/kg/day (6% bodyweight) for smaller dogs and 40mL/kg/day (4% body weight) for larger dogs (DiBartola 2006). In the absence of specific values for juvenile marsupials, these numbers are often quoted as a guideline, although its likely that pouch-bound marsupials have significantly lower water requirements due to their reduced energy expenditure. Denny & Dawson (1975) found that adult macropod water turnover rate was only about two-thirds that eutherian mammals such as dogs, and this was attributed to the marsupial's substantially lower metabolic rate. On this basis, a maintenance fluid requirement for marsupials of around 4 to 5% of body weight is probably appropriate.

Water quantities consumed in the milk for a typical kangaroo joey fed Wombaroo are given in the table below:

Milk Formula	Joey Weight (g)	Milk Fed (mL)	Water in milk (mL)	Water as % body weight
<0.4	250	45	43	17
0.4	500	63	57	11
0.6	1300	105	89	6.9
>0.7	1800	120	96	5.3

From the final column in the above table it can be seen that all stages of Wombaroo Milk Replacers provide fluid levels that meet or exceed the guidelines of 4-5% body weight predicted for marsupials.

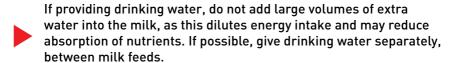
Joeys at the 0.6 or younger stages, receive fluid from their milk well in excess of their maintenance water requirements, and therefore do not usually require additional water, unless they are significantly dehydrated. Joeys at the >0.7 stage are starting to emerge from the pouch (or are at least leaning out of the pouch), so should have free access to bowls of water, as well as fresh grass, which can be sprayed with water. In this way, joeys can start to regulate their own water intake, and not just rely on the water present in the milk. Additionally, the marsupial kidney at this age is developing its ability to concentrate urine, which helps to conserve water and further reduces the maintenance requirement.

### **Dehydration in Hand-Reared Joeys**

Dehydration in hand-reared joeys occurs through respiration, which is directly linked to energy expenditure, as well as exposure to temperatures which exceed the thermoneutral zone. Husbandry conditions in captivity should mimic as closely as possible those in mother-raised joeys in order to avoid dehydration. However, often animals are kept at higher temperatures, lower humidity and with much more activity and stress (over handling) than they would have in the wild. These factors can all lead to dehydration, and the need to provide additional water, over and above that which is provided in the milk.

- It is important to monitor joeys and determine if they have become dehydrated, especially during hot weather.
- Provide additional drinks of water in hot weather, if the joey is showing signs of dehydration and when joeys begin to emerge from the pouch and become more active.

Healthy young animals will readily drink water when thirsty. Marginally dehydrated animals may only require an additional 1-2% of their body weight per day in water orally (ie 10-20mL/kg body weight). Severely dehydrated animals may require over 5% (50mL/kg) additional fluids, but in these cases it may be preferable to administer fluids subcutaneously under veterinary supervision.



#### References

Denny, MJS & TJ Dawson (1975). Comparative metabolism of tritiated water by macropodid marsupials. American Journal of Physiology. 228, 6, 1794-1799. DiBartola, SP (2006). Fluid, Electrolyte, and Acid-Base Disorders in Small Animal Practice. Third Edition. Saunders Elsevier. p21-22.

### **APPENDIX 4**

#### Calcium & Bone Fractures

Calcium is an essential mineral required for the healthy growth and development of bones. Mineralisation of marsupial joey bones relies on available calcium levels, balanced with other nutrients such as phosphorus and vitamin  $D_3$ . Calcium concentrations in marsupial milk tend to increase from around 1.5g/litre in early lactation to over 4g/litre in late lactation (compared to only 1.1g/litre in unfortified cow's milk). These increases occur in line with increasing energy content of the milk, so its useful to standardise calcium concentrations as weight per unit of milk energy (ie mg/MJ):

Species	Calcium (mg/MJ)	Reference
Red Kangaroo	500-700	Lemon & Barker 1967, Poole et al 1982
Grey Kangaroo	400-800	Poole et al 1982
Tammar Wallaby	375-550	Green et al 1980, Green & Renfree 1982, Green 1984
Red-necked Wallaby	400-700	Green 1984, Merchant et al 1987

In all cases the reported quantity of calcium in macropod milk is greater than 375 mg/MJ. In addition, Walker & Vickery (1988) boosted their calcium levels to 486 mg/MJ after experiencing fractures at 307 mg/MJ. At all stages Wombaroo formulae contain greater than 500 mg/MJ calcium, balanced with phosphorus and Vitamin  $D_3$  levels. It is noteworthy that some other commonly used milk replacers have deficient levels of calcium compared to those naturally present in marsupial milk.

#### Incidence of Bone Fractures

Bone mineralisation progresses when the joey leaves the pouch and load bearing occurs. Joeys need to gradually increase the level of load bearing to strengthen bones. Even if calcium levels in the milk are sufficient, pouch bound joeys are prone to fractures due to their low level of bone mineralisation. Problems are exacerbated if husbandry practices induce premature load bearing e.g. over-activity of young, excess movement in the artificial pouch or falls from an unsecured pouch opening. In the wild the mother tightly controls movement and level of activity in the pouch-bound young and captive husbandry needs to mimic this as closely as possible to minimise the incidence of fractures.

#### Reference

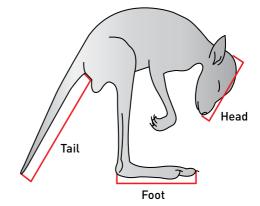
Walker, DM & K Vickery (1988). Tolerance of pouch young kangaroos (Macropodidae) for cow's milk and milk replacers containing different amounts of glucose and lactose. Aust. Mammal. 11: 125-133.

### **APPENDIX 5**

## **Body Measurements for Age Determination**

The following figure outlines the standard body measurements used to age joeys in the Wombaroo growth charts. Note that body weight is not an accurate indicator of age.

Source: Sharman GB, Frith HJ & Calaby JH (1964). Growth of the pouch young, tooth eruption and age determination in the red kangaroo, Megaleia rufa. CSIRO Wildlife Research 9, 20-49.



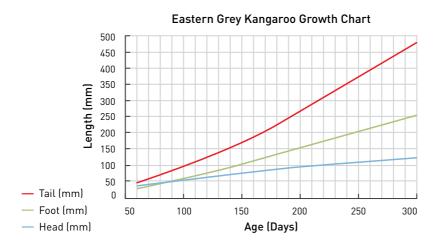
**Head Length:** Best measured with vernier calipers, from tip of the nose to the back of the skull. Head length is generally the most accurate indicator of an animal's age.

**Foot Length:** From the back of the heel to the end of the longest toe (excluding the nail). Measured with calipers, a ruler or tape measure.

**Tail Length:** Underside from the base to the tip (excluding any hair protruding from the tip). Measured with a ruler or tape measure.



Measuring the foot length of a joey with calipers.





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