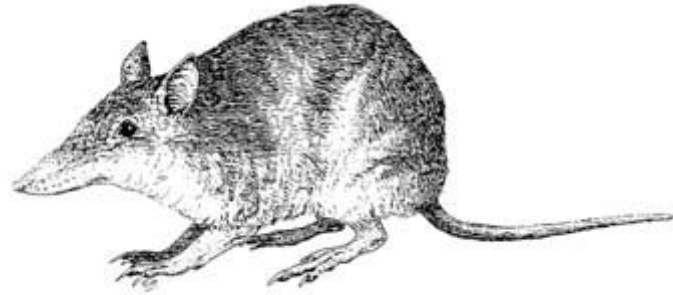


# Husbandry Manual for



Long-Nosed Bandicoot

*Perameles nasuta*

*Mammalia : Peramelidea*

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Captive animals Certificate III

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# Introduction

The Long-Nosed Bandicoot is probably best known for the small round conical holes it leaves behind in peoples lawns as it forages at night, other then that the long-Nosed Bandicoot is a carnivorous, nocturnal marsupial with a reverse pouch. They are a grey-ish brown colour on the back and a creamy white on the underside. Their forefeet and upper surface of their hind feet are also creamy white. Their muzzle is long and pointed, much more so then the short-nosed bandicoot..

their coat is bristly and rough, but unlike many other bandicoots they don't possess the same bars found on the rumps of many other species of bandicoot.

the Long-nosed Bandicoot were once widespread and common in Sydney. Today their range and distribution in the Sydney region is reduced and isolated populations remain in bush land areas to the north and south of Sydney. A small colony at North Head, Manly is classified as an 'endangered population'. A Recovery Plan has been made, but is still in draft form.

It has now become illegal to hunt, house or handle the Long-nosed bandicoot for conservation reasons.

## Things to know before handling The Long-Nosed Bandicoot:

*Perameles nasuta* is prone to having Toxoplasmosis and Lyme disease.

Toxoplasmosis can be transmitted though cat feaces, raw, uncooked, cross-contaminated meat and water contaminated with toxoplasma. It normally doesn't need treatment and will leave the body itself. If you plan to breed I recommend seeking veterinary help.

Some severe symptoms can cause damage to the brain, eyes and other organs.

There are 3 principal ways *Toxoplasma* is transmitted:

- Directly from pregnant mother to unborn joey when the mother becomes infected with *Toxoplasma* during pregnancy.
- Consumption and handling of undercooked or raw meat from infected animals.
- Ingestion of food or water or inhalation of dust contaminated with a very resistant form of *Toxoplasma* called the oocyst



## **Taxonomy:**

### ***2.1 Nomenclature:***

Class Mammalia

Order Dasyuridae

Family Peramelidae

Genus Perameles

Species nasuta

### ***2.2 Subspecies:***

Long-nosed bandicoot: GENUS: Perameles: 3 species:-

- Western barred bandicoot (P.bougainville)
- Eastern barred bandicoot (P.gunnii)
- The desert bandicoot (P.enemiana) now listed as extinct by IUCN
- Long-nosed bandicoot (P.nasuta)

(David MacDonald, 2001)

### ***2.3 Recent Synonyms:***

None.

(E.Stodart, 1995)

### ***2.4 Other Common Names:***

None.

(E.Stodart, 1995)

\*Family:Peramelidae is often referred to as the 'Ordinary Bandicoot'.

(Suzanne J. Hand, 1990)



## 3 Natural History

### 3.1 *Morphometrics:*

The Long-Nosed Bandicoot has long pointed ears and short bristly distinctive fur that is a grey-ish brown colour on the back, and creamy white on the underside. Their forefeet and the upper surface of the hind feet are also creamy white.

the bars that are commonly found on the rump on many other species of bandicoot, like *Perameles gunnii* (Eastern Barred Bandicoot) are absent on *Perameles nasuta*. their muzzle is long and pointed, much more so than the Short-Nosed Bandicoot, who it often gets confused with.

(Pers obs, E.Stodart, 1995 & Leonard Cronin, 1997)

#### 3.1.1 *Mass and Basic Body Measurements:*

Head & body Length: 310-425mm

Tail Length: 120-155mm

Weight: 850-1100g

(Males are somewhat larger than females.)

(E.Stodart, 1995)

#### 3.1.2 *Sexual Dimorphism:*

Due to the Long-Nosed Bandicoots decreasing numbers and small dispersion, their sizes don't range far from the numbers listed above.

#### 3.1.3 *Distinguishing Features:*

*Perameles nasuta* has some very distinguishing features that separates it from all the other bandicoots:

- They are the only species of bandicoot to have a call.
- They often let off a shrill-like grunt whilst foraging.
- The bars that usually appear on the back of all other species of bandicoots are absent.
- They have the shortest known gestation period of 12.5 days, also shared by the Northern Brown Bandicoot.

(Pers obs & Ronald Strahan, 1995)

### 3.2 *Distribution And Habitat:*

Widely distributed in coastal New South Wales from the Victorian to the Queensland borders. The species has suffered a contraction of its range, particularly west of the Great Dividing Range. Most recent records are largely restricted to the coastal strip. They were once common and widespread in the Sydney region but many formally recorded populations have become extinct.

Across their range, they have been recorded in rainforest, wet and dry forests and woodland, heathland and grassland.

(The Old Coot, Issue no1~July 2000)



### **3.3 Conservation Status**

The Long-Nosed Bandicoot: Red List Category and Criteria: EN B1 + 3a\* (version 2.3 1994)

Year Assessed: 1996

Assessor/s: Australian Marsupial And Monotreme Specialist Group.

History:

- 1965 “Status inadequately known- Survey required or data sought” as *Perameles nasuta* (Scott 1965)
- 1982 – Rare (Thornback and Jenkins 1982)
- 1986 – Rare (IUCN Conservation Monitoring Centre 1986)
- 1988 – Rare (IUCN conservation Monitoring Centre 1988)
- 1990 – Rare (IUCN 1990)
- 1994 – Endangered (Goombridge 1994)

Major Threats:

- Habitat loss/Degradation – Land management of non-agricultural areas – change of management regime (ongoing)
- Habitat loss/Degradation – invasive alien species (ongoing)
- Invasive alien species (directly affecting the species) Predators (ongoing)

\*See appendix for explanation of criteria codes.

(www.IUCN.org)

### **3.4 Diet in the wild:**

*Perameles nasuta*'s diet in the wild, mainly consists of:

Insects: Worms, snails, crickets, earthworms, beetles, slugs, cockroaches, larvae, ants.

Small invertebrates: Mice, frogs, lizards...

Plants: Soft tubers, and succulent plant material, seeds of non woody plants, subterranean fungi, monocot leaf and stem

They increase their consumption of plant material and beetle larvae in winter and early spring and decrease their consumption of cockroaches, seeds and adult ants.

(The Old Coot, Issue no1~July 2000 & David Macdonald, 2001)

### **3.5 Longevity**

#### **3.5.1 In the wild:**

In the wild, given the right conditions, the Long nosed bandicoot can live to about 2 and a half years.

(The Old Coot, Issue no1~July 2000)

#### **3.5.2 In captivity:**

Bandicoots are easily kept in captivity and breed readily given the right conditions. If kept well, their maximum age can reach up to 4 and a half years.

(Suzanne J. Hand, 1990)



### ***3.5.3 Techniques used to determine age in adults***

There seems to be no useful technique to determine the age of the Long nosed bandicoot. The only age classes that could be distinguished were 0 – 4 months and greater than 4 months, using the degree of fusion of the epiphyses of the limb bones.

(Stephen Jackson, 2003)

Some juveniles show light bars on the rump which are normally absent on *Perameles nasuta*.

(E.Stodart, 1995)



## **4 Housing Requirements:**

### ***4.1 Exhibit/Enclosure design:***

It is recommended that fully enclosed cages, using bird netting or fabric mesh with 1.2cm hole size be built. This will prevent vermin, such as rats and predators including pythons, cats, foxes and owls getting into the cage. It is of course impractical to roof over large enclosures, but perimeter steel strip near the top of the fence will prevent predators climbing the fence. Wire netting buried approximately 30cm deep will prevent animals digging in or out of the enclosure. All gates need to be a snug fit in the frames. It is virtually impossible to keep owls and snakes, particularly pythons out of large enclosures.

(Suzanne J. Hand, 1990)

### ***4.2 Holding area design:***

A wire mesh cage (nogel cage) measuring 2m x 1.5m x 1m with food and water bowls, and newspaper substrate can be used as a holding cage for short periods of time while serving the animals enclosure. The cage should be covered and should have shredded paper lining the cage for the animal to hide in. The position of the nogel cage should be in a low traffic area, as to not stress the animal.

(Pers: Comm; Graeme Phipps & Suzanne J. Hand, 1990)

### ***4.3 Spatial requirements:***

The minimum area of the enclosure recommended for *Perameles nasuta* is

AREA (L x B x H) 4 x 4 x 2

Additional floor area for each extra animal (m) 2.5m x 2.5m

Bandicoots *can* be held in relatively small enclosures, but if possible should be made larger to reduce the chance of aggression and stress in females with young. Long-nosed bandicoots can be held in 76 x 60 x 40 cm stainless steel boxes, but will rarely breed in them, compared with frequent breeding in out door enclosures.

(Stephen Jackson, 2003, & Suzanne J. Hand, 1990)

### ***4.4 Position of enclosures:***

If on display, Bandicoots should be displayed in reverse-cycle lighting conditions. If kept for conservation reasons, the position of the enclosure should be facing east and the back of the enclosure should be facing west so the animal can feel the morning sun and isn't forced to feel the full brunt of the sun all day.

(Kirsty Dixon, 1997 & Pers: comm. Andrew Titmuss, 2005)

### ***4.5 Weather protection:***

Bandicoots are never normally found far away from dense vegetation. So outdoor enclosures must be planted with long grass and tussocks, branches hollow logs and other fallen timber to make good refuge. It is recommended that half the enclosure be covered with roof for refuge out of the weather elements.

(D.D Evans, 1979)



#### ***4.6 Temperature requirements:***

Heating is generally not needed, providing you supply adequate dry, bedding material, and cover is available.

(Stephen Jackson, 2003)

The preferred temperature of the Long nosed bandicoot is between 19 degrees Celsius and 25 degrees Celsius.

(Suzanne J. Hand, 1990)

#### ***4.7 Substrate:***

*Perameles nasuta*'s substrate should be about 10 to 30 cm deep of soft soil for the animal to forage, if the substrate is too abrasive on their feet they may experience problems.

(Kirsty Dixon, 1997)

#### ***4.8 Nestboxes and/or bedding material:***

Bandicoots live in nests consisting of a mass of ground litter raked together with a chamber and a loose area in each end of the heap for entry and exit. The nest is situated either in a deep depression, the surface flush with ground level (when sited on open ground) or in a shallow depression with the litter raised a few inches above the surface in a low mound (when placed in low ground cover)

Bandicoots are occasionally found nesting in hollow logs or under grass tussocks.

(E.Stodart, 1995)

#### ***4.9 Enclosure furnishings:***

*Perameles nasuta* is never found far from dense vegetation, so grass tussocks and long grass must be planted. Along with branches, tree logs to take refuge in. A pond for drinking out of would be ideal, but a sipper bottle is more convenient, as they tend to throw substrate into the pond while foraging.

Fallen timber and large rocks are ideal to climb on and make good exhibit furnishings, but care must be taken that they are stable and will not crush the animal as it fossicks around the base. They require a lot of leaf litter and debris for nesting.

Because they are such shy creatures, they should be housed in reverse-cycle conditions with one-way glass.

(Kirsty Dixon, 1997)

#### ***4.10 Pest control:***

It is almost virtually impossible to have your enclosure mouse proof if situated outside. But wire mesh 1cm x 1cm wide and dug about half a metre underground will keep out rats and rabbits. A roof of colourbond will keep out/away owls and raptors. Because the Long-nosed bandicoot is an omnivore, placing rat and mouse bait around the enclosure isn't practical, as the mouse could go into the enclosure directly after devouring the bait and the bandicoot will likely feed on the mouse and get indirectly baited. Traps are a much more efficient way of eliminating rodents.

Make sure to check your traps regularly to reduce owl and raptor numbers around your enclosure, as they may stress the animal.

Clean up of excess and uneaten food should be done daily to reduce rat and mouse numbers.

(See table in appendix)

(Suzanne J. Hand, 1990 & Pers: comm.; Graeme Phipps, 2006)



## 5 General Husbandry:

### 5.1 Hygiene and cleaning

#### DAILY:

- Give Bandicoot fresh food and water.
- Give live insects twice a week. Remove any that haven't been eaten to prevent diseases and vermin
- Do a D/E. Check enclosure for anything unusual in animal's health. I.e.: Vomit, blood, faeces...
- Wash food and water bowls with disinfectant. I.e.: Domestos

#### WEEKLY:

- Clean around food and water bowls and nesting area.
- Check supplies Example: Food, insects, nesting material.
- Provide environmental enrichment: nesting material, insects in substrate.
- Clean around enclosure to reduce vermin/pests
- Replace leaf litter if necessary.

#### MONTHLY:

- Replace nesting material.
- Oil locks on enclosure.

#### HALF YEARLY:

- Total change of substrate
- Disinfect whole enclosure: walls, floors, roof.
- Worm and medicate bandicoots.

#### NOTE:

Disinfectants like Dettol should NOT be used as it leave a residue built up. Bleach can be used, if used properly. Leave the cleaned area out in direct sunlight for approximately three hours so the UV rays can properly break down the bleach and no residue is left.

(Pers: comm.; Andrew Titmuss, 2005 & worksheet Captive animals: Maintain housing, 2005)

### 5.2 Record keeping:

A daily diary should be used for record keeping.

Things you should include are:

- Things you see in your D/E
- The time you checked the enclosure.
- The number of animals in the enclosure.
- The temperature; current, min, max
- The humidity; current, min, max
- Any abnormalities
- The behavior of the animals
- The amount if supplies left.

(Worksheet, Captive Animals, 2005)



### ***5.3 Methods of identification:***

Cage cards are commonly used for bandicoots, as there is never usually more than one bandicoot in the same cage at any one time, due to them being a solitary creature. Other methods used are ear notching and microchipping. (Commonly used out in the wild)

(Stephen Jackson, 2003)

### ***5.4 Routine data collection:***

When using the daily diary there are codes you should become familiar with using.

These codes are:

**ACQ: ACQUISITION:**

Any importation from outside the collection, public donation, or capture from grounds or from the wild.

**B/H: BIRTH/HATCHING:**

Birds: Generally recorded as hatch date. If date of leaving the nest is used it must be noted as such, under information column.

Marsupials: The date on which the animal is 'permanently out of the pouch', or the day the juvenile is thrown from the pouch.

Placentals: The day on which they are born.

**D/30: DEATH WITHIN 30 DAYS:**

Death/euthanasia within 30 days of birth, hatching or acquisition.

**D/E: DEATH ESTABLISHED:**

Death/euthanasia of any animal which has been resident in the collection for longer than 30 days.

**DIS: DISPOSITION:**

Includes exports from the collection, release, sales, escapes.

**BRD: BREEDING:**

Reproductive details/observations. Any nesting, laying of eggs, oestrus, menstruations, mating, courtship, pouch checks, sexing of previously unsexed individuals or any other reproductive matter.

**INT: INTERNAL MOVEMENT/TRANSFER:**

Movement of an animal from its residing enclosure be it within a section or to a different section transfers/exports out of the collection NOT included.

**TAG: TAGGING**

Animal identification by banding, tagging, notching, tattooing, naming or any other method of identification.

**W/C: WEIGHT/LENGTH:**

Weight or length measurements.



**Rx/Tx: TREATMENT:**

Any medical treatment administered to animals, either by vets, or continuing treatments administered by animal care staff. Include observations of anything related to treatment. Flag if veterinary examination is required using VET code.

**VET: VET EXAMINATION REQUIRED:**

Note if veterinary treatment/examination is required.

**OTH:OTHER:**

Any notable observations made in reference to daily routine or animals. Example: Behavior, change to routine etc... also anything of interest. I.e.: Animal management procedures, diet change, maintenance etc....

(Worksheet, Captive Animals, 2005)

## 6 Feeding Requirements

### 6.1 Captive diet:

- A small handful of dried dog kibble. (\$3.49)\*
- 30g of Wombaroo\* small carnivore mix. (\$11.00)
- 6-10 small pieces of apple. (\$2.65 kilo)
- 1 small medium banana (\$1.98 kilo)
- 4-6 pieces of tropical fruit and melons
- ¼ slice of bread.

#### **This will feed ONE animal per day**

Mice are relished and are given when available once or twice a week instead of the small carnivore mix. Insects such as mealworms, cockroaches, grasshoppers and fly pupae can be given if available, although if kept outside on dirt floor the animal can search for insect prey itself.

This diet is suitable as it covers the range and variety of what *Perameles nastua* would eat in the wild. If insects cannot be accessed, an emergency insect cake can be made. This recipe is essential during winter when insects aren't readily available.

\*Prices are approximations taken from the year 2005.

\*See appendix for details.

(Suzanne J. Hand, 1990)

### 6.2 Supplements

Insects: including 5 – 6 crickets or moths.

Fruits: including apple, banana, kiwi fruit, carrot sweet potato and corn.

Di Vetelact can be used to increase the weight on sick or aged bandicoots.

(Stephen Jackson, 2003)

### 6.3 Presentation of food

Because of *Perameles nastua*' aggressive and solitary nature it is best to have n+1 feeding stations around the enclosure.

The food can be placed in a small sized dog bowl:

- A handful of small dried dog kibble
- 30g of wombaroo small carnivore mix
- ¼ sliced of ripped up/crumbled bread

In a separate dog bowl:

- chop up 6-10 small pieces of apple into cubes that the animal can hold.
- Peel banana incase insecticides have been used, and slice into slices approximately 1cm in width.
- Chop pieces of tropical fruit into cubes

(Pers; obs)

## 7 Handling And Transport

### 7.1 *Timing of capture and handling*

Capture and handling is best undertaken during the day, or just before the lights go on in the nocturnal house, when the bandicoots are in their nest or nest box.

Regurgitation can occur if the animal has been previously fed before capture. Wait at least 4 hours before capturing after feeding.

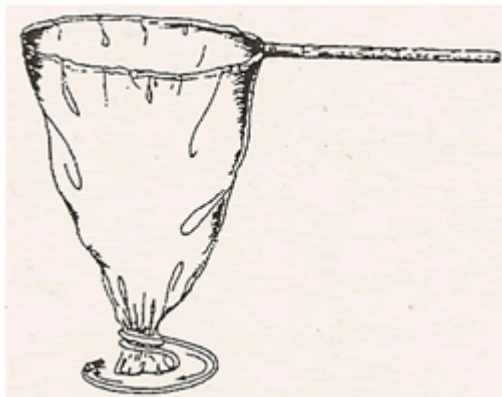
(Stephen Jackson, 2003)

### 7.2 *Catching bags*

If using catching bags the hoop bag with a black long cotton bag can be used. The animal will experience less stress as it is dark and the animal cannot see its surroundings. When placed in a hoop bag, place the animal at the base of the bag, do not drop the animal. Twist the handle, so the animal can't jump out of the bag.

Good quality pillowcases can also be used (otherwise they will be ripped by the animals feet).

(Stephen Jackson, 2003 & The T G Hungerford Refresher course for Veterinarians 1994)



(Picture taken from: The T G Hungerford Refresher course for Veterinarians 1994)

### ***7.3 Capture and Restraint Techniques***

Use this grip shown here. You cannot hold the bandicoot in it long as they have fast, jerky movements and can escape from your hands, falling, which can result in injury. So while someone else is placing a towel or blanket over the bandicoots eyes, you can restrain them like this.

Once restrained, like most mammals, place something over their eyes to make them feel less stressed.

(Stephen Jackson, 2003 & The T G Hungerford Refresher course for Veterinarians, 1994)



(Picture taken from: The T G Hungerford Refresher course for Veterinarians 1994)

Three tips for Handling and Restraint of the Long nosed bandicoot:

- 1: PLAN: How are you going to do it, to keep stress to a minimum.
- 2: EQUIPMENT: Have your BAG; TOWEL and CAGE ready to use.
- 3: APPROACH: Be calm, firm, gentle and definite.

Five simple steps to follow when capturing bandicoots are...

- They are timid and gentle creatures.
- They tend to, at first immobilise themselves, and then try to make a sudden escape.
- Once you have them, hold their body against the ground, and push down gently.
- Then when your ready to place them in their holding cage, lift their body, while supporting the rump (shown in the picture below)
- Then bag him!

(Howard Ralph)

### ***7.4 Weighing and Examination***

When weighing, keep the bandicoot in the hoop bag. Make sure you have the weight of the hoop bag first, then tare the weight.

Examination is best done by two people. One person to hold the bandicoot, and the other to examine.

Things to check in an examination:

- Check gender
- Check females pouch for young
- Check health (eyes are bright, no mites, skin disease, canines are in complete set and are clean)
- Check age (by looking at the condition of teeth, feet and tail.)

(Pers: Obs & Stephen Jackson, 2003)

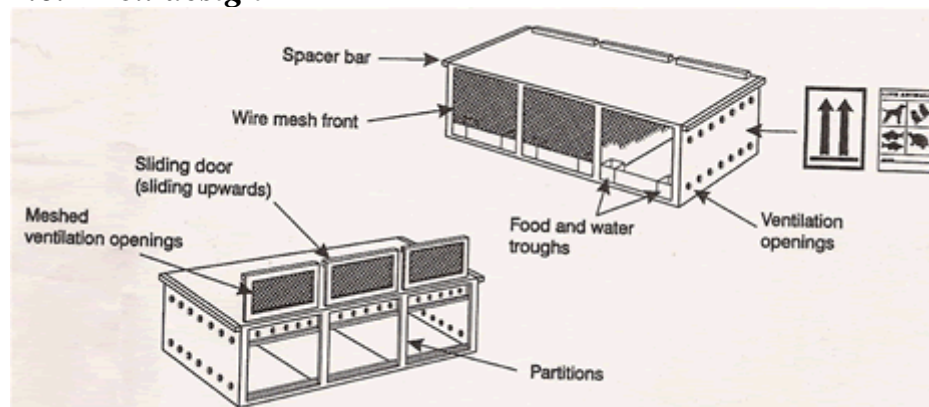
## 7.5 Release

Bandicoots are often very flighty and will often try to scale the wall, which more than often results in foot trauma. So take care when releasing them back into their enclosure. Remove anything you would consider an obstacle (i.e.: logs, hollows), then wait till the bandicoot is settled and calm in its box/bag then leave the enclosure and allow the bandicoot to emerge in its own time.

(Stephen Jackson, 2003)

## 7.6 Transport Requirements

### 7.6.1 Box design



(IATA, 1999, Live animal regulations)

The box should be constructed from wood, plywood, hardboard (mansonite), non-toxic plastic, fiberglass, synthetics, sheet metal, weld mesh or wire mesh. It should be constructed so the animal's normal habits and movement can be made. They must be able to stand naturally and move freely.

There must be multiple compartments with individual access doors. The frame of the box must be made from wood, or plywood and must be screwed together.

the sides and door must be made of the appropriate plywood, wood or plastic. One their of the container must be made from weld mesh. Two rows of meshed ventilation openings, with a diameter of 2.5cm (1inch) must be present on the sides and top.

The floor must be solid and lined with absorbent material such as wood shavings, or shredded paper for bedding.

The roof must have two rows of ventilation, and must be solid wood, plywood or plastic. The door must have a secure means of fastening so that it cannot be opened accidentally. A sliding door must be provided at the rear of the container to give access into the container or each compartment of the container. A sliding front door must also be provided, external to the weld mesh, on the front to all containers. Both doors must have 10% of their surface area covered with correct ventilation openings.

(IATA, 1999)

### ***7.6.2 Furnishings***

Simple, absorbent nesting material should be added, such as wood shavings, shredded newspaper, or barley hay should be provided.

(Suzanne J. Hand, 1990)

### ***7.6.3 Food and water***

Soldered tin must NOT be used. Food and water containers MUST be fitted into the wood/plywood at the front of the container and be fixed into the framework so the animal cannot move them. It must be near outside access so food and water can be replenished during the 24 hours following the time of dispatch, animals do not normally require additional feeding or watering.

(IATA, 1999)

### ***7.6.4 Animals per box***

Adults: One per box

Juveniles: To be placed in with mother, access if needed.

(IATA, 1999)

### ***7.6.5 Timing of transportation***

Ideally the animal should be transported overnight or in the cooler part of the day. Between 10-20 degrees Celsius. If it is too hot, place the bandicoot in an air-conditioned vehicle.

(Stephen Jackson, 2003)

### ***7.6.6 Release from box***

Please refer to section RELEASE 7.5.

## **8 HEALTH REQUIREMENTS:**

### **8.1 Daily health checks**

A daily SOP (standard operating procedure) should be hung on the cage door of the bandicoot/s enclosure to tell the keeper how to care for the animal and what possible things to look out for when servicing the enclosure.

- Any abnormal excretions from the eye, cloaca or mouth.
- Any different or foreign smells coming from the enclosure.(i.e.: Rat/Mouse = musky smell)
- Blood
- Any foreign faeces or urine smells coming from in, or around the enclosure. (i.e.: Rat/mouse pellet faeces)
- How has food been eaten? Vermin like, or bandicoot like?
- Make sure stools are firm and endoparasite free
- Make sure food and water is undercover and out of the weather.
- Check consumption of food – if too much possibility of vermin or worms. If too little possibility of ectoparasite infestation.

(Andrew Titmuss & Graeme Phipps – Pers Comm & worksheet)

### **8.2 Detailed physical examination:**

#### **8.2.1 Chemical restraint:**

Isoflurane administered by mask, T-piece and vaporizer is the anesthetic of choice. Rapid recovery makes this anesthetic ideal for field situations as well. Intubation is straightforward with the aid of a small bladed laryngoscope and a 2mm uncuffed endotracheal tube (for species under 1kg)

Diazepam (valium) has been used for sedation at a dose of 0.5-1 mg/kg I/M

(Postgraduate committee in veterinary science university of Sydney – WILDLIFE)

#### **8.2.2 Physical examination**

When performing a physical examination, things you should be looking out for are, open wounds, or lumps throughout the body, especially around the face and rump, their eyes for cloudiness and clarity and the animals body weight condition. This can suggest aggression problems between the animals.

The physical examination may include:

- Fur – Check for alopecia, trauma, fungal infections and ectoparasites (ticks, fleas)
- Eyes
  - ✓ Should be clear, bright and alert
  - ✓ Should not have any discharges
  - ✓ Normal corneal reflex
  - ✓ Normal bilateral papillary light response.
- Cloaca
  - ✓ Should be clean
  - ✓ Check for excessive amount of fecal matter around the cloaca
- Pouch
  - ✓ If pouch young are present, record sex, age, weight (if detached from the teat), development, and if available measure to determine age from growth curves.

- ✓ Condition of the pouch
- ✓ Cleanliness of the pouch
- ✓ Milk teats to check whether the mother is lactating.
- Respiratory rate – The average breaths per minute at rest is 34. But this may vary depending on the size of the bandicoot.
- Body condition – Best assessed by muscle palpation in the area over the scapula spine and temporal muscle
- Temperature – The average temperature for the Long-nosed bandicoot is 33.5 degrees Celsius. This can be taken through the anus, via the cloaca.
- Weight – Captive animals should be weighed monthly to indicate trends. To assess and compare trends in weight, go back to previous records. Trends in body weight suggest good health in bandicoots, provided age, sex, and geographical location.
- Males
  - ✓ Check the size (length, width, depth) and consistency (firm, not squishy) of the testes.
  - ✓ Check the size and activity of the sternal gland.
  - ✓ Extrude penis and assess.

(Stephen Jackson, 2003)

### ***8.3 Routine treatments***

A monthly dose of ivermectin will prevent most common intestinal worms (except tapeworms), most mites, and some lice. It is not effective against fleas, ticks, flies, or flukes. It is effective against larval heartworms (the "microfilariae" that circulate in the blood) but not against adult heartworms (that live in the heart and pulmonary arteries).

Ivermectin should not be used in combination with valium or related tranquilizers that are commonly used to restrain bandicoots.

(<http://www.marvistavet.com/html/ivermectin.html>)

### ***8.4 Known health problems:***

The long-nosed bandicoot doesn't generally suffer from many health problems associated with disease. Most bandicoots die from either old age, or aggression.

#### **Ectoparasites:**

**Cause:** During the warmer months the long-nosed bandicoot can suffer from seasonal infestations of fleas, ticks and mites.

**Signs:** Younger bandicoots may suffer from a reduced growth rate. And large infestations can visibly be seen. Alopecia may indicate mites.

**Diagnosis:** Generally by visual signs and skin scrapings for mites with microscope examination to identify the parasite.

**Treatment:** Ticks and fleas can be treated with an insecticidal wash (Malawash, ICI Australia) diluted as recommended and given every 14 days.

Ticks can be removed manually, and mites can be treated with a topical acaricide in mild cases using three or four treatments of 1.25% solution or amitraz (Demadex, Delta Laboratories) at weekly intervals.

**Prevention:** Change the bedding regularly, and if kept in an outdoors enclosure, continuously monitor the animals fur/skin.

(Stephen Jackson, 2003)



### **Endoparasitic worms:**

**Cause:** Bandicoots are infested with various endoparasites.

Roundworms have been found such as

- *Labiobulura*
- *Physaloptera*
- *Strongyloides*
- *Moniliformis*

They can cause severe ulcerations sufficient to cause debility if found in abundance of 20 – 50.

Various cestodes, nematodes have also been found in bandicoots though their significance was not stated. They were:

- *Nicollina*
- *Asymmetracantha*
- *Austrostrongylus*
- *Mackerrastongylus*
- *Parastrongyloides*
- *Peramelistrongylus*
- *Trichurus*

**Signs:** Signs were not obvious. Diagnosis was to be conducted.

**Diagnosis:** Fecal floatation and the presence of eggs or proglottids.

**Treatment:** Usually treated with ivermectin at 400 ug/kg by mouth and a single dose. Or with Panacur at 50 mg/kg by mouth daily for 3 consecutive days.

**Prevention:** This generally cannot be done. But remove all feaces form the enclosure and maintain good hygiene.

(Stephen Jackson, 2003)

### **Protozoans:**

**Cause:** The protozoan *Toxoplasma gondii* has caused deaths in both wild and captive animals.

Bandicoots become infected as a result of ingesting sporluated oocytes contaminating food, soil and invertebrate hosts. They can come into contact directly as a result of soil or plant matter put in their enclosure or though earthworms that have ingested the oocycs in the soil.

Bandicoots have died within 11 – 14 days from toxoplasmosis after eating infected worms.

**Signs:** Toxoplasmosis can cause:

- Cataracts and retinal disease.
- Incooridination
- Apparent blindness
- Erratic staggering movements
- Unnatural daytime activity
- Death

**Diagnosis:** Specific doctors conduct Ante mortem diagnosis of toxoplasmosis and certain tests are done to monitor the development of the specific *T.gondii* antibodies.

**Treatment:** Once infected, individuals usually die.

**Prevention:** Keep all bedding material and food away from cats

(Stephen Jackson, 2003)

### **Trauma:**

**Cause:** Trauma is the most common reason for treatment in bandicoots. It can result in aggression by other individuals, from climbing up walls, or running into obstacles, especially during transport. It can be anything from being injured from motor vehicles, bicycles, mowers, leg traps, snares, its cage type, collisions, netting, wire, or during flight.

**Signs:** Fur loss, especially around the rump or damage to the eyes and face is often caused by other animals, avulsion of claws, obvious injuries from any of the above. Climbing the walls of the enclosure often results in nail and foot trauma. You may find some injuries may be obvious, like external hemorrhage, deformity, or odd behaviour, or you may find that they are hidden like brain damage, internal hemorrhage or hairline fractures. Get seen by a vet if any abnormal behaviour occurs.

**Diagnosis:** Through clinical signs and radiography

**Treatment:** Depends on the injury sustained. Seek veterinary guidance early, as delay may allow a treatable lesion to deteriorate into a non-treatable one, or may jeopardize future rehabilitation.

**Prevention:** Definite management of any significant injury. Great care needs to be taken when introducing bandicoots into enclosures. Enclosure walls should have 1.5 m high metal skirting to decrease opportunity of wall climbing.

(Howard Ralph & Stephen Jackson, 2003)

### **Predation:**

Predation is a type of trauma. Always check the mothers pouch.

**Cause:** Introduced species. Domestic animals not kept confined within the house.

**Signs:** Almost any type of injury can result, including:

- External wounds
- Small punctures to large lacerations
- Fractures
- Spinal injury
- Bruising or rupture of internal organs.
- The animal is usually severely stressed, and often cold.

**Treatment:** The animal should be seen by a vet immediately for cleaning and draining of the wounds and treatment of other injuries such as fractures, treatment of shock and infection.

**Prevention:** Keep domestic pets indoors at night. Get involved with local pest management.

(Howard Ralph)

### **Pneumonia:**

Pneumonia implies infection of the lung with one or more types of microorganism.

**Cause:** When the animal is stressed or there is lung damage either by trauma or larvae of internal parasites.

After hypothermia, which can be caused by orphaned joeys rapidly becoming cold after mother is killed, or bad husbandry when hand raised joeys are without well controlled heating systems.

**Signs:** The animal may show very few signs, or be very sick with:

- Collapse
- Breathing difficulty



- Coughing
- Rapid deterioration and death.

**Treatment:** The animals can make a full recovery with possible treatments such as antibiotics administered by a vet.

**Prevention:** This can be prevented by attending to the orphaned animal as quickly as you can. And by administering correct husbandry.

(Howard Ralph)

### **Hyperthermia:**

Hyperthermia is present when the body temperature is above normal.

The higher the body temperature rises the more dangerous it becomes until eventually irreversible tissue injury results and organ failure will occur. Death may rapidly follow.

#### **Cause:**

- Poorly controlled artificial heating.
- Prolonged exposure to high environmental temperature.
- Prevention from losing adequate heat
- Overexertion in hot weather. Pursuit and capture attempts.

#### **Signs:**

- Panting
- Feel hot to touch.
- Rapid pulse and heart rate.
- Salivating
- Dehydration with little to no urine output.
- General distress and agitation or immobility.
- Eventual collapse, convulsions, coma and death.

**Treatment:** Cool the animal and prevent brain damage. Do not cool too quickly unless the situation is desperate cooling:

- Remove heat source.
- Expose to cool environments
- Expose to moving cool air. (ventilation, breeze, fan...)
- Sponge with luke warm water, and expose to moving air.
- Cool the extremities (feet, tail, ears)

Cool fluids may be given orally if the patient is well enough.

**Prevention:** Monitor heat application very carefully.

And ensure adequate ventilation particularly during transport.

(Howard Ralph)

### **Hypothermia:**

Low body temperature causes all metabolic processes to slow down so that tissue activity is reduced. Eventually cell and tissue damage may result from lack of blood, oxygen and nutrients. This may lead to death of a patient.

**Cause:** inadequate heating facilities for hand raised joeys. Prolonged exposure to low environmental temperatures for recently orphaned joeys left in dead mothers pouch.

#### **Signs:**

- Inactivity.
- slow moving or may appear dead.

- Cold to touch.
- Slow heart rate, pulse rate and breathing
- Won't feed or suckle
- Unresponsive.

**Treatment:** Provide warmth immediately but do not try to heat the joey too quickly. Do not apply a very hot temperature as burns may result. Cold tissues are compromised and are easily damaged. Wrap and hold the joey near to your body if nothing else is available. Hot water bottles, thermal blankets, heating pads and humidicribs are useful but the temperature must be carefully controlled.

**Prevention:** Proper husbandry must be applied when dealing with young unfurred joeys. Adequate heating at all times.

(Howard Ralph)

### **Stress Alopecia:**

**Cause:** The cause is either inappropriate husbandry or the presence of a stressor which may not be immediately apparent.

**Signs:** Clinical signs include:

- Loss of fur in a bilateral and symmetrical pattern
- Normal underlying skin.
- Other signs of stress.

**Treatment:** Ensure no intercurrent disease (check with vet). Remove stressor, or change husbandry. (may need to change environment).

**Prevention:** Exercise good husbandry (know the animals needs). Keep animal in good health.

(Howard Ralph)

## ***8.5 Quarantine requirements***

The long-nosed bandicoot if being quarantined around Australia would only have to spend a minimum of 21 days in quarantine. Considering it has no signs of disease or parasites. (Jacki Salkeld; pers comm.)

An enclosure with stainless steel walls and floor measuring up to 76 x 60 x 40 cm can be used adequately. Nestboxes can be placed in the enclosure (35 x 24 x24) with shredded paper for substrate.

(Measurements taken from Suzanne J. Hand, 1990 & Stephen Jackson, 2003)

## **9 Behaviour**

### ***9.1 Activity***

All species of bandicoot are primarily nocturnal.

In captivity, observation have been made in nocturnal conditions and show that the long-nosed bandicoot spent 36% of the time in their nest, 28% stationary, 16% moving, 9% digging, 4% grooming, 3% standing upright, 2% feeding and 1% Wall climbing.

(Stephen Jackson, 2003)

### ***9.2 Social Behaviour***

The Long nosed bandicoot is a solitary animal, coming together only to mate with no lasting connection between mother and young. Males are usually larger than females and socially more dominant. Dominance between closely matched males may be established by chases or, rarely, by fights, in which the males approach each other standing on their hind legs.

The males home range is often between 4.2 - 12.8 acres with the females home range ranging from 2.2 - 5.2 acres. The ranges for both sexes overlap extensively. Females will defend high quality nesting and foraging sites in their areas while the male will patrol most of their home range each night for receptive females and other males.

(David MacDonald, 2001)

### ***9.3 Reproductive behaviour***

Because of their aggressive behaviour the long nosed bandicoot is notoriously difficult to breed in captivity unless kept in larger cages. If handled too frequently young will often be found dead or eaten by the mother.

The reproductive behaviour of the long nosed bandicoot involves the male following the female for up to several hours, sniffing her rump and making numerous attempts to mount her. Mating attempts can be as short as three to seven seconds. The male rests his head on the female and grips her with his forelegs.

(Suzanne J. Hand, 1990 & Stephen Jackson, 2003)

### ***9.4 Bathing***

The long-nosed bandicoot has not been known to bathe, but has been observed splashing in shallow puddles.

(Stephen Jackson, 2003)

The two small joined toes on the hind feet are known to be used for grooming the fur, which helps dislodge many ectoparasites, particularly ticks

(E.Stodart, 1995)

### ***9.5 Behavioural problems***

Stereotypical behaviors can occur if there is excessive noise and disturbance.

Aggression and cannibalism is a major behavioral problem between bandicoots and often occurs when the enclosures aren't big enough, and don't have enough hiding places to be out of one another's sight.

(Stephen Jackson 2003)

## ***9.6 Signs of stress***

Signs of acute stress may include

- Increased vocalization
- Escape attempts
- Reduced food intake
- Reduced weight
- Poor coat condition
- And alopecia.

(Stephen Jackson, 2003)

## ***9.7 Behavioural enrichment***

Being a small insectivorous mammal, the Long nosed bandicoot spends most of its time awake foraging for food. It's important then to make sure it has plenty of feeding activities to fill their time awake at night.

The long nosed bandicoot searches for its prey with ol'factory senses. It digs conical shaped holes and probes them with its long nose, hence their name.

Firstly you need to make sure the enclosure has 10-15 cm of soft non-abrasive soil, so the insects can freely move and the bandicoot will have no trouble digging.

You can then begin to look at enrichment strategies:-

The automatic mealworm feeder is a successful slow release activity.

It is cost effective and easily constructed using some PVC piping, sealed at both ends with 4 small evenly spaced holes drilled into the underside (big enough for the mealworm to crawl through, but not too easily). This will allow the mealworms to eventually, randomly crawl out of the holes, and onto the floor. This device is hung from the ceiling of the enclosure. BUT be wary, be sure to have more than one, so if the animal predicts where the insects are coming from, he may spend his day constantly watching the mealworm feeder which may create a stereotypic behaviour. So make sure to have more than one on different sides of the enclosure so they can't possibly watch them all.

You can naturally attract insects using a compost placed somewhere near the enclosure. The compost should contain any left over food from either its own enclosure or different species. The insects will devour the food and therefore be gut loaded before foraged by your bandicoot. This is an effective way of recycling and adding nutrition to your bandicoots diet.

You may have bug zappers set up around your work place. Set up trays underneath them and empty the contents into the bandicoots enclosure for afternoon feedout.

Other than insects bandicoots also enjoy eating a variety of things from; meats, breads, fruit, vegetables, and fungi, so keep their diet new and different everyday.

Other non-feeding activities can include:

- Swapping enclosures between bandicoots. (i.e.; male-male or male-female or female-female)
- Training sessions with your bandicoots. Teach them useful behaviors for improved husbandry.
- Lots of things to hide/nest in. Allow them to have multiple nests to replicate the wild.
- Audio to stimulate hearing senses. Play insect noises over speaker systems. Crickets at night, cicadas in the day, to promote foraging behavior.

(Celia Maher, Captive Animals, 2006)

### ***9.8 Introductions and removals***

It has been observed that members of the opposite sex can be particularly aggressive towards each other, and injuries often lead to death. House only in pairs, and when introducing, introduce the larger bandicoot to a smaller bandicoots enclosure, rather than the other way round.

Have multiple nests set up, and feed stations so one bandicoot isn't trying to dominate it all. Don't have the enclosure overcrowded, and make sure there is plenty of shelter. Once introduced daily checks should be established between staff to observe any possible aggression, signs may include, blood, fur loss or animals out in the open.

(Pers Comm; Graeme Phipps & Stephen Jackson, 2003)

### ***9.9 Intraspecific compatibility***

The long-nosed bandicoot is unsocial and highly aggressive towards members of their own sex. They should only be housed alone, or in breeding pairs. It is important that animals of similar size are introduced, and that the enclosure is as large as possible. Initial monitoring needs to be done for cases of aggression.

### ***9.10 Interspecific compatibility***

Bandicoots can be housed with many other species of animal, especially arboreal species such as:

- Yellow-bellied gliders (*Petaurus australis*)
- Sugar gliders (*Petaurus breviceps*)
- Squirrel gliders (*Petaurus norfolcensis*)
- Leadbeater's possums (*Gymnobelideus leadbeateri*)
- Common ringtail possums (*Pseudocheirus peregrinus*)
- Common brushtail possums (*Trichosurus vulpecula*)
- Brush-tailed phascogales (*Phascogale tapoatafa*)

(Stephen Jackson, 2003)

### ***9.11 Suitability to captivity***

The long-nosed bandicoot isn't very suitable to captivity if being used for display purposes. Because this animal is nocturnal, and very shy towards the public. It can be displayed in a nocturnal house, but still will rarely be seen due to its timid nature.

Bioparks are the most efficient way to display these animals.

If used for conservation, they breed quite readily in captivity.

## **10 Breeding**

### ***10.1 Mating system***

The long-nosed bandicoot has a polygynous mating system.

### ***10.2 Ease of breeding***

The long-nosed bandicoot will readily breed in captivity, and will re-enter oestrus as early as five to ten days if young are lost. (Stephen Jackson)

### ***10.3 Reproductive Condition***

#### ***10.3.1 Females***

Bandicoots are generally placed into different categories depending on their reproductive status.

- Non – parous (females that have never been bred) They have small pouches, and dry clean teats
- Parous – (Females that have bred previously but not presently)
- Oestrus – The females urogenital opening changes with swelling of the lips.
- Pregnant – Pouch pink in colour and glandular in appearance .
- Pouch young present – Attached to the teat
- Lactating – (young absent from the pouch, but still suckling) the pouch area is large, skin folds loose, hair sparse and stained, skin smooth and dark pink, nipple elongated.

•

#### ***10.3.2 Males***

Sexual maturity of the bandicoot corresponds to the pigmentation of the scrotum, though this isn't an efficient way of telling, and is not precise.

### ***10.4 Techniques used to control breeding***

Bandicoots are solitary creatures and should only be brought together when ready to breed. Methods to control breeding are:

- Keep only one sex in your enclosure.
- Keep only one sex in your whole collection. (Females)
- Make sure no pouch young are males in female enclosure.
- Do constant pouch checks for up to two months after separation. Females can have young 5 – 10 days after losing their young and will re-enter oestrus.
- Vasectomy on males. – Only do this if you NEVER wish to breed your male again.

(Pers Comm; Graeme Phipps)

### ***10.5 Occurrence of hybrids***

There is no known occurrence of hybrids.

(Stephen Jackson 2003)



### ***10.6 Timing of breeding***

Mating takes place at night, and may occur throughout the year, although there is a trough in breeding activity from late autumn (April) to mid winter (June).

(The Old Coot Newsletter, Issue No1~July 2000)

### ***10.7 Age at first and last breeding***

Female bandicoots may begin breeding at about four months of age, and males at 5 months. And will continue to reproduce shortly before they die.

(The Old Coot Newsletter, Issue No1~July 2000)

### ***10.8 Ability to breed every year***

Bandicoots can breed every year.

(Walton D.W & Richardson B.J 1989)

### ***10.9 Ability to breed more than once per year***

It appears the long-nosed bandicoot can breed more than once per year. In good years, females can produce up to four litters. One of the techniques that bandicoots have is they appear to use different nipples for different aged young.

(Stephen Jackson 2003 & The Old Coot Newsletter, Issue No1~July 2000)

### ***10.10 Nesting, hollow or other requirements***

A nest box (35 x 24 x 24cm) can be used for breeding, and has been successfully used in the past. But for environmental enrichment, soft soil with leaf litter and debris should be added to the enclosure to construct a nest out of with grass tussocks to hide in. As outlined in 4.8

(Suzanne J. Hand, 1990)

### ***10.11 Breeding diet***

The amount of food can be slightly increased towards late lactation, and if all is eaten, then more food can be added to the diet.

(Stephen Jackson, 2003)

### ***10.12 Oestrous cycle and gestation period***

The gestation period of the long-nosed bandicoot is the shortest known for any mammal, being 12.5 days.

(Ronald Strahan, 1995)

The long nosed bandicoot is polyoestrous and is capable of producing several litters in the season of their birth. Females can achieve maturity at 3 months and males at 4.5 months. Indeed it appears that peramelids can conceive at their first oestrus.

(C.H Tyndale)

### ***10.13 Litter size:***

The litter size decreases as the bandicoots travel to the pouch. Only 2 – 3 ever make it to sexual maturity. The average being 2.44 taken from the means of 52 litters.

(A.G Lyne, Australian Journal of Zoology)

### ***10.14 Age at weaning***

Weaning in the long nosed bandicoot is at about 60 - 70 days. The young grow rapidly and the females breed almost continually with often several months between litters. In both captive and wild animals, the greatest losses are directly after weaning.

(Stephen Jackson, 2003 & The T G Hungerford Refresher course for Veterinarians 1994)

### ***10.15 Age of removal from parents***

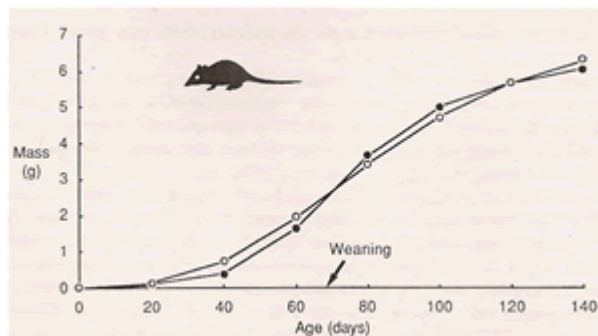
Young should be removed from their parents immediately after weaning. As inbreeding and aggression can occur. Especially in the case on females who reach sexual maturity at 4 months of age.

(David Macdonald, 2001)

### ***10.16 Growth and development***

As the animal ages, its appearance changes. Hair emerges on the trunk at 40 days after birth and at two months the coat is similar to that of an adult. The rate of body growth is extremely rapid just prior to the opening of the eyes. (usually 45 – 48 days), and the young first appear outside the pouch several days later.

They then reach sexual maturity, with females its 3 months with males its 4.5 months. (A.G Lyne, Australian Journal of Zoology)



- = *Perameles nasuta*
- = *Isodon macrourus*

(The T G Hungerford Refresher course for Veterinarians 1994)

## 11 ARTIFICIAL REARING OF MAMMALS:

### *11.1 Housing*

Minimizing stress is a major consideration. The right housing can create a stress free environment. You can achieve this by:

- Securing the area from children and animals.
- Ensuring the area offers shelter from weather and noise.
- Clearing the area of obstacles
- Clearing the area of hazards.
- Maintaining the area in a hygienic manner.
- Escape-proofing the area.

Young Marsupials will need a pouch to feel secure. Only natural materials such as cotton and wool should be used to make artificial pouches, as synthetics are either too hot or too cold, and do not 'breathe'.

Use a humidicrib or a secure box. Line the box with a towel, and place a beanie or an old woollen jumper sewn up at the neck and armholes. It has been noted that beanies are most ideal for juvenile bandicoots. Pillowcases can be used for pouch liners.

(Stephen Jackson, 2003 & Erna Walraven, 1990)

### *11.2 Temperature requirements*

Unfurred joeys require external heating at 32 degrees Celsius. This can be from a hot water bottle, heat pad or heat lamps with a gradient to ensure the animal doesn't get too hot or too cold. Once fully furred, animals no longer require external heating, as long as the animal is kept clean and dry.

The temperature is generally kept at 28 degrees Celsius. Use a minimum/maximum temperature gauge, and place it next to the joey to monitor the temperature.

(Stephen Jackson, 2003 & Erna Walraven, 1990)

### *11.3 Diet and feeding routine:*

Milk formulas:

The three main low lactose formulas for hand rearing bandicoots are:

- Wombaroo Kangaroo milk – Different formulas are used for the different stages of development to mimic the changes that occur in the females during lactation.
- Di Vetelact – this should be fed at approximately 20% bodyweight, except for very small joeys. It is a low lactose milk formula but due to its low energy content when prepared as directed, some groups advise the addition of cream as with the Wombaroo diets.
- Biolac – M100 for furless joeys. M150 which is a transitional milk to feed when dense fur has developed, and M200 which makes the animal produce solid dark pellets.

You can mix formulas for one transition to another. Animals should be fed 10 – 15% of their body weight per day.

Very small joeys can be fed using a syringe fitted with a bicycle tyre rubber valve, plastic intravenous catheter 25mm length of infant gastric feeding tube. Larger joeys can be fed with plastic feeder bottles that come in 50 and 100 ml sizes with a T4 Biolac teat.



Milk should be fed at approximately 36 degrees Celsius. Older animals will generally lap from a saucer, while smaller animals can be fed with a plastic eye dropper which they will lap from.

The bandicoot should be given 10% of its body weight in food per day. The number of daily feeds changes as the joey develops.

- Very young, unfurred joeys should be fed every 2 to 3 hours around the clock.
- When furred the number of feeds is reduced to 5 and the volume is increased per feed
- Once fur begins to emerge, Farexor Heinz Rice Cereal can be added to the formula with invertebrates such as earthworms, mealworms, grubs, moths, snails and grasshoppers can be offered, mixed in with Wombaroo small carnivore or insectivore mix.

When feeding it is important not to feed the milk too quickly. The rate being squeezed into the mouth, should not be any faster than what is being swallowed. Make sure the hole in the teat is not too large, if it is, it can fall into the bandicoot's nostrils. Make sure the hole in the teat is small enough.

(<http://www.biolac.com.au/> & Stephen Jackson, 2003)

### ***11.4 Specific requirements***

If the animal is dehydrated give it plain boiled water with 5g of glucose to 100mls of water. It is important to warm the joey before feeding to avoid inhalation pneumonia. If it's taking too long to warm the joey, place in a warm bath, and feed warm fluids instead of stick in a hot box. As this will only heat the outside of the joey.

If the joey is unfurred use Sorbelene cream so their skin doesn't dry out. Do not use baby oil, as it has been found that it isn't easily absorbed, and is absorbed more by the liner bag fabric.

Stress can be overcome by minimizing noise, and do not over handle the animals and maintain high levels of hygiene.

For the first 24 hours, a newly orphaned animal can be fed on a solution of 100 ml boiled water and one teaspoon of glucose. This also allows for a transition period from a maternal milk diet to the artificial diet.

An emergency milk formula for furred joeys already on solid foods when no other milk substitute can be obtained is as follows:

- 25 ml unsweetened evaporated milk
- 1 teaspoon of glucose
- 1 egg yolk

Mix together and make up 200 ml with boiled water. This formula contains lactose, which is not ideal for joeys. However, if none of the milk formulae listed in the reference section are available, this or the glucose and boiled water solution mentioned can be used for one or two days. Feed formula at body temperature at approximately 35 degrees.

(Stephen Jackson, 2003 & Erna Walraven, 1990)

### ***11.5 Data recording***

When the animal is first brought in for hand rearing, you need to keep certain records such as:

- Sex and approximate age
- Using growth charts
- A number of important pieces of information
- Background of food consumption
- Date
- Time when the information was recorded
- Body weight to the nearest 1 g if possible
- General activity and demeanour
- Characteristics and frequency of defecation and urination.
- Amount (g) of different food types offered
- Food consumption at each feed
- Vet examinations and results

(Stephen Jackson, 2003)

### ***11.6 Identification methods***

Large enough ears can be tattooed. Once furred, PIT tags can be used.

(Stephen Jackson, 2003)

### ***11.7 Hygiene***

Cleanliness is essential when rearing joeys. Lack of hygiene leads to infections which could easily kill the animal.

- Maintain a clean pouch lining at all times. Older joeys can be trained to urinate on newspaper by keeping some newspaper with some urine already on it



- Wash and disinfect hands before and after handling the joey this needs to be done as their immune system is not well developed.
- Wash hands between feeding
- Use filtered water when making formulas
- The animals fur should be kept clean from food, faeces, and urine.
- If furless rub the joey down with Sorbelene cream after each feed.
- Use a new pouch after each feed
- Stimulate toilet before and after feeding. Warm water to the cloaca using cotton wool. This will allow the animal to keep warmer and drier in its pouch.
- Only heat up milk once, and discard leftovers
- Contact with other animals should be avoided

Yeast infection (thrush) is often caused by poor hygiene. The animal must be thoroughly cleaned after each feed. Spilt milk, urine, or faeces must be washed off the fur with moist cotton wool and dried with tissue paper. The carer should wash hands before and after each time the animal is handled.

Particular attention should be paid to the area under the chin as many orphans develop a dermatitis infection in this spot caused by milk left on the fur. Matted fur allows dirt to be trapped and should be combed out gently using a toothbrush. Bottles, teats, syringes and other feeding implements must be sterilized after each feed with a human baby-bottle sterilizing agent, available at supermarkets and chemists.

(Stephen Jackson, 2003 & Erna Walraven, 1990)

### ***11.8 Behavioural considerations***

Bandicoots do not appear to show any bonding, although if they are to be released they should not be exposed to other species of animals, with which they may become accustomed. It appears they do better when paired with a bandicoot approximately the same age as them.

(Stephen Jackson, 2003)

### ***11.9 Use of foster parents***

Despite some observations cross fostering should not be relied upon as bandicoots lose or eat their young when disturbed.

(Stephen Jackson, 2003)

### ***11.10 Weaning***

Solid food can be offered at approximately 60 days of age. pureed boiled eggs and cat food are readily accepted. Once the bandicoot is lapping water, the amount of solid food can be increased over the next two weeks.

It can include:

- Diced apple.
- Sweet potato
- Corn
- Kiwi fruit
- Tomato
- Crushed Eukanuba\* kibble
- Finely diced lean meat can also be used with added insectivore mix

Live food such as earthworms, fly pupae, mealworms, moths and other invertebrates should also be provided. The bandicoot should be weaned at about 4 – 5 months of age.

(Stephen Jackson, 2003)

\*See appendix for details

### ***11.11 Rehabilitation and release procedures***

If the bandicoot is going to be released it is important that you place it in a very large enclosure, and feed it as much live prey as possible (earthworms, beetles, moths, mealworms, fly pupae, invertebrates) to encourage foraging behaviour. If reared properly bandicoot will not imprint on their rearer. Males will often become aggressive as they become older, and will start to defend their 'captive territory'. This will become important later on, as they will have to defend their wild territory.

(Stephen Jackson, 2003)

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I would also like to thank the Environment Centre Manly for going out of their way to get me all the information they could possibly find to do, or relating to the Long Nosed Bandicoot, in any way shape or form.

And to all my friends who have devoted time and effort to not only do their husbandry manuals, but also help me complete mine.

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<http://www.drneils.com.au/indexPrev.php?updateUrlPrev=articles&artId=363>
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Pictures/Photos:

1# Title page:

[www.epa.qld.gov.au/.../marsupials/bandicoots/](http://www.epa.qld.gov.au/.../marsupials/bandicoots/)

2# Catching bag:

The T G Hungerford Refresher course for Veterinarians 1994

Published by: Post Graduate Committee in Veterinary Science University of Sydney.

3# Handling Restraint

The T G Hungerford Refresher course for Veterinarians 1994

Published by: Post Graduate Committee in Veterinary Science University of Sydney.



4# IATA, 1999, Live animal regulations. Page 78 Chapter 8

5# Growth Chart

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- National Parks and Wildlife Service (quarantine station)- 9977 6732
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# Glossary:

Abnormalities: The condition of not being normal

Arthropods: Any of numerous invertebrate animals of the phylum Arthropoda, including the insects, crustaceans, arachnids, and myriapods, that are characterized by a chitinous exoskeleton and a segmented body to which jointed appendages are articulated in pairs.

Daily Diary: A book for keeping records of animals health, weight, medications, dosages, death, pregnancies etc...

D/E: Distant Examination:- An examination on an animal that doesn't involve hands on contact. Just viewing from a distance, and recording what you see.

Definitive: Precisely defined or explicit.

Fruit Tubers: Fruit plant roots.

Oestrus: The periodic state of sexual excitement in the female of most mammals, excluding humans, that immediately precedes ovulation and during which the female is most receptive to mating; heat.

N+1: One feeding station per animal.

Oocyst: A thick-walled structure in which sporozoan zygotes develop and that serves to transfer them to new hosts.

Solitary: Living alone or in pairs only.

Perameles nasuta: the scientific name for the long-nosed bandicoot.

scapula spine and temporal muscle

Polygynus: Having more than one wife at a time.

# Appendix:

**BIOLAC:** PO Box 93 BONNYRIGG NSW 2177  
FAX/PHONE (02) 9823-9874

Use **M-100** on all furless macropods. When dense fur has developed, progress to **M-150**, which is a transition milk. Then, when the animal produces solid, dark pellet droppings, change to **M-200**, which contains elevated lipid in the form of canola oil. As the joey progresses to weaning, the level of lipid in the mothers milk continues to increase, this lipid is a major source of energy for the young.

## Approximate analysis charts for M-100, M-150 & M-200

<b>M100 Approximate analysis</b>	
Protein 5%	Carbohydrates 5%
Lipid (Fat) 5%	Total solids 16%
<b>Energy</b> 390kJ/100ml	

<b>M150 Approximate analysis</b>	
Protein 7.5%	Carbohydrates 3.5%
Lipid (Fat) 7.5%	Total solids per litre 19.5%
<b>Energy</b> 521kJ/100ml	

<b>M200 Approximate analysis</b>	
Protein 10%	Carbohydrates 2%
Lipid(Fat) 10%	Total solids 23%
<b>Energy</b> 652kJ/100ml	

All milk products available in:

- 500gram plastic jars .
- 5 kilogram buckets .
- 10 kilogram buckets



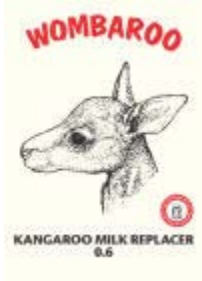
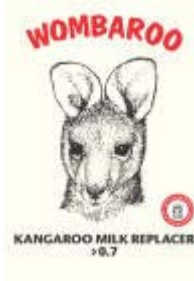
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**WOMBAROO FOOD PRODUCTS:** PO Box 151, Glen Osmond,  
South Australia 5064. ph / fax: (08) 8391 1713. email:  
[wombaroo@adelaide.on.net](mailto:wombaroo@adelaide.on.net) web: [www.wombaroo.com.au](http://www.wombaroo.com.au)



Wombaroo and Passwell products are widely available at most pet shops, fodder stores and veterinary clinics. If you can't get the products at your local shop,

Four stages of kangaroo milk are available. The stage required is dependent on the developmental stage of the joey. The illustrations on the front of each packet provide a visual guide in determining the milk type to be used. The kangaroo milk replacers are suitable for all species of macropods including kangaroos, wallabies, bettongs and potoroos.

			
<b>STAGE</b> <b>&lt;0.4</b> 140g/Litre	<b>STAGE</b> <b>0.4</b> 180g/Litre	<b>STAGE</b> <b>0.6</b> 220g/Litre	<b>STAGE</b> <b>&gt;0.7</b> 250g/Litre
<b>PACK SIZES</b> 140g, 700g	<b>PACK SIZES</b> 180g, 900g, 5kg	<b>PACK SIZES</b> 220g, 1.1kg, 5kg, 10kg, 20kg	<b>PACK SIZES</b> 250g, 1.25kg, 5kg, 10kg, 20kg
<b>ANALYSIS</b> Min Crude Protein 34% Min Crude Fat 14% Max Fibre 0% Max Salt 1%	<b>ANALYSIS</b> Min Crude Protein 32% Min Crude Fat 22% Max Fibre 0% Max Salt 1%	<b>ANALYSIS</b> Min Crude Protein 30% Min Crude Fat 26% Max Fibre 0% Max Salt 1%	<b>ANALYSIS</b> Min Crude Protein 28% Min Crude Fat 42% Max Fibre 0% Max Salt 1%

**DI VETELACT:** Postal: Dr Neil's Pet & Equine Supplies:  
 PO Box 4322, Marayong, 2148 Phone: 1800 032 139 or (02) 9421-1500  
 Fax: (02) 9421-1599. Email: [sales@drneils.com.au](mailto:sales@drneils.com.au)



Di Vetelact is a low lactose animal supplement ideal for use as a milk replacer for early weaned animals, and as a general supplement for older animals, pregnant and lactating animals  
 Di-Vetelact is suitable for furred and furless native animals and is 95 per cent lactose free.

The product comes in three sizes- 375g (\$12.25), 900g(\$23.90) and 5kg.(\$146.10)

**EUKANUBA:**

Eukanuba Chicken & Rice Formula Cat Food is:

- made with chicken
- naturally balanced to help maintain Urinary Tract Health, by reducing urinary pH and providing low dietary magnesium
- made with OmegaCOAT Nutritional Science™ an adjusted ratio of omega-6 and omega-3 fatty acids which help nutritionally support healthy skin, and promote a rich, lustrous coat
- made with a moderately fermentable fiber for a healthy intestinal environment

Eukanuba Chicken & Rice Formula Cat Food also contains the Eukanuba Dental Defense System, which is clinically proven to help reduce tartar build-up by up to 45%. The proprietary technology used in Eukanuba Dental Defense System helps to prevent tartar build-up both during and after meals.

Guaranteed Analysis

<b>Nutrient</b>	<b>(percent)</b>
Crude Protein not less than	34.0%
Crude Fat not less than	21.0%
Crude Fiber not more than	2.5%
Moisture not more than	10.0%
Ash not more than	7.0%
Magnesium not more than	0.0965%
Vitamin E not less than	250 IU/kg
Taurine not less than	0.16%
Omega- 6 Fatty Acids not less than	1.40%*
Omega- 3 Fatty Acids not less than	0.28%*



Product Availability and Packaging

1 kg Bag

3 kg Bag

5.6 kg Bag

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### **IVERMECTIN:**

Also known as IVOMEC, HEARTGARD30 & ACAREXX

AVAILABLE IN TABLETS / CHEWABLES FOR HEARTWORM PREVENTION, TOPICAL SOLUTION FOR EAR MITE TREATMENT, OR AS ORAL OR INJECTABLE SOLUTION FOR OTHER PARASITE PROBLEMS.

Ivermectin is effective against most common intestinal worms (except tapeworms), most mites, and some lice. It is not effective against fleas, ticks, flies, or flukes. It is effective against larval heartworms (the "microfilariae" that circulate in the blood) but not against adult heartworms (that live in the heart and pulmonary arteries).

The most common uses in small animal practice for ivermectin would include:

- Monthly prevention of heartworm infection
- Treatment of ear mite situations
- Clearing heartworm larvae in active heartworm infection
- Treatment of sarcoptic, notoedric or demodectic mange

It should be noted that doses of ivermectin used for prevention and treatment of heartworm disease are approximately 50 times lower than doses used for other parasites.

### **IUCN CRITERIA CODES:**

B1 : Extent of occurrence estimated to be less than 5000km<sup>2</sup> or area of occupancy estimated to be less than 5km<sup>2</sup> and estimates indicating any two of the following.

Severely fragmented or known to exist at no more than 5 locations.

3A : Extreme fluctuations in any of the following: extent of occurrence.

# Maintenance Chart:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimize Disturbance	X	X	X			X	X	X	X	X	X	X
Breeding Season	X	X	X			X	X	X	X	X	X	X
Substrate change	X						X					
Pouch Checks	X	X	X			X	X	X	X	X	X	X
Ideal Transport Period				X	X							
Horticulture	X						X					
Replace Nesting Material	X						X					

## **Minimize Disturbance:**

Bandicoots are stress prone. It is a good idea, if trying to breed, to keep them off exhibit and use CCTV monitors to monitor their breeding habits. It is almost certain that with human presence they will not mate.

## **Breeding Season:**

Breeding season is not restricted to one part of the year. Bandicoots will breed all year round.

## **Substrate Change:**

Substrate change should be done every 6 months. It is not necessary to do it any more frequently, as the bandicoot is constantly digging, and over turning the soil, exposing all of it to the sun, allowing particles to breakdown naturally. This also allows for environmental and behavioral enrichment for the bandicoot, as insects will be present in the new soil, and will allow the bandicoot to reconstruct its nest.

## **Pouch Checks:**

Even though they breed all year, around the summer months when there are many insects and sprouts around, this may encourage bandicoots to mate. So if your looking for young, keep an eye out in this season..

**Ideal Transport Period:**

This is the time when they are least likely to breed. Do it now to reduce the number of young mortality rate.

**Horticulture:**

Replace Grass Tussocks, logs, hollows, and shrub maintenance now.

**Replace Nesting Material:**

Replace nesting material in this time frame to reduce the numbers of tick/flea infestations.