

# Husbandry Manual For Bearded Dragons.



**Genus = *Pogona*** (Storr, 1982)

With particular reference to the Inland Bearded Dragon *Pogona vitticeps*

## Reptilia: Agamidae

Compiler: Alyce Nelson©

Date of Preparation: 07/08/06 Western Sydney

Institute of TAFE, Richmond Course Name and

Number: Captive Animals Cert 3 1068

Lecturers: Graeme Phipps, Andrew Titmuss.

# TABLE OF CONTENTS

<b>OH&amp;S</b> .....	<b>5</b>
<b>INTRODUCTION</b> .....	<b>6</b>
<b>1 TAXONOMY</b> .....	<b>7</b>
1.1 NOMENCLATURE.....	7
1.2 SUBSPECIES.....	7
1.3 RECENT SYNONYMS.....	7
1.4 OTHER COMMON NAMES .....	7
<b>2 NATURAL HISTORY</b> .....	<b>8</b>
2.1 MORPHOMETRICS.....	8
2.1.1 <i>Mass And Basic Body Measurements</i> .....	9
2.1.2 <i>Sexual Dimorphism</i> .....	10
2.1.3 <i>Distinguishing Features</i> .....	11
2.2 DISTRIBUTION AND HABITAT .....	11
2.4 DIET IN THE WILD .....	12
2.5 LONGEVITY.....	12
2.5.1 <i>In the Wild</i> .....	12
2.5.2 <i>In Captivity</i> .....	12
2.5.3 <i>Techniques Used to Determine Age in Adults</i> .....	12
<b>3 HOUSING REQUIREMENTS</b> .....	<b>13</b>
3.1 EXHIBIT/ENCLOSURE DESIGN .....	13-15
3.2 HOLDING AREA DESIGN.....	16
3.3 SPATIAL REQUIREMENTS .....	16-17
3.4 POSITION OF ENCLOSURES .....	17
3.5 WEATHER PROTECTION.....	17
3.6 TEMPERATURE REQUIREMENTS .....	17-19
3.7 SUBSTRATE AND LIGHTING .....	20-22
3.8 NESTBOXES AND/OR BEDDING MATERIAL .....	23
3.9 ENCLOSURE FURNISHINGS .....	23-24
<b>4 GENERAL HUSBANDRY</b> .....	<b>25</b>
4.1 HYGIENE AND CLEANING.....	25-26
4.2 RECORD KEEPING .....	26-27
4.3 METHODS OF IDENTIFICATION .....	27
4.4 ROUTINE DATA COLLECTION .....	28
<b>5 FEEDING REQUIREMENTS</b> .....	<b>29</b>
5.1 CAPTIVE DIET .....	29-30
5.2 SUPPLEMENTS .....	30-32
5.3 PRESENTATION OF FOOD .....	33
<b>6 HANDLING AND TRANSPORT</b> .....	<b>34</b>
6.1 TIMING OF CAPTURE AND HANDLING .....	34
6.2 CATCHING BAGS .....	34
6.3 CAPTURE AND RESTRAINT TECHNIQUES .....	34
6.4 WEIGHING AND EXAMINATION .....	34
6.6 TRANSPORT REQUIREMENTS.....	35-36
6.6.1 <i>Box Design</i> .....	36
6.6.2 <i>Furnishings</i> .....	37

6.6.3	<i>Water and Food</i> .....	37
6.6.4	<i>Animals per Box</i> .....	37
6.6.5	<i>Timing of Transportation</i> .....	37
6.6.6	<i>Release from Box</i> .....	37
<b>7</b>	<b>HEALTH REQUIREMENTS</b> .....	<b>38</b>
7.1	DAILY HEALTH CHECKS .....	39
7.2	DETAILED PHYSICAL EXAMINATION.....	40-42
7.2.1	<i>Chemical Restraint</i> .....	42
7.2.2	<i>Physical Examination</i> .....	42
7.4	KNOWN HEALTH PROBLEMS .....	42-50
7.5	QUARANTINE REQUIREMENTS.....	50-51
<b>8</b>	<b>BEHAVIOUR</b> .....	<b>52</b>
8.1	ACTIVITY .....	52
8.2	SOCIAL BEHAVIOUR .....	52-53
8.3	REPRODUCTIVE BEHAVIOUR .....	53
8.4	BATHING .....	53
8.5	BEHAVIOURAL PROBLEMS .....	53
8.6	SIGNS OF STRESS.....	53
8.7	BEHAVIOURAL ENRICHMENT .....	53
8.8	INTRODUCTIONS AND REMOVALS .....	55
8.9	INTRASPECIFIC COMPATIBILITY .....	55
8.10	INTERSPECIFIC COMPATIBILITY.....	55
8.11	SUITABILITY TO CAPTIVITY .....	55
<b>9</b>	<b>BREEDING</b> .....	<b>56</b>
9.1	MATING SYSTEM.....	56
9.2	EASE OF BREEDING .....	56
9.3	REPRODUCTIVE CONDITION .....	56
9.3.1	<i>Females</i> .....	56
9.3.2	<i>Males</i> .....	56
9.4	TECHNIQUES USED TO CONTROL BREEDING .....	56
9.5	OCCURRENCE OF HYBRIDS.....	56
9.6	TIMING OF BREEDING.....	57
9.7	AGE AT FIRST BREEDING AND LAST BREEDING .....	57
9.8	ABILITY TO BREED EVERY YEAR .....	57
9.9	ABILITY TO BREED MORE THAN ONCE PER YEAR .....	57
9.10	NESTING, HOLLOW OR OTHER REQUIREMENTS.....	57
9.11	BREEDING DIET.....	58
9.12	OESTROUS CYCLE AND GESTATION PERIOD .....	58
9.13	CLUTCH SIZE.....	58
9.14	AGE AT WEANING .....	58
9.15	AGE OF REMOVAL FROM PARENTS.....	58
9.16	GROWTH AND DEVELOPMENT.....	59
<b>10</b>	<b>ARTIFICIAL REARING OF REPTILES</b> .....	<b>60</b>
10.2	INCUBATION REQUIREMENTS .....	60
10.4	SPECIFIC REQUIREMENTS .....	61
10.5	DATA RECORDING.....	61
10.6	IDENTIFICATION METHODS .....	61
10.9	USE OF FOSTER SPECIES.....	61
10.10	WEANING.....	61
<b>11</b>	<b>ACKNOWLEDGEMENTS</b> .....	<b>62</b>
<b>12</b>	<b>REFERENCES</b> .....	<b>63-64</b>

<b>13</b>	<b>BIBLIOGRAPHY .....</b>	<b>65</b>
<b>14</b>	<b>GLOSSARY .....</b>	<b>66-67</b>
<b>15</b>	<b>APPENDIX.....</b>	<b>68-152</b>

## OH&S

The OH&S issues that will arise with the capture and restraint of a Bearded Dragon  
(Genus = *Pogona*).

### Species Category: Innocuous

**Warning:**

Bearded Dragons are capable of scratching with their claws and giving a painful bite; scratches and bits may penetrate the skin enough to draw blood with general first aid being the only medical attention required. Pulling the lizard from its grip will only encourage it to bite harder.

(*Green and Larson*)

**1. Scratches:** If handled incorrectly the handler can be scratched with the claws of a Bearded Dragon. A clean and healthy Bearded Dragon should not harm the handler, but scratches on the skin surface are possible. The possible Health Issues that can occur are Tetanus which requires a Vaccination against Tetanus if required. Refer to Chapter 7 of this Husbandry Manual (*Pages 38-51*).

**2. Bites:** Bites from a Bearded Dragon can hurt, they break the skin surface and they can draw blood if bitten hard enough. Zoonotic diseases are diseases that can be transferred from animal to human and being bitten and breaking the skin surface is a possible cause of transmission. Refer to Chapter 7 of this Husbandry Manual (*Pages 38-51*). Zoonotic diseases such as Coccidia, Salmonella, Worms, etc can be transmitted.

### **Zoonotic Hazards:**

Ways of contracting Zoonotic Diseases:

- Reptiles Skin (*From Their Shedding Process*).
- Via Reptile Urine, Bodily Fluids (*eg blood, regurgitation*) and Faeces.
- You may be exposed to pathogens through open wounds.
- Equipment or bedding that has been used by reptiles.
- A body part or sample taken from a Reptile (*eg swab, blood, or tissue samples*).

#### **Note:**

Putting into practice strict hygiene and cleaning routines. Such as cleaning enclosures on a daily basis if the need be to remove faecal waste and uneaten foods. Washing hands before drinking, eating or smoking and wash hands after drinking eating and smoking. Wash hands after handling any reptiles and their enclosure and furnishings. (*Clark, 2007*)

## **Introduction**

Bearded Dragons are lizards of a moderate yet manageable size that have a good temperament and are easy to tame. They are very sociable and they interact with one another, using a complex set of body gestures, arm circling movements, body tilts and differing tail and head postures, together with other more subtle movements.

They also socialize and interact with humans who are familiar to them. Fully-grown adults vary in length from 45-60 centimeters (18 to 24 inches) and are relatively easy to breed. As a result of these attributes, their popularity as pets is rapidly increasing. (*Raferty 2002*)

Although the life spans of the various dragons are virtually unreported on in the wild, those of captives are somewhat better known. Compared to some lizards, the bearded dragons do not seem particularly long-lived. Many accounts exist, for both small and large dragon species of longevity only in the 5 to 6 year range. The Inland Bearded Dragon is marginally the longest lived. (*Bartlett 1999*)

Bearded Dragons belong to the lizard family called Agamidae that also includes the well known Frill-Knecked Lizards, Thorny Devils, Eastern Water Dragons, Lake Eyre Dragons and Earless Dragons. Bearded Dragons are distinguished from other Agamids by

certain features and belong in the genus *Pogona*, which includes several Bearded Dragons. The term genus refers to the group of living things that have similar structural characteristics, or more precisely, a formal group of closely related species with a common ancestry.

The genus *Pogona* characterizes a small group of dragon lizards with relatively large and triangular shaped heads possessing spinose scales and having varying sized spines along their sides and to the base of the head.

According to Harold Cogger, a prominent herpetologist, the genus comprises several distinct species; these are *Pogona barbata*, *P.microlepidota*, *P.minima*, *P.minor*, *P.mitchelli*, *P.nullarbor*, and *Pogona vitticeps*.  
(Green, Larson 2001)

Bearded Dragons are innocuous creatures. They carry zoonotic diseases such as Salmonella that can be transferred to humans.  
(Class Notes)

## 1. Taxonomy

### 1.1 Nomenclature

Class: Reptilla  
Order: Squamata  
Family: Agamidae  
Genus: *Pogona*  
Species: *vitticeps*

### 1.2 Subspecies

- *Pogona barbata* (CUVIER, 1829)
  - *Pogona henrylawsoni* (WELLS & WELLINGTON, 1985)
  - *Pogona microlepidota* (GLAUERT, 1952)
  - *Pogona minima* (LOVERIGE, 1933)
  - *Pogona minor* (STERNFELD, 1919)
  - *Pogona mitchelli* (BADHAM, 1976)
  - *Pogona nullarbor* (BADHAM, 1976)
  - *Pogona vitticeps* (AHL, 1926)
- (Hauschild and Bosch 2005)

### 1.3 Recent Synonyms

*Amphibolurus*

(Bartlett 1999)

**Pogona henrylawsoni:**

*Amphibolurus rankini*

*Pogona brevis*

**Pogona Barbata:**

*Pogona barbatus*

(Green and Larson)

## 1.4 Other Common Names

- Bearded Dragon.
- Beardie/s.
- Bearded.
- Beardy.

(Green and Larson 2001)

## 2 Natural History

Bearded dragons are naturally found in the deserts and semi-arid scrub lands of Australia. They are generally easy to maintain, have gentle dispositions, grow to a manageable size, are extremely hardy, and can live over 10 years. Many hobbyists are attracted to these reptiles because of their dinosaur-like appearance. They look like they are covered with tiny, spiky scales, but they are still quite pleasant to the touch and enjoy being handled. [www.petuniversity.com/reptiles/lizards/species/bearded-dragon/natural-history.htm](http://www.petuniversity.com/reptiles/lizards/species/bearded-dragon/natural-history.htm)

The inland bearded dragon is a medium sized lizard hailing from the hot, dry deserts of central Australia. These diurnal lizards are quite at home in this harsh environment, and are well adapted to a desert lifestyle. When they get too hot, bearded dragons will actually bask with their mouths wide open, almost like a panting dog! This allows for salivary evaporation to take place, ultimately resulting in cooler body temperatures.

Naturally occurring bearded dragons range in colour from dark brown and grey to orange and red. These coloured individuals (typically found in environments with similarly hued soil) have been selectively bred for generations to produce a variety of exciting colour morphs ranging from nearly white animals to ones that are completely red and orange!

Although male-male combat is often observed among sexually mature individuals, bearded dragons are in fact a social lizard, and interact favourably with others of their species (save for the exception noted above) and with humans as well. They are one of the few species of lizards that are naturally tame, that is, they will sit happily on your hand or shoulder with no intentions of biting, scratching, or running away.



[www.illreptile.com/info/library/animal-care-sheets/lizards-and-monitors/-/bearded-dragon/](http://www.illreptile.com/info/library/animal-care-sheets/lizards-and-monitors/-/bearded-dragon/)

## **2.1 Morphometrics**

### **2.1.1 Mass And Basic Body Measurements**

Central Bearded Dragon *Pogona vitticeps* –

SVL: 25cm

TLL: 31cm

TL: 56cm

Black Soil Bearded Dragon *Pogona henrylawsoni* -

SVL: 13cm

TLL: 17cm

TL: 30cm

Nullabor Bearded Dragon *Pogona nullabor* –

SVL: 14cm

TLL: 20cm

TL: 34cm

North-West Bearded Dragon *Pogona minor mitchelli* –

SVL: 17cm

TLL: 23cm

TL: 40cm

Western Bearded Dragon *Pogona minor minima* –

SVL: 12cm

TLL: 24cm

TL: 36cm

Western Dwarf Bearded Dragon *Pogona minor minor* –

SVL: 14cm

TLL: 26cm

TL: 40cm

Kimberley Bearded Dragon *Pogona microlepidota* –

SVL: 14cm

TLL: 27cm

TL: 41cm

Eastern Bearded Dragon *Pogona barbata* –

SVL: 25cm

TLL: 30cm

TL: 55cm

(Hauschild and Bosch 2005)

(Green and Larson 2001)

### **2.1.2 Sexual Dimorphism**

#### **Females:**

- Females lack both the pores and bulges. Females do not have the two bulges or the indentation between the lumps, rather, females have one small broad lump that is closer to the vent.

[www.lihs.org/files/caresheets/sheet19.htm](http://www.lihs.org/files/caresheets/sheet19.htm)

- Cloacal opening narrow.
- Base of tail narrows sharply.
- Small pre-anal and femoral pores.
- Head appears slightly narrow and long.
- No hemipene.

(Green and Larson)

#### **Males:**

- Males tend to be more animated than females. Males have distinct set of pre-anal pores between the back legs and have hemi-penal bulges at the vent area.

•

[www.lihs.org/files/caresheets/sheet19.htm](http://www.lihs.org/files/caresheets/sheet19.htm)

- Cloacal opening wide.
- Base of tail slightly thicker in appearance.
- Large pre-anal and femoral pores.
- Head slightly larger in depth and width.
- Hemipene may be everted.

Another method of sexing males is a technique where one of the male's hemipenes is everted by gently manipulating the base of the dragon's tail with your fingers. This practice may result in irreparable damage to the dragon if care is not taken. It should only be attempted by, or with the guidance of, an experienced keeper or vet

(Green and Larson)

[www.images.beardeddragon.org/images/sexing\\_male.jpg](http://www.images.beardeddragon.org/images/sexing_male.jpg)  
[www.images.beardeddragon.org/images/sexing\\_female.jpg](http://www.images.beardeddragon.org/images/sexing_female.jpg)

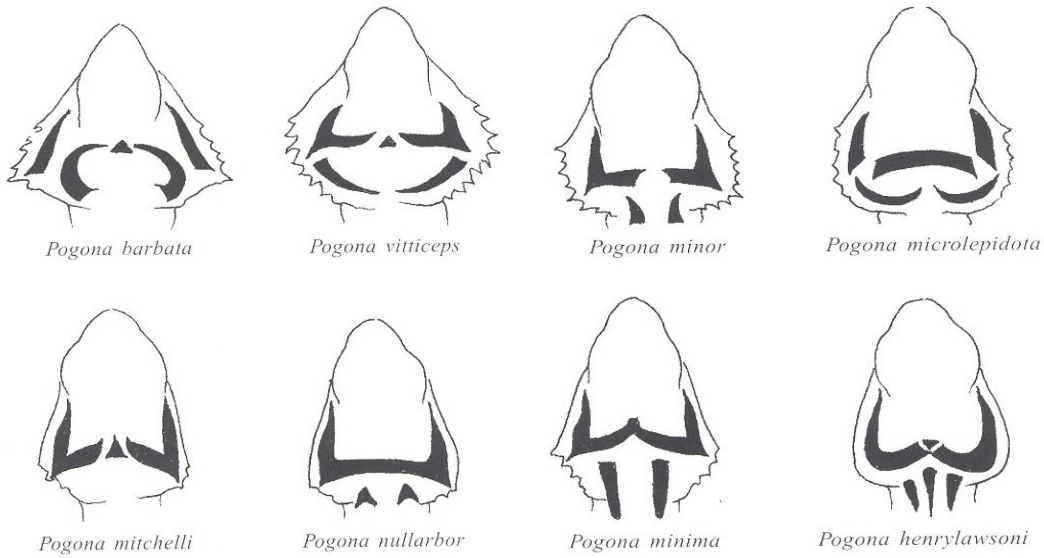
Male



Female



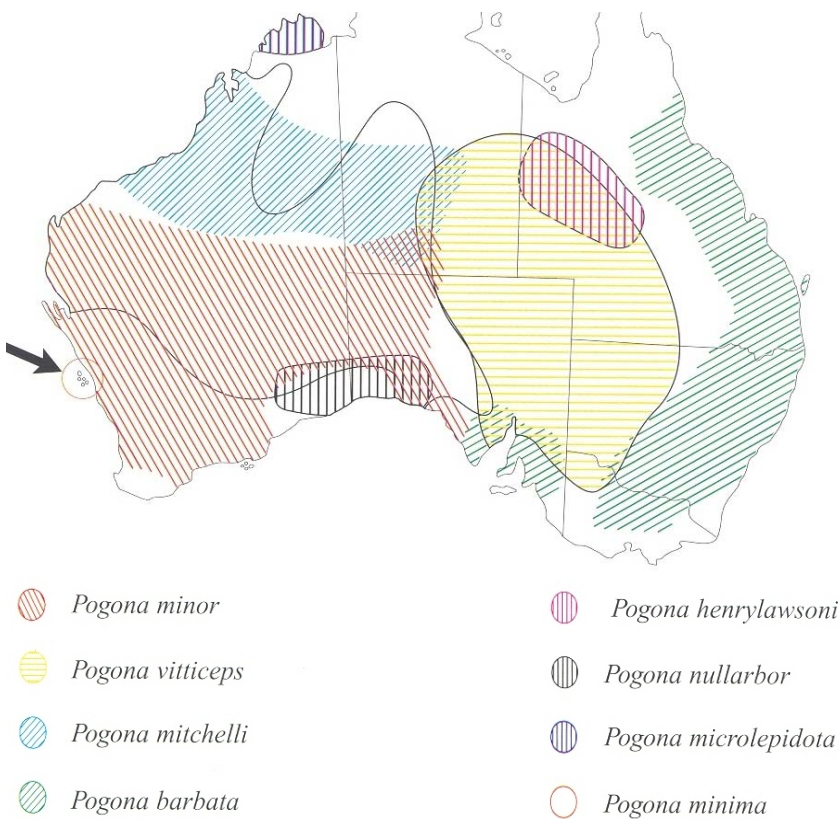
### 2.1.3 Distinguishing Features



Drawings: M.Becker

Schematic Representation of the spiny scales and shape of the head of the genus *Pogona* (Hauschild and Bosch)

### 2.2 Distribution and Habitat



(Hauschild and Bosch)

## **2.3 Diet in the Wild**

Due to their environment (desert, arid scrublands) bearded dragons can't afford to be picky eaters, and they are not. In the wild their diet is varied and it varies even more with their change in locality and the time of year.

In the wild bearded dragons will eat almost anything that could be considered food. They sit and wait ambushes forages prey on variety of insects and small invertebrates such as grasshoppers, termites, insect larvae, cockroaches, ants, and spiders and when they are very hungry even the occasional small rodent or lizard. Yellow dandelions are also a frequently eaten item, and bearded dragons have also been known to feed on certain available flowers and vegetable matter.

[www.environment.gov.au/biodiversity/trade-use/invitecomment/pubs/pogona-vitticeps-importing.pdf](http://www.environment.gov.au/biodiversity/trade-use/invitecomment/pubs/pogona-vitticeps-importing.pdf)

## **2.4 Longevity**

### **2.4.1 In the Wild**

None Recorded.

### **2.4.2 In Captivity**

Bearded dragons can live for 7 - 10 years in captivity. Some are now exceeding these ages and living up to 14 years.

[http://www.lizardrescue.co.uk/html/inland\\_bearded\\_dragon.html](http://www.lizardrescue.co.uk/html/inland_bearded_dragon.html)

Proper exposure to UVB, vitamins, and minerals along with a well balanced diet in every stage of a dragon's life will help enable your dragon to have a long and healthy life.

<http://www.michiganreptileshow.com/BeardedDragon.html>

### **2.4.3 Techniques Used to Determine Age in Adults**

None Needed

## 2. Housing Requirements

### 2.5 Exhibit/Enclosure Design

Indoor:-

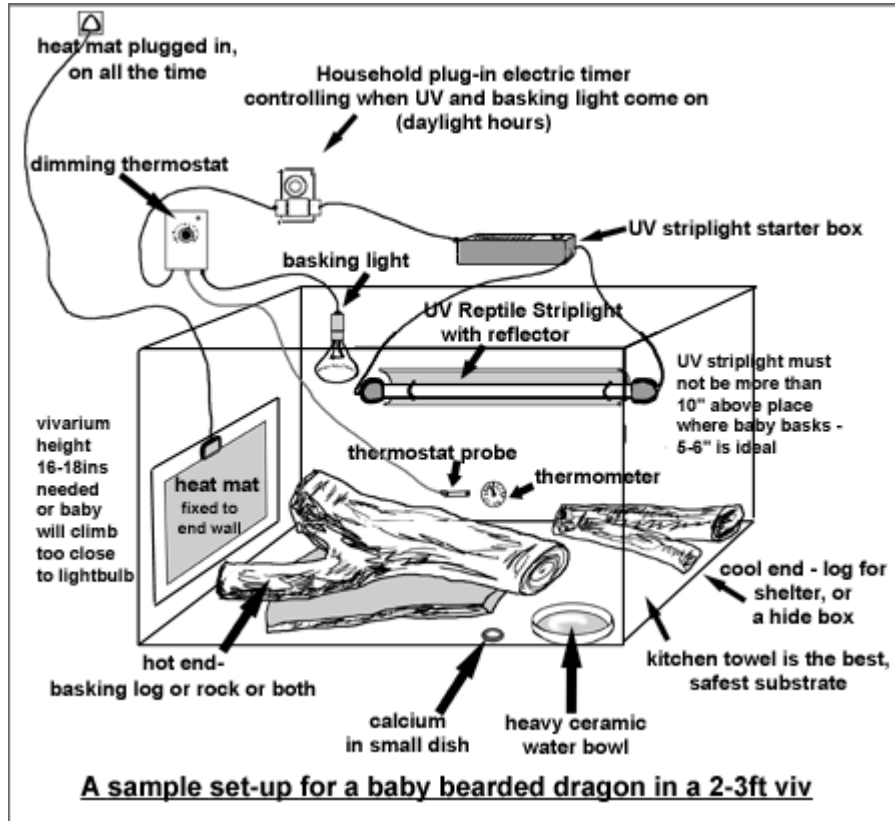


Figure 1



Figure 2  
(Picture Courtesy of the Australian Reptile Park)

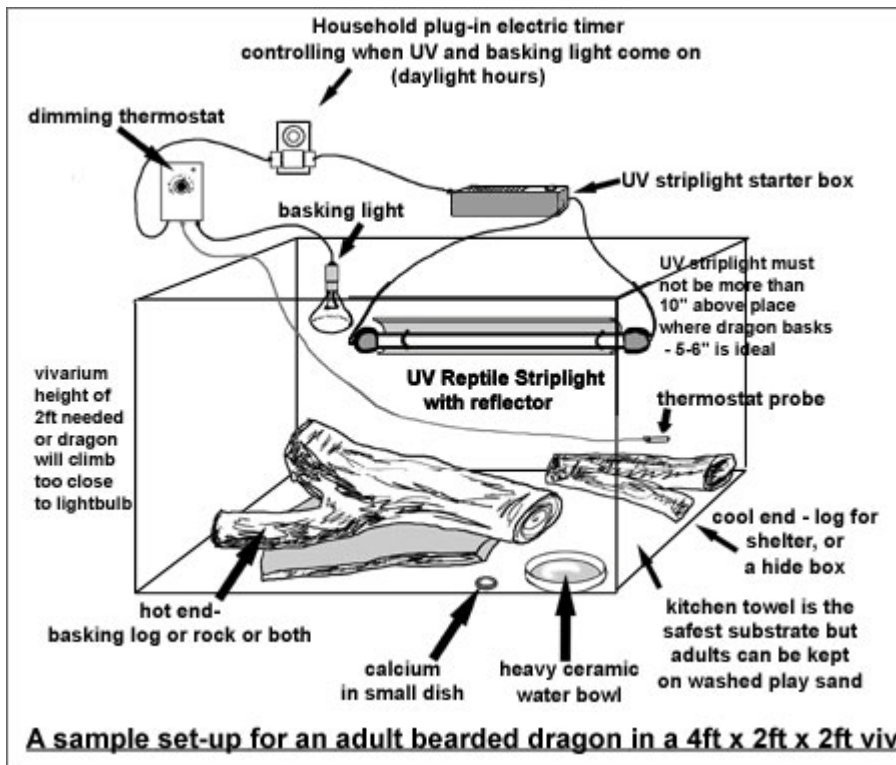


Figure 3

### Indoor Enclosures

Juvenile Bearded Dragons will need to be housed indoors. A suitable enclosure to house juveniles would be about 60cm x 30cm x 30cm. Due to their fast growth rate, you will likely need to upgrade to a larger enclosure within 6-12 months. To house 1 or 2 adults, a 120cm long enclosure would be ideal. Remember, it is impossible to provide too large an enclosure, but if you provide one that is too small, you risk stressing your lizard. It is very important that your enclosure has adequate ventilation and is easily cleanable.

### Outdoor Enclosure

Once your Bearded Dragon has gone through its first winter indoors, you can move it to an outdoor enclosure (this is ideal if you live in an area where Inland Bearded Dragons occur naturally). Note that Inland Bearded Dragons do not like humid conditions (unlike the Coastal Bearded Dragon), so if you live along the coast, it may be best to house your lizard inside. Humid conditions can lead to respiratory infections. One of the big advantages of housing your lizard outdoors is that there is ample UV light from the sun which is beneficial. With this in mind, placement of an outdoor enclosure should be where full sun is available for most of the day. Provide shady areas, such as hollow logs, so that your lizard can retreat when they get too hot. A water dish large enough to bath in is also needed. Make sure it is not too deep though, as Bearded Dragons can drown if they cannot get out. Placing a stone or a stick in the water bowl will assist with this.



The walls of the enclosure should be smooth as Bearded Dragons are excellent climbers. Do not use chicken wire as the lizards may injure themselves by rubbing against it. Sheets of metal are perfect. Walls should be sunk into the ground about 20cm, and extend upwards to a height of at least 60cm. If cats, dogs or birds are a problem, you may have to cover the top with wire or netting.

In outdoor enclosures you can provide many different plants to provide a more natural environment for your lizard.



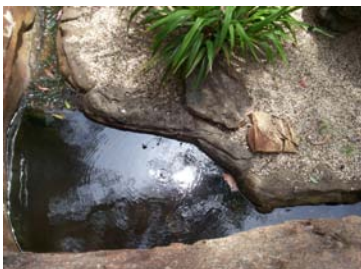
**Figure 1** Step up into the Outdoor pit



**Figure 2** Heat source



**Figure 3** Trees to climb



**Figure 4** Water source  
(Pictures Courtesy of the Australian Reptile Park)



**Figure 5** Whole enclosure  
(Pictures Courtesy of the Australian Reptile Park)

### **General Requirements:**

- 1) All captive animals must be kept in conditions that ensure temperatures, humidity and light cycles are appropriate to the species and allow normal physiological functioning and behaviour. (E.A.P.A)
- 2) Different species of reptile may be kept together within an enclosure provided that relevant factors, including feeding habits, relative sizes and interspecific compatibility are adequately taken into account. (E.A.P.A)
- 3) Reptiles must not be restricted or restrained by the use of a leash or tether. (E.A.P.A)
- 4) Reptiles must not be kept in areas with excessive noise or vibration, or which are subject to excessive temperature fluctuation. (E.A.P.A)
- 5) Care must be taken when introducing a reptile to an enclosure, including consideration of any effects this may have on the introduced animal, as well as on any reptile currently occupying the enclosure. Further, all introductions must be carefully monitored. (E.A.P.A)
- 6) All reptile enclosures must be constructed and landscaped to allow safe access of the entire enclosure and its inhabitants by the keepers. (E.A.P.A)



## 2.6 Holding Area Design



(Picture Courtesy of the Australian Reptile Park)

- 1) Quarantine facilities must be provided for the isolation of specimens for at least 30 days after arrival for most species and 12 month quarantine for pythons. This period may vary depending on the individual reptiles, their source and any potential associated disease risks. (E.A.P.A)
- 2) Quarantine facilities must be spatially separated from the main reptile collection and include the capacity for individual isolation. All cages must be isolated individually and be accessible for disinfection. (E.A.P.A)

## 3.2 Spatial Requirements

### 1. General:

- A) Sufficient space must be provided, both horizontally and vertically, to meet the activity needs of the animal and to enable husbandry to protect animals from undue dominance or conflict.
- B) The enclosure must be large enough to provide a temperature gradient that allows the reptile(s) to thermoregulate.
- C) The minimum floor space allowance for any enclosure must be increase in area by 20% for each additional specimen over one or two specimens for which a minimum floor space formula is established.

(E.A.P.A)

### 2. Lizards:

#### Note

The formulas used to determine the size of enclosures for lizards are a guide only as it is difficult to adequately address the varying spatial needs of all captive lizards with one simple formula. The guidelines in this text will be used by the

Director-General, his delegates and inspectors in assessing the sufficient space provided by lizard exhibits. The formulas do not prescribe mandatory standards. The Director-General however does have the power to decide whether or not an enclosure fits the general requirements relating to sufficient space. (E.A.P.A)

a) Animal Display Establishments and home base for exhibitors authorized to exhibit at temporary establishments

Minimum floor area for 2 specimens =  $2.5L \times 2.5L$   
(L = total length of longest specimen)

b) Medium Term Holding Enclosures and Display at temporary establishments

Minimum floor area for 2 specimens =  $1.5L \times 1.5L$

c) Minimum Height for terrestrial species

The larger of either 2 x head-body length or 40cm

d) Minimum height for arboreal species

The larger of either 4 x head-body length or 60cm

(E.A.P.A)

## **2.7 Position of Enclosures**

Because monitors and most lizards like to bask in the morning, outdoor enclosures should be positioned to the north-east to catch all year round sun and to also provide shade during the day.

(A.Titmuss)

## **2.8 Weather Protection**

The most important considerations when constructing an outdoor enclosure is temperature control, as often natural weather conditions are harsh and unpredictable. Therefore, protection from the sun, wind and rain should be provided, together with a well-insulated retreat if extreme low temperatures are common in the area.

(Vincent, Wilson, 1999)

During the winter/rainy period a piece of corrugated plastic or polycarbonate can be wrapped around sheltering logs to keep it drier and keep the animals slightly warmer.

(*Reptiles Australia Magazine*)

## **2.9 Temperature Requirements**

Like all reptiles, bearded dragons require a thermal gradient in their vivarium (one or more basking spots, and cooler areas) to enable them to thermo regulate

A daytime basking spot temperature of a minimum of 35 Degrees Celsius and a maximum of 40 Degrees Celsius is essential, but so are cooler areas ranging from 20 – 29 Degrees Celsius. At night, no extra heat is needed for adult dragons if the room stays

above 16 Degrees Celsius but hatchlings thrive better if kept warmer, with temperatures up to 27 Degrees Celsius.

A basking lamp is the best daytime heat source as dragons are attracted to light; ordinarily household (spot) light bulbs or “reptile basking bulbs” are equally good, set on a timer to give 12 hours light and heat per day. Select the wattage according to the heat needed at the basking spot.

Larger enclosures may need ceramic heaters as well. Wire mesh guards should be fitted over all heat sources so that the reptile cannot burn itself by accidentally touching the heater or lamp surface. A thermostat is essential, to control the heat source within the vivarium and prevent the dragon from becoming too hot or too cold. A dimming thermostat should be used with a basking lamp, and the sensor placed so as to prevent the cooler areas of the vivarium rising above about 28 Degrees Celsius. Digital thermometers should be placed regularly on the basking spot and at the cool end of the vivarium to check the temperatures.

It is usually necessary to experiment with the wattage of the heat lamps and the setting and position of the thermostat probe to achieve these temperatures when setting up a large new vivarium; placing max/min thermometers or digital thermometers in key spots is the best way to do this.

“Hot Rocks” with built-in heaters are not recommended for bearded dragons; they sense warmth from above, not below, and can burn their bellies from lying on these. Heat mats may be useful for extra warmth at night, for babies; however, these are safest mounted sideways on the vivarium wall, for the same reason.

a) Reptiles are ectothermic and maintain their preferred body temperature by positioning themselves in relatively warmer or cooler positions as required/desired. Reptile activity, physiological functions and feeding occur within a narrow range of the species’ preferred body temperature. Consequently it is critical that an appropriate ‘thermal gradient’ exist within enclosures so that terrestrial reptiles can regulate their body temperatures sufficiently by shifting between appropriately warmer and cooler positions in the enclosure. In the case of arboreal species, this thermal gradient must be present at elevated positions. (E.A.P.A)

The provision of an acceptable thermo gradient within an enclosure can be achieved through the appropriate use of electrical heating and/or lighting elements, and /or cooling devices. Other means of providing heating/cooling include sunlight (e.g. ‘solar-tubes’), and piped heated (or chilled) water.  
(E.A.P.A)

**Note**

A daytime temperature gradient of 24-34°C, would accommodate the thermal requirements for the majority of species, but appropriate texts must be consulted for individual species requirements. Natural daily and seasonal variations should be

provided. The 'cooling' of reptiles through refrigeration, or any other means, to make them more amenable to handling and public contact, is not acceptable practice. (E.A.P.A)

- b) Heating devices must be designed and positioned so that parts of the enclosure floor are not heated, thereby providing a range of temperatures. (E.A.P.A)
- c) Temperature readings must be taken regularly at the site where the reptile spends substantial amounts of time, or be constantly monitored using a maximum- minimum thermometer to ensure that extremes of temperature are prevented.  
(E.A.P.A)

**Note**

Heating sources should be thermostatically controlled to remove the potential for overheating, though this may not be necessary depending on how things are set up.  
(E.A.P.A)

- d) Light globes, exposed heat-pads, aquarium heaters, or other heat sources must be designed, constructed and positioned to prevent injuries to reptiles.  
(E.A.P.A)
- e) Where aquatic chelonians or crocodiles are displayed, appropriate water temperature must be maintained. A range of 26-32°C is appropriate for most tropical species.  
(E.A.P.A)

Bearded Dragons do not require additional heat if kept outdoor enclosures; here they experience natural conditions and will move about to regulate their body temperature. Those that are kept indoors may require an additional source of heat to keep the Bearded at an optimum temperature. Heating an enclosure may be accomplished with the aid of a light globe, which doubles as a basking lamp. The wattage of the globe depends on the size of the enclosure and the distance it is from the lizard, however as a guide globes are typically around 40 or 100 watts. Globes that are too close to the lizard or too high a wattage (eg. over 100W) may cause thermal burns to the lizard. Always use globes **specifically for reptiles** (see lighting section below).  
(Green and Larson)

A heat mat placed under half, or part of the enclosure may also be used in conjunction with the basking lamp. Heat mats are a series of thin heat elements covered with a plastic laminate, and come in a variety of sizes and wattage. The heat mat is connected to 240 volts and should be protected from accidental punctures which may result in electrocution. It is recommended that the mat sits on a layer of foam for insulation and protection. The

enclosure may then sit directly on the heat mat providing the lizard with a bottom source of heat.

*(Green and Larson)*

Some keepers also use a hot rock placed inside the cage, or a combination of all of the above. The most reliable seems to be a combination of globes and heat mat. Heat from above, in the form of a light globe or basking lamp, is a more natural heat source, and is also a physiological stimulant and can be likened to the warm rays of the sun. A heat mat on the other hand is similar to the radiant heat from a rock and should be less intense with comparison to an above heat source. Whatever your choice, the heat source is best placed at one end of the enclosure, so that a thermal gradient, that is warm at one end and cool at the other, is maintained over the length of the enclosure. The Bearded Dragon will regulate its body temperature by moving to an area where it feels most comfortable.

*(Green and Larson)*

Bearded Dragons are ideally maintained at an air temperature of 24 to 30°C which is monitored by a thermometer. A basking spot lamp must be provided towards one end of the enclosure to maintain a thermal gradient, where the dragon is able to bask. The Bearded Dragon should be able to regulate its body temperature at 35°C by moving to and from the basking spot lamp. Overnight temperatures may drop several degrees providing the daytime temperatures rises to the optimum level. For example, an enclosure may drop to 16°C or less overnight providing it rises to around 28°C during the day. This may be accomplished by turning the day heating off at night using an electronic timer. Bearded Dragon from southern Australia, like Victoria, brumate in the wild over winter and the “Brumation and Winter Care” section of this book (by Green and Larson) should be consulted for more details.

*(Green and Larson)*

## **2.10 Lighting:**

In an outdoor enclosure Bearded Dragons have natural day and night cycles and lighting is therefore not a concern. However, lizards that are maintained indoors will need artificial daytime lighting that is specific to reptiles. An electric security timer or normal electric time switch can be used to set the photoperiod, or amount of daylight, so that it resembles the natural day/night cycle by turning lights on and off each day. The photoperiod should run in tandem with the temperature cycle. In summer when temperatures are highest Beardies should receive 10 to 12 hours of light, while in winter this can be lowered to around 4 to 6 hours when the temperature is at its lowest. The easiest method is to simply have the lights come on at sunrise and off at sunset.

*(Green and Larson)*

One cannot underestimate the importance in quality of lights for lizards, especially those which are housed indoors. Lighting which is specially manufactured for reptiles are

generally termed full spectrum lighting and provide reptiles with beneficial light waves, similar to that of the sun. With research and development, full spectrum lighting is always improving, and advice on which type to choose should be sought from a pet shop. Generally speaking however, fluorescent lighting is the cheapest light source to run over long periods. But any old fluoro will not do. It should produce high levels of UVB wavelengths which may help prevent Metabolic Bone Disease and strengthen and improve growth in lizards. Similarly, it should also produce high levels of UVA wavelengths which helps to increase appetite and normal behaviour, such as reproductive behaviour. Full spectrum lighting like ZooMed Reptisun 5.0 UVB®, Hagen ReptiGlo®, should be placed no more than 300mm above the lizard, as its effectiveness is greatly reduced with distance. Full spectrum lighting should be replaced approximately every 12 months, or according to the manufacturer's recommendation, as their effective quality diminishes with age (*ie. with long term use*).

*(Green and Larson)*

An incandescent (tungsten) bulb specifically for reptiles such as ZooMed Repti Basking Spot Lamp®, can be used in combination with a fluorescent light. The bulb will help raise the air temperature and also doubles as a basking light which helps stimulate natural behaviour patterns. Like fluorescent lighting, these bulbs are manufactured specifically for reptiles and provide beneficial UVA rays, which as suggested above are a physiological stimulant. Full spectrum lighting, along with an appropriate basking lamp, are particularly beneficial for Bearded Dragons, as basking is a regular part of their natural behaviour.

*(Green and Larson).*

## **2.11 Substrate**

A good substrate for juvenile beardies is kitchen paper towel, as it is clean, easily replaced when soiled and most importantly, inedible. Some keepers use paper towels for adults too. Reptile carpet, brown paper, even newspaper is ideal for all dragons.

Many dragons enjoy digging in sand and children's washed play sand is also suitable for adult dragons, who are less likely than babies to eat quantities of their substrate. This is better than most other types of sand, although all can cause problems if ingested, and fine dusty sand can irritate the eyes. (*In particular there are doubts about the new Calci-Sand; there are reports of it causing impactions.*) Some keepers place sand in a "dig box" in part of the vivarium, thus keeping sand away from the feeding and water bowls, etc; this can be very effective.

As a substrate, play sand (*sterilized and washed*) is excellent for adults. It is easy to clean, cheap and looks nice. For babies and juveniles (*under 13" total length*) it is better to use newspaper. While dragons seem fairly immune to becoming impacted there is still a remote chance and it is best to wait until the dragon is large enough to safely pass small amounts of sand, which may be accidentally ingested while eating. Some keepers use alfalfa pellets (*rabbit pellets*) as a substrate as it is digestible. While not the nicest looking substrate nor easiest to clean and fairly safe.

Do not use sand substrates on hatchlings or young juveniles, instead use paper towels and "print-free" newspaper until they are 5-6 months old. It is not recommended putting hatchlings or very young juveniles on sand substrates because they are aggressive eaters and can ingest the sand causing digestive problems and impaction, which can lead to serious illness or death. An impaction can occur more easily in the fragile delicate digestive system of younger dragons. Once they reach the age of 5-6 months they are switched over to a fine sand substrate or they can remain on "print-free" newspaper. It is recommended when using sand substrates that you use a mixture of Zoo-Med Repti-Sand "Desert Red" colour with the Zoo-Med Repti-Sand "White" sand. The "Desert Red" sand alone can be dustier when sifting than the white. Mixing the two together will give good colour contrast between the substrate and the crickets at feeding time (*which will appear white once they have been dusted with calcium*). Some sand substrates on the market are calcium fortified. Do not use any type of sand substrate that has additives including sands called calci-sands. It is difficult to monitor the calcium intake of your bearded dragon if they are on a substrate that has additives not to mention your dragon should be getting all calcium, vitamins and minerals from food sources and NOT from a substrate matter. Eating the substrate matter can be harmful to your pet.

Once your dragon is a young adult (*around the age of one year*) you can begin using the cheaper white non-silica based play sand. If using play sand be sure it is screened very carefully first to get out all of the rocks and other particles that may be ingested by your bearded dragon. You should continue to mix it with the Zoo-Med "Desert Red". The grains of sand in "play sand" are typically larger than the grains of the ultra-fine reptile sand and we feel it is best not to use the larger grained sand on the more delicate digestive systems of young dragons. By mixing the finer grained "reptile sand" you will still have the added benefit of the good "clumping" factor of the finer sand when it becomes soiled by fecal matter. This also makes cleaning the cage easier.

For cleaning the cage and sifting through the sand substrate we use a small to medium size tropical fish net which you can purchase in the aquarium section. This works wonderful for getting out fecal matter, small food particles, skin sheds, left over insect parts and leaves a smooth, fresh, and clean substrate.

Do not use substrates consisting of ground walnut shells, ground peanut shells, ground coconut pulp, etc. many sold under the names of lizard litters as digestive impaction can occur with these substrates as well.

*(No Known Source)*

## **2.12 Nest boxes and/or Bedding Material**



Medium Exo – Terra Hide Cave  
[www.blagdonreptilehouse.co.uk](http://www.blagdonreptilehouse.co.uk)



Hide Box  
[www.undergroundreptiles.com](http://www.undergroundreptiles.com)

## **2.13 Enclosure Furnishings**

Bearded dragons climb. Basking and resting areas should be created with large rocks and or wood sections. Also, shelters should be provided out of the range of the basking lights.

Bearded Dragons also like to have somewhere to hide, go to for security, or take a nap either in the afternoon or evenings. This can be of any design but keep in mind the safety of your bearded dragon and the ease of being able to keep it clean and disinfected. Commercially available half round hollow logs work well for hiding places. They also fit in nicely with the natural look of cork bark as well as the natural looking backgrounds you can purchase to decorate the exterior of your enclosure.

There are many nice products that are made of synthetic materials that make cleaning easy. Be sure to select something that will not fall over on your dragons and crush them or crush them if they try to burrow beneath the object. Look for lightweight yet durable products as well as products that can be secured in place for the safety of your dragon. You can also use Zoo Meds Repti-Hammocks for your bearded dragons. Not only do the dragons love the hammocks but you will get lots of enjoyment out of watching them jumping from their basking sites into their hammocks or just lounging in the hammock.

Too many furnishings can provide problems with cleaning. However, remember that Bearded Dragons are semi-arboreal, so providing some climbing branches would be ideal. Make sure they are securely placed so they do not fall on top of your lizard. You will also need a hide area. This can be a purpose bought hiding den, a hollowed log or a PVC pipe. You may want to also put a flat rock or log in for the lizard under the basking light.

Bearded Dragons will need a water bowl that is not too deep and away from the basking site. Some Bearded Dragons will bath in the water bowl, so make sure it is big enough for the size of your lizard. This is especially important when shedding.



Beardies need both basking and hiding areas. Ideally, the tank should be big enough to have a hiding place at both ends of the temperature gradient, plus a basking area closer to the heat source. Provide, at least, a hiding area on the cooler side, with branches and logs for climbing and basking on the warm side.

*(No Known Source)*

## 4. General Husbandry

### 4.1 Hygiene and Cleaning

Hygiene is important in lizard husbandry. Any water spillage, un-eaten food, and faeces should be removed and the enclosure cleaned immediately. Faeces may also spread parasites to other inhabitants.

*(Green and Larson 2001)*

Almost every animal, including human beings, carries with it a host of micro-organisms of various types. Most of these organisms cause no harm, and some are even beneficial. An example from the human digestive tract is *E. coli*, a species of bacteria. *E. coli* lives in the human large intestine making vitamin K as part of its metabolism, which humans then utilize.

Like other animals, the bearded dragons carry around a plethora of microorganisms normally. When you handle your dragon and its cage fixtures, some of these microbes are transferred to the skin of your hands. If you put your fingers in your mouth or rub your eyes, you can become infected with one or more of these microbes. Preventing these infections is not difficult. Wash your hands immediately after every time you touch cage fixtures. Never allow a reptile access to any food preparation areas. Never eat or drink while cleaning the cage or handling the animal.

*(Mazorlig 1998)*

The cage and food and water bowls should be cleaned routinely with a 1:10 dilution of household bleach. Rinse items well after cleaning. Bearded Dragons can also harbor the bacteria Salmonella. Be sure to wash your hands after handling the Bearded Dragon or its cage.

[www.peteducation.com/article](http://www.peteducation.com/article)

#### **Cleaning kit:**

- Assemble a cleaning kit containing all the tool required to do a good job:
- Rubber Gloves.
- Scrapers (paint scraper for example).
- Bucket (for hot soapy water).
- Bucket (for rinse water).
- Towels, paper or cloth.
- Bag for waste.
- Soap (dish washing varieties work well).
- Disinfectant (Virkon, F10 and Methylated Spirits)

*(No Known Source)*

Cleaning of the vivarium or any enclosure in which the bearded dragon is kept, whether it be indoor or outdoors, involves the removal of uneaten food, faeces, urates, saliva, blood and any other body secretions.

When you have done that, you then need to disinfect all the surfaces. It is essential that no disease – causing agents are allowed to invade the vivarium.

Your choice of substrate is very important. The right one is easy to maintain and provides the opportunity to observe the faeces and urates of your animals. Regardless of which substrate is used it should be kept clean and dry. Damp areas will quickly grow mould, which, if ingested regularly over a period, will damage the lizards liver.

*(No Known Source)*

## **4.2 Record Keeping**

Basic:

- Common Name
- Scientific Name
- Gender
- Date Of Birth
- Seller or Breeder (incl. telephone number)
- Parents (morphs etc)
- Permit Number (indigenous animals)
- Medical History (diseases, illnesses & treatments)

Feeding:

- Date (when or when not)
- What (how big)
- How many

Breeding:

- Date of mating
- Male & female
- Date eggs laid
- Number of eggs laid
- Due date
- Date of hatching
- Number of eggs hatched
- Number of offspring survived

Shedding:

- Date
- Complete or incomplete
- Cage Inspection
- Cleaning/sterilizing dates
- UV installation & replacing dates

*(No Known Source)*

- 1) Feeding records must be maintained for all reptile species, and include feeding date, as well as quantities and type of food both offered and eaten. (E.A.P.A)
- 2) For all reptile species, more detailed records must be kept, providing at least the following information:
  - a) The dates of acquisition and disposal, with details of circumstances and addresses.
  - b) The date or estimated date of egg laying and/or birth.
  - c) Breeding and details of any offspring.
  - d) The date of occurrence of skin shedding and any problems encountered.
  - e) Clinical data, including results of physical examination by a qualified veterinarian and details of, and date when, any form of treatment was given
  - f) Opportunistic measurements of body weight and lengths.
  - g) The date of death and results of post mortem
- 3) All relevant records must accompany an animal when it is transferred to another establishment. (E.A.P.A)
- 4) The exhibitor must identify each individual, if required by the Director-General, with an approved form of identification, such as Passive Intergrated Transponders Tags, and keep a record of each individual. (E.A.P.A)

### **4.3 Methods of Identification**

- Micro-chipping.
  - Shell notching.
  - Painting of shell with nontoxic paint.
  - Photo id- digital photo gallery.
- (Australian Reptile Park)

#### **4.4 Routine Data Collection**

- Feeding:
  - Small, medium, large insects (si, mi, li)
  - Lizard mix (lm)
  - Pinkie mice (pm)

(Australian Reptile Park)

DAY	FOOD/S	AMOUNT	SUPPLEMENT (STATE TYPE)
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Sunday			

*(Chart from the Really Useful Handbook of Reptile Husbandry by Caroline Gosden)*

## 5. Feeding Requirements

### Captive Diet

Insects such as brown house crickets (*Acheta domesticus*), mealworms (*Tenebrio molitor*), locusts, cockroaches (*Nauphoeta cinerea*), grasshoppers & pinkies, nestling mice (*Mus musculus*). Vegetables such as pumpkin, green beans, peas, corn/maize, broccoli, carrots & beetroot. Fruit such as kiwis, grapes, strawberries, raspberries, bananas, melon, apple, peach and pear. The leaf of nasturtium, lucerne/alfalfa, parsley, celery, rosemary, oregano, basil & carrot tops. The flowers of nasturtium, lucerne and rose petals. A mixture of these groups must be supplied.

(Clark 2007- scientific names)

[www.beardeddragons.co.za/beardeddragon\\_caresheet.htm](http://www.beardeddragons.co.za/beardeddragon_caresheet.htm)

For juvenile beardies feeding should commence a day after their removal from the incubator. A starter diet of appropriately sized crickets, termites, flies and other insects should be supplied two or three times a day. Every second day the insects should be dusted with a reptile multi-vitamin and mineral supplement, which should include vitamin D3 and calcium, to ensure the lizards are receiving a nutritionally balanced diet. Food items should be small enough to fit in their mouths and varied as much as possible. This feeding routine should be continued for six to eight weeks, removing larger dragons as necessary to a separate enclosure to ensure they are all housed together with dragons of their own size.

A water bowl should always be provided. The water should be kept clean for drinking purposes, and should serve to provide the enclosure with an adequate, albeit low, humidity level. Water bowls need not be large, and should only be partly filled so that if the lizard enters the bowl, the water will not spill over the top. Water should be changed at least twice a week, or as soon as it is fouled.

(Green & Larson)

Food sources: crickets, mealworms, king mealworms (super worms), and plant food (mustard greens, collards etc)

**1-2 months:** 3/8" crickets twice a day (vitamin/mineral supplement for 1<sup>st</sup> feeding). Finely chopped mustard greens and chopped frozen mixed veggies, thawed every other day.

**2-4 months:** 1/2" crickets twice a day (vitamin/mineral supplement for 1<sup>st</sup> feeding every other day). Finely chopped mustard greens, collards, endive, romaine, squash) and finely chopped mixed veggies every other day.

**4 months – maturity:** 3/4" crickets once to twice daily (vitamin/mineral supplement every other day). Chopped mustard greens, collards, endive, romaine, squash) every other feeding.

**Adults:** Prewing crickets and/or super worms every 1 to 2 days (vitamin/mineral supplement twice a week). Chopped mustard greens, collards, endive, romaine, squash) every other feeding.

Vitamin/mineral supplement: 1 part multi vitamin to 5 parts calcium powder (Rep-Cal phosphorus free).

[www.vanjdivers.com/bdcare.html](http://www.vanjdivers.com/bdcare.html)

In captivity, the species will eat plant matter such as banana (Kennerson and Cochrane, 1981), dandelion flowers (Kennerson and Cochrane, 1981) and vegetables (Mantell, 2000). It also eats animals such as ants (Kennerson and Cochrane, 1981), beetles (Kennerson and Cochrane, 1981), crickets (Mantell, 2000), flies (Kennerson and Cochrane, 1981), mealworms (Mantell, 2000), slaters (Kennerson and Cochrane, 1981), slugs (Kennerson and Cochrane, 1981), spiders (Kennerson and Cochrane, 1981) and worms (Kennerson and Cochrane, 1981). It will also eat processed food such as biscuits and minced meat (Kennerson and Cochrane, 1981)

[www.amonline.net.au/herpetology/research/pdf/agamidae.pdf](http://www.amonline.net.au/herpetology/research/pdf/agamidae.pdf)

## **Supplements**



Rep-Cal Bearded Dragon Foods are fortified with optimal levels of vitamins and minerals like calcium and vitamin D3 so no other food supplements are required. Because bearded dragons are sometimes wary of new foods, make all food changes gradually and monitor your lizard's weight, condition, and food intake.

[www.repcal.com/BDragon.htm](http://www.repcal.com/BDragon.htm)



Rep-Cal Ultrafine (fine grind) is an excellent source of calcium for all reptiles and amphibians. Scientifically formulated from 100% natural Oyster Shell phosphorous-free calcium carbonate with added Vitamin D3 to aid in the absorption of calcium.

**Dosage:** We ask that you mix Rep-Cal with our vitamin supplement Herptivite. If we premixed the products, the "beadlets" of beta carotene in Herptivite may possibly be damaged during manufacturing by the calcium in Rep-Cal. Mix with vegetables, fruits, and pastes approximately 1/2 tablespoon Rep-Cal with 1/2 tablespoon Herptivite per pound of food.

**Before feeding insects:**

- 1) Thoroughly mix a 1:1 ratio of Rep-Cal and Herptivite in a plastic bag.
- 2) Place insects in the bag.
- 3) Shake slowly until they are completely covered.

No other supplementation is required.



Rep-Cal's HERPTIVITE is a superior multi-vitamin, multi-mineral and amino acid food supplement developed from the latest findings in reptile and amphibian nutritional research. Its formulation contains all natural source ingredients with a base of "sea vegetation." Unlike other companies which use non-nutritional "bases," Rep-Cal's "sea vegetation" base is rich in essential trace elements and minerals. Furthermore, HERPTIVITE contains precise levels of vitamins and minerals combined in perfect balance to ensure correct utilization of protein and other essential nutrients for growth, reproduction, maintenance and many aspects of your reptile's bodily functions.

[HERPTIVITE is the first reptile vitamin without Vitamin A. Instead we use Beta Carotene which is an anti-oxidant that is converted into Vitamin A in a regulated way, so there is no threat of Vitamin A toxicity.](#) Make Rep-Cal's HERPTIVITE the dietary supplement of choice for your reptiles.

**Dosage:** We ask that you mix Rep-Cal with our vitamin supplement Herptivite. If we premixed the products, the "beadlets" of beta carotene in Herptivite may possibly be damaged during manufacturing by the calcium in Rep-Cal. Mix with vegetables, fruits, and pastes approximately 1/2 tablespoon Rep-Cal with 1/2 tablespoon Herptivite per pound of food.



**Before feeding insects:**

- 1) Thoroughly mix a 1:1 ratio of Rep-Cal and Herptivite in a plastic bag.
- 2) Place insects in the bag.
- 3) Shake slowly until they are completely covered.

No other supplementation is required. Contains no added starch, sugar, soy preservatives, artificial coloring, flavoring, or fragrance. Consult your veterinarian for any special nutritional problems or advice.



Calcium deficiency is a major dietary problem of captive reptiles and amphibians. Maintaining a proper calcium:phosphorous (Ca:P) ratio in the diet of 1.5:1 is believed to be just as important nutritionally as an adequate Ca intake. The problem in most cases is an improper Ca:P ratio, not too little Ca.

Ca:P ratios of common cultured food items are shockingly poor:

	Calcium	Phosphorous
Crickets	0.13	1
Meal Worms	0.06	1
Wax Worms	0.08	1
Pinky Mice	0.89	1

Using a calcium supplement that also adds phosphorous makes no sense as an adequate Ca:P ratio can never be achieved. Bone meal contains phosphorous. Rep-Cal contains only 100% Natural phosphorous-free oyster shell Calcium Carbonate for its calcium source.

**Dosage:** Mix with vegetables, fruits and pastes approximately 1/2 to 1 tablespoon per pound of food.

**To coat insects:**

- 1) Place insects and calcium powder in a plastic bag.
- 2) Shake slowly until insects are completely covered.

Contains no added starch, sugar, soy, preservatives, artificial coloring, flavoring, or fragrance. Do not use if tamper proof seal is broken or missing. Consult your veterinarian for any special nutritional problems or advice.

[www.repcal.com/supp.htm](http://www.repcal.com/supp.htm)

## ***Presentation of Food***



Just load, shake, and feed. Its that simple with a Exo-Terra Feeding Rock. Just place crickets and vitamin supplements inside the feeder, shake to coat the crickets, and remove the plug to release the crickets into your pets cage.

No-mess feeder retains the excess vitamin powder, which can be reused at the next feeding. It also reduces vitamin residue on the substrate which may be dangerous as it can harbor harmful bacteria, especially in humid terrarium conditions.

Crickets release into the cage, stimulating your pets natural feeding behaviour realistically designed poly-resin feeder is easy to clean.

[www.petco.com](http://www.petco.com)



### **Medium Feeding Dish**

Meal worms and mixed vegetables can be presented to the Bearded Dragon in the vivarium.



### **Medium Water Dish**

Water dishes need to be heavy so that the Bearded Dragon cannot tip the water bowl over. Water should not be filled to the top so that if the Bearded Dragon dips in the dish it does not spill over the edges soaking the substrate in your Bearded Dragons enclosure.

[www.petco.com](http://www.petco.com)

## **6. Handling and Transport**

### ***Timing of Capture and Handling***

First thing in the morning, where the weather is cooler and the beardies haven't reached their ambient body temperature.

*(Titmuss and Brooks)*

### ***Catching Bags***

For short trips can use pillow cases or other types of bags.

*(Titmuss)*

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

Bearded Dragons grow large enough to handle and they do not resent being picked up and held – as long as you are polite, supportive, and considerate of their concerns for balance and their rather fragile limbs. To be polite, don't suddenly grab your dragon. Especially when you are still relatively strangers, approach slowly. For babies, place a finger under the chin and extend it under the body; the baby will cling to your finger. Soon, your baby or juvenile can be gently transferred to your hand. Support your Beardie fully in the palm of your hand, with its head pointed in the direction of your fingers. Place your thumb lightly on your Bearded's shoulder blades. Don't press down hard. If you are pressing hard enough to depress the body, you are pressing too hard. If your beardie starts to squirm, place your other hand over his head. For adults, scoop them up more directly, by the body. Hold them in your hand in the same posture as with juveniles, with their tail supported by your upper arm. If you don't support their tail, they will feel out of balance and will thrash their tail. If you want them to sit on your chest or shoulder, keep a supporting hand handy.

[www.biology.Isa.umich.edu/research/labs/ktosney/file/BDcare.html](http://www.biology.Isa.umich.edu/research/labs/ktosney/file/BDcare.html)

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

Bearded Dragons will normally stay on a set of kitchen scales long enough to be weighed. At other times they tend to get the wanders and not stay put long enough to obtain a reading. This may be overcome with the aid of a calico bag or plastic container, ice-cream container or bucket. First weight the bag/container and record weight, then place the lizard on the scales inside the bag/container. Deduct the weight of the bag/container from the second figure to obtain the correct weight of the lizard. Weighing the Bearded Dragon on a regular basis, for example once a month would be sufficient, providing the keeper with an actual weight of the lizard. This information is useful to veterinarians who may need to give medication and is another example of keeping records. Weighing your Bearded Dragon prior to, and after brumation allows the keeper to keep an eye on the lizards well-being.

*(Green and Larson)*

## ***Transport Requirements***

- **Ventilation and Temperature:**

The container must be adequately ventilated. As reptiles and amphibians are cold blooded animals with considerably lower oxygen requirements than birds and mammals, ventilation and the size of the ventilation openings depend on the ambient temperature. Shipments exposed to cold climates will need fewer ventilation openings than shipments exposed to hot climates.

The ventilation openings must be small enough to prevent the escape of the animal. Meshed openings must be added to the outer container to prevent possible blockage of inner ventilation holes by the outer container.

Mesh covering of the ventilation holes must be attached to the inside surface of the outer container wall.

Since reptiles and amphibians have a lower tolerance to temperature fluctuations and can be harmed from extreme temperatures insulated or lined containers that are recommended for these species to provide better protection against temperature variations during shipment and trans-shipment. Care must always be taken that the specimens are not exposed to either extreme cold or heat. In hot conditions low temperatures can be maintained by the inclusion of ice in a polyethylene/waterproof plastic bag. In cold conditions, heat packs can be used, in hot conditions, cold packs can be used. Heat and cold packs are most useful in primary enclosures with good insulation. Dry ice is not allowed.

**Warning:** Some heat or cold packs can contain substances which, due to their properties, are classified as dangerous goods. Consequently, they are not allowed in packages containing live animals.

When using heat or cold packs, they must not be in direct contact with the inner enclosures or bags containing animals, or with the animals themselves. Heat or cold packs must have insulation such as bubble wrap or foam rubber to avoid over heating or undercooling of the animals.

- **Labelling and Marking:**

The container must be correctly labelled and marked with the consignee's name, address and telephone number. Labels must not block ventilation holes, especially on small containers.

The container must be marked "**LIVE ANIMAL**" and have "**THIS WAY UP**" labels affixed to all four sides. Reptiles and amphibians must be noted on the "**LIVE ANIMAL**" label.

- **Documentation:**

Shipper's name, address and telephone number and a list with the scientific names and quantities of each species contained in the primary container must be attached to the outside of the primary container or printed on the outside of the outer container.

In addition, the shipper must check the appropriate box in the Shipper's Certification for Live Animals, certifying that the animals contained in his shipment are apparently healthy enough to travel by air, that they have been examined prior to shipment and are free of any apparent injury and readily recognizable diseases, and that they are also free

of external parasitic infestation, including mites, ticks and leeches, that can be seen under normal lighting conditions.

- **Special Care:**

Since reptiles and amphibians are highly dependent on the ambient temperature, they must be immediately removed from areas with very high and very low temperatures to a location where temperatures are not below 7°C and not above 29°C. The preferred temperature range should be 15-25°C. The location should be free of drafts, out of direct sunlight, and should be sheltered as much as possible from physical vibration and noise.

- **Transport Container:**

Large reptiles must be crated individually in containers that prevent movement. Certain species require reinforced containers due to their weight and size.

The outer container for larger species must be a strong heavy wooden or metal framed wooden crate with ventilation on the sides. The lining within the frame must be strong enough to withstand the animal's strength and can be plywood or solid wood. The ends of the container must be very smooth or padded to prevent injury to the animal's nose.

Forklift spacer must be provided for shipment with a total weight exceeding 60 kg.

- **Important Notes:**

Primary enclosure also means outer container;

Inner enclosure is an inner container, compartment or bag, where the animal is confined.

Mixing of different species is not allowed in a single inner container, compartment or bag.

(I.A.T.A)

### ***Box Design***

- When constructing containers for shipment of reptiles and amphibians, the normal habits must be considered.
- For general transport purposes, these species will be carried only in closed and adequately ventilated containers. The container must be well constructed and be able to withstand other freight damaging it or causing the structure to buckle or collapse. It must be constructed of non-toxic materials. Chemically impregnated wood may be poisonous and must not be used.
- The container must be suitable to keep the species inside at all times and protect it from unauthorized access. The door or lid must be constructed so that accidental opening cannot occur, either from the inside or the outside.
- The container must not cause injury to the animal. All inside edges must be smooth or rounded. There must be no sharp projections, such as nails, upon which the animal can injure itself.
- The container must be clean and leak proof. If it is to be reused, the container must be thoroughly cleaned and then either disinfected or sterilized prior to reuse.

(I.A.T.A)

### ***Furnishings***

Absorbent bedding that is suitable for the species must be provided. Straw and other plant material like leaves or mosses are unacceptable as many other countries prohibit their importation. All amphibians and a few reptiles require dampened bedding to provide the necessary moisture throughout the transport period.

All containers and bags should have some kind of packaging material (i.e. crumpled paper). Animals in the same containers or bags should belong to the same size class to avoid damage to smaller individuals.

The maximum number of animals per bag or container must not be increased even when larger bags or containers are used.

*(I.A.T.A)*

### ***Water and Food***

The need to feed or water any of these species during the normal transport time must not arise. Under severe delay and under certain circumstances watering may be recommended if advised by a specialist.

*(I.A.T.A)*

### ***Animals per Box***

For lizards, rigid containers can be used instead of bags with a maximum of 25 animals.

*(I.A.T.A)*

### ***Timing of Transportation***

Coollest part of the day.

*(Clark, 2007)*

### ***Release from Box***

Early Morning. The animal will have all day to establish its new territory and surroundings.

*(Clark, 2007)*

## 7. Health Requirements

### **Salmonella:**

Salmonella is a type of bacteria, which the most recognized disease of reptiles transmissible to man. There are more than 2,000 types known. Not all cause disease, and some only cause disease in specific species of animal

In humans, salmonella is most commonly caught through eating contaminated food. The types of salmonella that reptiles can carry only account for a very small percentage of human cases of salmonella. However, this could grow as the number of people in direct contact with reptiles increases, if precautions are not taken.

Salmonella infection can vary in severity from individual to individual. Symptoms vary from none, to mild flu for 24 hours, right through to extreme cases with diarrhea, dehydration, stomach cramps, high fever and, in rare cases, even death.

As different studies estimate the incidence of salmonella in lizards to be somewhere between 13 to 41 per cent, it is safest to work on the basis that all lizards are carriers. Remember that reptiles, even though they can be infected with salmonella, rarely show any symptoms associated with that infection. Some people theorise that, in a proportion of reptiles, salmonella is a normal inhabitant of the gut.

Work is being done to develop better tests to identify the individuals that are carrying salmonella and also to develop ways to eliminate the salmonella from those carriers.

### **Hygiene:**

- There are a number of hygienic precautions to prevent salmonella and other possible diseases that might be transmissible to humans:-
- Do always wash hands thoroughly with soap and water after handling any reptile, cage or cage accessories.
- Do keep reptiles out of kitchens and away from any surfaces where food for human consumption is prepared or stored.
- Do wear gloves while cleaning the reptile enclosure or during changing the water bowl.
- Do keep the reptile enclosure as clean as possible.
- Do avoid splashes to the face while cleaning the reptile enclosure by wearing eye and face protection if necessary.
- Do cover any cuts or sores with dressings or gloves during handling.
- Do supervise children under 12 when they are handling reptiles.
- Do teach children to wash their hands thoroughly after handling.
- Do not eat, drink or smoke while handling any reptile.
- Do not put your hand in your mouth or use your mouth to hold anything (for example a writing pen) at the same time as handling any reptile.
- Do not clean reptile accessories or cage furniture in the kitchen sink.

### **At Risk:**

The following categories of people should avoid all contact (direct or indirect) with Bearded Dragons and other reptiles, as they are the members of society most at risk of salmonella:-

- Children up to the age of five.
- Anyone with HIV infection or any other immuno-suppressive illness.
- Anyone who is on any drug or treatment that suppresses the immune system.
- Pregnant women.

*(Raferty 2002)*

Personal Protective Equipment (P.P.E):

- Latex Gloves.
- Dust Mask/Face Mask.
- Water Proof Apron.
- Water Proof Shoes/Enclosed Shoes.

*(Class Notes)*

### ***Daily Health Checks***

Bearded Dragons should be examined before purchasing a new arrival, during quarantine, before and after brumation, and conducted on a regular basis, eg. every month.

*(Green and Larson)*

Manipulate enclosures as necessary to observe appearance and behaviour of animals.

Examples of conditions which may be observed and should be reported include:-

- Excessive weight loss/ emaciation or weight gain/ obesity.
- Unusual growths or swellings.
- Unusual posture, activity, lethargy.
- Skin irritation, lacerations, lesions or ulcers.
- Bleeding or discharge from an orifice.
- Unusual faeces.
- Difficulty breathing.
- Unusual locomotion.
- Convulsions/ seizures.
- Dehydration (sunken eyes, loss of skin elasticity).
- Abnormal skin shedding.
- Eyelid swelling.
- Vomiting.

[www.ucuca.umich.edu/forms](http://www.ucuca.umich.edu/forms)



## ***Detailed Physical Examination***

**Eyes:** Eyes should be open, bright, glossy and alert. They should not be dull, cloudy, sunken, have swollen lids or have discharges. Bearded Dragons with a missing eye, perhaps from an old wound, may be still healthy; however fresh wounds will need the appropriate attention.

**Nostrils & mouth:** The nasal passages and mouth should be dry and free of blockages, obstructions, foamy bubbles, phlegm or other discharge. The breathing should clear and consistent. The dragon should not be sneezing, have laboured breathing, nor should it be audible or have a noticeable wheeze as these signs may indicate a respiratory infection. Ensure the nostrils are not blocked and check the mouthparts for damage. The interior of the mouth should be yellow in colour, any coloured blotches may represent a health problem. These Bearded Dragons which have not adjusted to captivity, are in unfamiliar conditions, or not “tame”, may puff out their beards when handled.

**Skin, Limbs & Tail:** Look for cuts, abrasions, sores, lumps or swellings; coloured patches of skin may indicate inflammation or haemorrhages, or signs of more serious ailments. Monitor old wounds that may have healed over for anything abnormal such as developing lumps under the skin, and on the soles of the feet or belly. Legs should be strong and struggle if the lizard is picked up, with the body often twisting in your hand. On the other hand, some lizards may appear lazy at times; however they should also be alert and respond to touching and should not be limp, or rubbery, when held in the hand. The thighs should be round to feel and solid to touch. Legs should not be noticeably thin or the bones be readily felt through the muscle. Undernourished Bearded Dragons will have a noticeably thin or flat tail instead of a round tail, the hip bones may be protruding or the eyes sunken back into the sockets. Pay attention to the ear opening and toes for signs of an incomplete slough as this may result in infections, or damaged and missing toes.

*(Green and Larson)*

- **Nose/Breathing:** Check the animal’s nose for signs of abrasions, damage or infection (e.g. mucous). An abrasion on a reptile’s nose is a sign that an animal has been trying to escape from an enclosure (they damage their nose on wire enclosures or if the area is too small and they constantly pace along a glass window trying to push their way out). How does the animal’s breathing sound? Healthy reptiles will make no noise or hiss in defence. If the animal clicks as it breathes, then it may have a respiratory infection. Healthy animals breathe through their nose, never through their mouth. There is something wrong (probably a respiratory infection) if a reptile breathes through its mouth or gasps.
- **Mouth:** The mouth should be free of swellings, food, scabbing or lumps. Depending on the species, the mouth area may normally have a slight yellow tinge (dragons) or be white (snakes). If an animal’s gums look red, it may have canker. Dragons that have been hit by cars often have a fracture along the symphysis of the jawbones, which causes free and independent movement.

However, this is normal in snakes. To open the mouth of a lizard, snake or dragon, hold on to the animal's head and gently pull on the loose skin under their jaw. Other animals will need their mouths pried open. A solid flat object such as a spatula may be used, or in some cases a crop needle or the blunt end of a pencil. You will need time and patience to open a turtle's mouth.

- **Eyes:** The eyes should be clear, bright and responsive to light (pupils dilate and contract). An animal that constantly keeps its eyes closed may be sick or dehydrated. If the eyes are cloudy, they could be damaged. This could also mean a snake is ready to shed its skin. Check the eyes for discharge or swelling (some captive specimens may get swollen eyes due to a Vitamin A deficiency — this is unlikely to occur with wild reptiles).
- **Body:** The body should be free of abrasions, lacerations, scratches and hard or soft swellings. The colour of the animal should be within the normal range for the species (most reptiles look duller just before they are going to shed). Is the animal in good condition? For some lizards, if the bones of the tail and pelvis are prominent, then it is in poor condition. The spine is normally quite prominent in these animals. It can be difficult to determine whether a turtle is in poor condition. A turtle is in poor condition if the skin where its legs and neck enter the shell is sunken (this may take some practice to be able to identify).
- **Legs and Feet:** Legs should be of a similar length without enlarged bumps in the joints or muscle tissue. Feet and toes should not be swollen. Some animals survive without all of their toes.
- **Cloaca:** The cloaca should be clean and free of faecal matter. If the cloaca is swollen, enflamed or has internal body tissue extruding from the vent (prolapse), the animal will require veterinary care. It is quite normal for male animals to extrude their hemipenis when defecating. If the hemipenis stays out of body for a significant amount of time it can dry out and become infected.
- **Tail:** Normally the tail should be free of abrasions, lesions and swelling or signs of infection. Note: not all reptiles lose their tail.
- **Faeces:** The normal appearance of reptile faeces differs between species. Generally, the faeces should be firm and brown. Aquatic and semi aquatic species may have watery faeces. It may contain bits of fur and vegetation. Urates should be white to off-white. The reptile should not strain while defecating. The reptile is sick and needs veterinary care if the faeces become loose, watery (if not aquatic/semi-aquatic species) or bloody, or the urates become bright yellow or tinged with red.

- **Dysecdysis:** This condition occurs when a reptile does not properly shed its skin. It will occur when the animal is dehydrated, sick or stressed. Unshed skin attaches to snake's eyes and the end of the tail; an unshed eye spectacle can become infected and lead to loss of vision. In lizards, the unshed skin remains attached to the toes, tail, head and legs and can constrict the animal's movement or cause it to lose an appendage, particularly toes. The skin is also irritating, causing the reptile to hurt itself by rubbing the area continuously.

[www.epa.qld.gov.au/nature\\_conservation/wildlife/caring\\_for\\_wildlife/carers\\_kit/reptiles/diseases/](http://www.epa.qld.gov.au/nature_conservation/wildlife/caring_for_wildlife/carers_kit/reptiles/diseases/)

## **Chemical Restraint**

The Chemical Restraint Methods used would be relevant only in the veterinary surgery for operations on the reptile.

(Clark, 2007)

## **Physical Examination**

See Above in Detailed Physical Examination

## ***Known Health Problems***

### **Infectious Diseases:**

Infectious diseases are caused by exposure to bacteria, fungi, viruses or parasites. Parasites may either be microscopic (protozoan or unicellular parasites) or large enough to see with the naked eye (metazoan or multi-cellular parasites). Fungal infections are often profuse enough to see with the unaided eye.

### **Respiratory Infections:**

Respiratory ailments can be caused by bacteria, viruses and less frequently by fungi. Respiratory infections are rare among bearded dragons. When they do occur, they are often the result of improper environmental conditions, including temperatures that are too low, humidity levels that are too high. Symptoms include gaping, noisy breathing, puffiness around the throat pouch and mucus discharge from the nostrils and/or mouth. Because such infections are potentially fatal, a trip to the vet is usually required. In the meantime, keep your sick dragon warm (in an enclosure that is about 32 Degrees Celsius), and at a relatively low humidity. To prevent respiratory infections keep an eye on the environmental conditions and the temperatures are correct and humidity levels are correct.

### **Gastrointestinal Infections:**

Gastrointestinal infections are most commonly caused by an over growth of bacteria such as *E.coli*, salmonella sp., pseudomonas sp. and other organisms. Symptoms include loss of appetite, weight loss and foul smelling diarrhea. Lizards do not vomit, and so even if they have symptoms of nausea they cannot relieve themselves in this way. A gastrointestinal infection should be evaluated quickly by a vet who can do a faecal examination. Delay can be fatal, so consider this type of infection a real emergency.

**Viral Diseases:**

Reptiles are subject to contracting viruses, and findings of adenoviruses in Bearded Dragons have been reported. Because antibiotics are ineffective at fighting viral infections, the best treatment is to warm the animal, including a fever unfavorable to the virus.

Other lizard viruses known to occur are from the family of poxviruses and papilloma (herpes) virus. Papillomas, or flattened “warts” were discovered in Emerald Lizards, at the base of the tail in females and at the base of the neck in males. The warts were associated with mating bites. As part of the mating ritual, females bite males on the neck and males bite females at the base of the tail. Because Bearded Dragons are also known to bite each other during mating, it is possible that they may develop similar viral infections.

*(Steve Grenard 1998)*

**Parasitic Infections:**

Parasites are classified by their physical relationship with their host. Parasites that reside on the outside of a host, such as mites, fleas, ticks or maggots, are known as ectoparasites. Those that live inside a host are called endoparasites. Reptiles are susceptible to and may harbor both types of parasites. There are many methods of ridding your beardies of parasites, and not all of them can be addressed here. As a rule, it is best to seek professional help when your lizard has a parasitic infection. Many hobbyists, however, effectively use home treatments on their animals. This is only a good solution if you are confident that you can diagnose the problem properly and treat it completely.

*(Steve Grenard 1998)*

**Coccidiosis:**

Coccidiosis is the most common disorder seen in bearded dragons. Coccidian are microscopic, protozoan parasites that live primarily in the small intestine and replicate in the lining cells of the intestinal tract. The end product of the reproductive process is a microscopic entity called an oocyst. These tiny oocysts are passed into the environment with the feces when the bearded dragon has a bowel movement. The oocysts can then reinfect the host by being ingested.

Coccidia are so prevalent in bearded dragons that they have their own species of coccidia – *Isospora amphiboluri*. Since almost all bearded dragons in captivity have coccidia, maybe the parasites are normal inhabitants.

1. The parasites have a direct life cycle and build up to tremendous levels in captive animals. This is known as a superinfection.
2. Coccidia invade the intestinal lining cells to reproduce. In large numbers this can lead to gastrointestinal pain, diarrhea, malabsorption, and fluid loss. Eventually, this can lead to a failure to eat, weight loss, secondary nutritional disorders, and secondary bacterial infections.
3. Hatchling bearded dragons appear to pick up coccidia even when not exposed to the environment of the parent. This would infer transuterine or egg-related transfer. At some point we must break this cycle.

4. The coccidia may be transmissible to other reptiles. While coccidia are somewhat host specific, there have been *amphilboluri* affects other reptiles.

Coccidia is not easy and not fun to get rid of. Due to the lack of research on anticoccidial drugs for many decades, there are mainly two old standby sulfa drugs – sulfadimethoxine (Albon) and trimethoprim-sulfa (from many manufacturers). These drugs should be obtained from a reptile veterinarian only after a diagnosis of Coccidiosis is confirmed with a fecal examination.

Environmental control is the best way to eliminate this disease. You have to pretend that you are an obsessive/compulsive cage cleaner; and if you already are, then that's even better. To have a chance at breaking the exposure cycle with coccidia, the cage must be reduced to the bare essentials. Use newspaper or paper towels on the floor of the cage. Change the cage at least once or twice daily. Don't try to clean branches and rocks with cracks, crevices, or holes. Throw them out. Use cardboard cage furniture that you can eliminate daily. Water dishes should be simple and cleaned thoroughly twice every day.

Maintain the use of heat lamps and under cage heaters. Eliminate hot rocks and replace them with an under cage heater.

Feeder crickets, mealworms, wax worms, or veggies that are not eaten in a twenty-four-hour period should be *eliminated*. Do not recycle them or save them to use with other reptiles. Remember, the insects may have dined on the dragon droppings and would only serve to perpetuate the cycle.

A word of warning: sulfa drugs should not be indiscriminately administered to every sick bearded dragon and should be used only if coccidia have been diagnosed. Sulfa drugs are potentially dangerous to dehydrated reptiles and need to be used under expert supervision. Rely on your reptile veterinarian for diagnosis, prescription of medications, and performance of follow-up fecal examination.

*(Steve Grenard 1998)*

### **Pinworms:**

Pinworms are another group of parasites that are ubiquitous in bearded dragons. While considerably less harmful than coccidia, pinworms can reach tremendous parasitic loads due to their direct life cycle.

While the treatment of pinworms is somewhat controversial, any parasite capable of creating superinfections should be eliminated. Pinworms are easily eliminated by administering oral Fenbendazole (Pancur) daily for three to five doses, repeating this regimen again in ten days. Follow-up fecals should be checked three weeks after the last treatment.

*(Steve Grenard 1998)*

### **Microsporidia:**

Dr. Elliott Jacobson recently reported the first cases of this intracellular protozoan parasite in three bearded dragons that had been inappetent and depressed, and that eventually succumbed to the protozoan parasites. While known to infect some amphibians and other reptiles, Microsporidia had not been previously reported in breaded dragons.

These obligate intracellular unicellular protozoans are important pathogens of invertebrates and it was speculated that feeder insects were the source of infection, which is unlikely. The main source of transmission is probably spores shed from infected reptiles. While uncommon, this is a parasite that reptile veterinarians will be watching for in the future. It possesses characteristics that reptile owners and veterinarians dislike – a direct life cycle and resistant spores that can persist up to a year in the environment. *(Steve Grenard 1998)*

### **Tape worms:**

While rarely diagnosed, it is suspected that tapeworms are more common than is currently recognized. Tapeworms should be considered in breaded dragons that have been treated for coccidia and pinworms yet don't gain weight despite ravenous appetites. An analogous situation was seen in ball pythons that had trouble gaining weight despite good appetites and appearing otherwise healthy. Occasionally these animals have been treated for tapeworms despite no definitive proof of their presence. Such a course of treatment should be based on discussions with a reptile veterinarian who knows the overall health parameters of the bearded dragon in question.

The most common means of diagnosing tapeworms is by the presence of tapeworm segments (proglottids) in the faeces. Proglottids are small, white, rice-shaped segments that can be found on the surface of the faeces or moving away from it. These segments contain tapeworm eggs to be distributed to the environment either by desiccation of the segment (thereby releasing the eggs) or by being ingested. Tapeworm eggs can be found on routine faecal flotations but seem to be present only in very heavy infestations. Treatment consists of either an oral or injectable dose praziquantel (Droncit), which is repeated after two weeks. Tapeworms require intermediate hosts and have indirect life cycles, so self-exposure is not the problem it is with coccidia or pinworms.

*(Steve Grenard 1998)*

### **Pentastomids:**

Pentastomids have an indirect life cycle, requiring intermediate hosts such as insects and rodents to complete their reproductive cycle. Extensive larval migration occurs before adults form in the lungs and complete their cycle by laying eggs that are then passed through the faeces and into the environment. Despite large numbers and extensive larval migration of these prehistoric caterpillar-like parasites, most infestations occur without major symptoms. In some cases, there can be damage to the tissue during larval migration or when adults are in the lungs.

Pentastomids pose an unknown zoonotic risk and owners should be informed of this if their bearded dragons are affected.

*(Steve Grenard 1998)*

### **Fungal Diseases:**

Fungal diseases occur in damp, warm environments and thus are not a known problem in desert and dry land dwelling beardies. Some types of cage substrate such as corn cob (which is heavily infused with dormant fungal spores), rapidly vegetate with fungal growth when exposed to dampness and heat. This type of substrate is not recommended for any reptile, especially those that may accidentally ingest it with food matter.

In beardies, the most likely place a fungus may occur would be in a skin abrasion or cut. This should be rapidly treated with an anti-fungal, such as Lotrimin, or by a vet using an anti-fungal conditions.

*(Steve Grenard 1998)*

### **Traumatic Injuries:**

Bearded Dragons, when housed with other beardies, are apt to suffer traumatic injuries as a result of combative or aggressive behaviour of one animal against another. Thus it is not unusual for less aggressive members to have toes and tail tips nipped off. Separate caging is the key to trauma prevention of this nature in beardies. Bite injuries should be treated with the use of a disinfectant ointment, such as Betadine.

In addition to injuries inflicted by cage mates, Bearded Dragons can be burned by hot rocks or seared by basking lamps if they cannot escape them when it gets too hot. Burns should be evaluated and treated by a vet, but you can also try any number of over-the-counter burn creams and salves on an emergency basis. If the skin is completely burned away (a first degree burn), professional attention is a necessity. Burns can easily become infected, and death by septicemia is often the result in severe burns that are not properly treated.

*(Steve Grenard 1998)*

### **External #1:**

Mite is a problem that is often encountered in lizard collections. Signs are little white spots (mite faeces) on the lizards scales, and little black spots (mites) seen throughout the cage. If left unchecked, the lizard will become increasingly infested, its appearance will deteriorate, reducing its overall health even to the point of death.

Various treatments are available, however the most common practice from the lizard in a ventilated container, in the enclosure for several hours, every week until no sign of mite is present. Some keepers advise against this method, and suggest other products available from pet shops or a vet who specialize in reptiles. A second “informed” opinion is always a good idea. The entire cage should be treated after the pest strip had been used. By cleaning all the contents, including walls, ceiling, floor, substrates, and huts or hide boxes, and paying particular attention to corners and crevices, you eliminate the eggs attached to the surfaces. An old tooth brush is great for those tricky corners. Once again, the enclosure should be cleaned after each treatment. Removing any of the contents prior to this may spread the mite by means of your hands or from accidentally dropping to the floor.

Ticks are an occasional problem for Bearded Dragons that are housed outdoors. They are recognized by small grey to black coloured animals protruding from under the scales, under the limbs or folds of skin, and around the ear openings. They are typically 3 to 12 mm in length and on close to the body. Ticks may be removed with tweezers or forceps, ensuring the mouth parts have been removed and attachment areas painted with Betadine. Alternatively ticks may be dabbed with olive oil, thus suffocating the tick, before removal. Upon removal, ticks should be squashed and disposed of away from the collection.

*(Green and Larson 2001)*

## **External #2**

Mites are not common, but when they do appear, they seem to be acquired from other reptiles within a collection. Mites do not appear to be indigenous to bearded dragons. Snake mites will infest bearded dragons and can be seen crawling on the lizards with the naked eye.

As with all the mite infestations, treatment begins with the environment. At least temporarily, change the paper substrate at least two to three times a week. Reduce cage furniture to a minimum and eliminate all rocks or branches with cracks and crevices. An initial cage cleaning with a mix of water and bleach (one capful of bleach to each gallon of water) helps to mechanically eliminate mites and their eggs.

The preferred method of treating mites is to use an ivermectin-based spray (5-10 milligrams of ivermectin per quart of tap water). This solution is sprayed liberally in the cage after a thorough cleaning, with the lizard is gently but liberally sprayed, including the face and eyes, and returned to its dried cage. The water dish can be replaced once the cage and the lizard are thoroughly dried. This spray needs to be used every four to five days for three weeks. Ivermectin is not a quick kill product, so you may continue to see mites moving for the first few days of treatment. Store the spray in a dark cabinet between treatments and mix a new batch every thirty days.

For large, outdoor enclosures, it is recommended removing the lizards to smaller indoor cages for individual treatment with the above ivermectin spray, while the outdoor enclosures are sprayed with a pyrethroid (type of insecticide) product designed for flea control in dogs and cats. The lizards should remain off the sprayed area until it has completely dried. If possible, it is ideal to keep the lizards in indoor cages while they are treated, but if they must be returned to the outdoor enclosures the lizards should remain off the sprayed areas until drying is complete. Most of the toxicity of pyrethroids has been linked to respiratory exposure in non-ventilated containers, so a pyrethroid spray used as instructed in an open-air enclosure should be relatively safe. Pyrethroid has residual action and depending on the product, need only be applied every one to three weeks. The dragon should be sprayed with the ivermectin product every four to five days for three weeks. Due to numerous hiding places and other variables, mites may be difficult to control in outdoor enclosures.

*(Herp Library 2001)*

## **Internal:**

Internal parasites can affect the health of Bearded Dragons in a variety of ways. Often they can cause refusal to eat, weight loss, lethargy, failure to grow or thrive, lower resistance to disease and also account for reproductive failure. A vet is able to analyse the presence of internal parasites via a faecal test, and administer a course of treatment. For example, vets may control various nematode worms with Fenbendazole (Pancur 25) at a dose rate of 2ml/kg given orally, and control various protozoans with Metronidazole (Flagyl) at a dose rate of 50mg/kg, also given orally; a follow up dose of either product may be required in 14 days.

*(Green and Larson 2001)*



### **Adenovirus:**

Adenovirus disease in bearded dragons is poorly understood for the same reason most reptile diseases are poorly delineated-lack of funding for critical research.

Unfortunately, there are no specific signs to watch for in bearded dragons sick with adenovirus. Most of the bearded dragons that have been diagnosed with adenoviruses have had a history of failing to thrive, sometimes showing poor appetite, sometimes exhibiting diarrhea. Sometimes they die. The young, especially those four to twelve weeks old, appear to be affected more often than older specimens.

An affected animal is typically difficult to differentiate from one with Coccidiosis or certain forms of calcium deficiency. To further complicate matters, dragons can have multiple disorders. A young bearded dragon with adenovirus could also have Coccidiosis, which may or may not be causing problems at that moment. This young dragon could, or would, certainly develop nutritional disorders including hypocalcemia as poor food intake becomes a factor. These mix and match illnesses could go on and on, with one factor affecting another or making no difference. It's important to know if adenovirus is present in a sick dragon.

The only method currently available to diagnose adenovirus is autopsy. Most dead bearded dragons fail to demonstrate significant gross (readily visible) abnormalities of the internal organs. It is only on examination of tissues and cells with a microscope that the presence of intranuclear inclusions (material characteristic of certain viral infections), primarily in necrotic (dead) areas of the liver, is found. Such inclusions are *presumptive* evidence of adenovirus, but electron microscopy is required to *confirm* the diagnosis by demonstrating typical viral particles. This is *not* the same inclusion body disease that afflicts boids and pythons. Both are viral diseases but entirely different groups of viruses. The only similarity would be to make the suggestion that a liver biopsy is a useful diagnostic test, prior to the bearded dragon's death. While it may be somewhat risky to perform a surgical biopsy technique on a sick bearded dragon, the information obtained from liver biopsies is invaluable. A quick surgical biopsy on a living dragon is always preferable to a necropsy on a dead one.

While technology exists to produce a simple blood test, this won't happen until it is demanded by you, the bearded dragon owner and veterinary client.

*(Herp Library 2001)*

### **Nutritional Disorders:**

#### **Calcium Deficiency:**

The most common cause is a diet of almost exclusively crickets. Most feeder crickets come straight from a pet store and are not fed balanced diets (gut loaded) or dusted with nutritional supplements prior to being fed to dragons. Calcium deficiency is also seen in bearded dragons fed excessive amounts of meat products. These diets are low in calcium, and less calcium in the dragon's body leads to stimulation of receptors in the parathyroid hormone (PTH). Increased levels of PTH activate cells in bone (osteoclasts) to start demineralizing bone to release calcium into the blood stream.

If the primary problem presents as soft bones and multiple fractures, the dragon's disease is termed metabolic bone disease (MBD). If the primary problem is twitching and seizures, then the dragon likely suffers from hypocalcaemia (which is more common in juvenile dragons). Both forms are caused by too little calcium in the diet.

*(Herp Library 2001)*

**Other Health Concerns:**

**Kidney Disease and Gout:**

Water is extremely important to the elimination of nitrogenous waste products in all reptiles. Because bearded dragons originate in the red sand deserts of Australia, it used to be assumed that bearded dragons have durable kidneys. Most desert-dwelling reptiles have adapted to extremely dry conditions by developing mechanisms to preserve water and to excrete concentrate uric acid.

Visceral gout is usually fatal in bearded dragons unless corrected very early in its course. It is not yet known whether the visceral gout is primary (kidney damage) or secondary (dehydration). Some experts have speculated that wild bearded dragons retreat to moist underground burrows or stay buried to prevent loss of fluids. In the wild, adult bearded dragons appear to eat mainly vegetation, which can be a major source of moisture. Our hope is that husbandry factors such as excessively dry substrates, basking under a heat lamp, and a lack of moist veggies are the cause of dehydration, because these can easily be corrected.

*(Herp Library 2001)*

**Prolapses:**

Prolapses are not common in Bearded Dragons, but they do occur, and should be treated as a relative emergency. The most common type seen in practice is hemipenal prolapse after breeding. The prolapsed hemipenes is a relatively large (3/4 inch long by 1/4 inch wide) bright red to dark red mass protruding from the vent of the affected male. The treatment is to *gently* clean and lubricate the tissue and then *gently* push it back into the vent with a lubricated Q-tip. The problem is that by the time this problem is noted, the tissue is often quite inflamed and swollen and cannot be replaced without it popping back out. If the tissue becomes excessively swollen, begins to dry out, or is traumatized by being dragged around the cage, the hemipenes' vascular supply could become damaged, necessitating an eventual amputation.

*(Herp Library 2001)*

**Eye Problems:**

A common hypothesis for this condition is that dust from sandy substrates is irritating, setting up an inflammatory conjunctivitis that is soon complicated by infections. This is somewhat puzzling as bearded dragons originate primarily from the red deserts of Australia where they are certainly exposed to a bit of sand. In any case, unprocessed silica sands and calcium-based sand products can certainly produce profound irritation if a few particles become trapped behind the third eyelid. Most of these problems respond nicely to a temporary change of substrate to newspaper for a couple of weeks while applying an artificial tears ointment or eye drop two to three times daily. The drops and ointment hydrate the eye and allow small particles to be flushed out.

*(Herp Library 2001)*

**Loss of Tail or Digits:**

Parts of tails and digits of juvenile bearded dragons are sometimes nipped off by cage mates. Unlike many other lizard species, caudal autonomy, or the dropping of part of the tail is not part of the defensive repertoire of these species. Once lost, neither tail nor digits will grow back. Fortunately, infections seldom develop following these cannibalistic snacks.

*(Herp Library 2001)*

**Quarantine Requirements**

Quarantine can be defined as the restrictions placed on the entering or leaving of premises or regions where a case of infectious disease exists or is suspected. It is usually done by enforcing isolation for certain periods of time. A quarantine station is an institution which houses animals that have to serve out a mandatory period of quarantine because they have come from an infected port or have been exposed to, or affected by one or more exotic diseases.

It is important to note that isolation should be carried out at two different levels:

- National level.
- Local level.

*(No Known Source)*

**Levels of isolation:**

National level quarantine regulations are (or should be) in place to prevent exotic (*i.e.* from other countries) diseases from entering a country. National and international quarantine stations are supposed to be active at all importing airports or harbors. Illegally imported animals or importations that bypassed national quarantine facilities and regulations pose big threats to the rest of a country's herptile population.

Local level quarantine prevents disease (local, wild, or exotic) from entering private collections. This is usually done by local quarantine facilities. It is the responsibility of every keeper to quarantine all newly obtained animals to prevent diseases from spreading to and within private collections. Local isolation prevent exotic and local diseases from entering collections and should thus be enforced even if national level isolation was enforced. It is recommended to quarantine each and every animal, including local bred, apparent healthy and wild caught animals.

*(No Known Source)*

**Important Factors:**

The idea of effective quarantine is to keep animals long enough in isolation for all potential diseases to develop and show clinical signs or symptoms. Infected animals can thus be identified and treated or removed. The incubation period of pathogens is the time from infection to when the pathogen causes disease or clinical signs. This period should be used as effective quarantine period. Different diseases have different incubation periods, but by isolating animals according to the longest potential disease incubation period, all potential diseases can be excluded. After quarantine the chance of still harboring a disease is minimal and animals can generally be declared free of diseases.

*(No Known Source)*

### **Quarantine Facilities:**

The following should apply to quarantine and quarantine facilities:

- The facilities should be separate from existing collections preferably with no air communication *i.e.* a separate room with different air conditioning.
- Quarantine containers or cages should be set according to normal / minimal husbandry standards of the species.
- Quarantined animals should be housed separately, *i.e.* one per container.
- Handling of quarantined animals should be kept to a minimum to prevent contamination and stress.
- After handling quarantined animals (all herptiles for that matter) hands and all other in contact parts should be washed and disinfected immediately.
- Quarantine facilities should be visited after the normal collection.
- Quarantine areas should be isolated to prevent free movement of unauthorized people to prevent contamination and stress.
- Quarantine containers or cages should be set up for easy regular cleaning.
- Food and water containers should be washed and disinfected on a daily basis.
- Fresh food and water should be supplied on a daily basis.
- No prophylactic medication should be given to quarantined animals to prevent the masking of diseases.
- All animals should be identifiable and records should be kept on a daily basis.
- Herptiles should be quarantined for at least 2 months but up to 3 months is preferable.
- Animals showing any signs of disease should be isolated immediately and examined by an experienced reptile veterinarian and treated accordingly.

*(No Known Source)*

## 8. Behaviour

### **Activity**

Bearded dragons are diurnal (awake in the daylight, asleep at night) and timers controlling UV and incandescent light ensure a regular “day” for a beardie. In summer, 14 hours of light (with UV) per day is ideal; this can be reduced over several weeks to 8 hours per day in winter, then back up again in the spring. Some keepers time their daytime lights in keeping with the natural rise and setting of the sun.

<http://www.geocities.com/borderviewdragons>

### **Social Behaviour**

Bearded dragons have a distinct social structure; they recognize each other and some even seem to form attachments to one another and to their keepers. Both sexes form dominance hierarchies; it is important to provide enough space – especially basking space – to prevent bullying. Two males will fight and should not be housed together. Social responses include head-bobbing and beard display, especially in males; a number of distinct poses, bows and body-tilting gestures; and arm waving, a submissive gesture shown most often by juveniles and females. Individuals also greet each other by touching the face of the other with their tongue.

<http://www.geocities.com/borderviewdragons>

- **Gaping or Panting When Basking:**

Some bearded dragons choose to remain at high temperatures and may gape (keep the mouth open) or pant (keep the mouth open while performing throat movements to increase the rate of air flow in and out of the mouth and lungs) while basking. Gaping is also performed in the initial stages of over heating, presumably in an attempt to cool down. This behaviour should not be of concern to owners unless their vivarium is over heated and fails to provide cool areas. If the enclosure is too hot, heat sources should be turned off and the vivarium design adjusted to provide a heat gradient. Gaping and forced exhalation may also occur in bearded dragons with respiratory infections, with lung damage from inhaling too much dust, or with certain types of parasite infection.

*(Herp Library 2001)*

- **Thermoregulation:**

Like most reptiles, bearded dragons can raise their body temperature relatively quickly, but they cool down slowly, and cannot readily cool below air temperature.

Bearded dragons flatten and darken their bodies to increase heat absorption and quickly raise body temperature when exposed to sunlight. Bearded dragons can also warm their bodies by absorbing radiant heat from warm surfaces such as rocks or the ground.

*(Herp Library 2001)*

- **Open mouth display:**

Bearded dragon hatchlings perform the classic display of an open mouth with beard extended toward large moving objects they interpret as threats. It's easy to see how this defensive display earned these lizards their common name. In captivity, most bearded dragons readily habituate to movements by their caretakers and the propensity to perform the open-mouth display quickly wanes. Nonetheless, the potential to perform this display remains throughout the life of a bearded dragon.

*(Herp Library 2001)*

- **Arm-Waving:**

Arm-waving is the earliest social behaviour in bearded dragons and it can be witnessed within days of hatching. It serves both as an intra-species signal and as an appeasement gesture. It persists as an appeasement/submissive gesture in adult females during breeding. More rarely it is performed by submissive males when more aggressive males bite their necks.

*(Herp Library 2001)*

- **Tail Curling:**

Bearded dragons commonly adopt a position in which most of the tail is curled up above the ground as they remain still. This is a sign of being alert and is commonly performed by adult bearded dragons throughout the day.

*(Herp Library 2001)*

- **Head-bobbing or Head-jerking:**

Head-bobbing refers to a lowering and quick raising of the dragons head, usually performed in repetitive sets. The lifting component of the behaviour can be so vigorous that the entire front of the body jerks upward. This behaviour is most often seen when males are in breeding/territorial mode, usually exhibiting a black beard. This is a sexual display performed as a part of courtship toward females prior to copulation.

*(Herp Library 2001)*

- **Male-Male Encounters:**

At the onset of the breeding season, male-to-male encounters and occasional male-male fights occur. These fights are mostly ritualistic and no serious harm comes of them. Typically two males in breeding condition will blacken their beards and perform head-bobbing behaviours. This will be followed by a great bluff performance in which males tilt their flattened bodies toward each other. One of the males may twitch its tail. A male may then try to bite the tail of the other. They may bob and again display flattened bodies to each other.

*(Herp Library 2001)*

- **Tongue-Tasting:**

Dragons taste new foods, new objects, and other dragons with their tongues. Tongue-tasting serves a chemoreceptive function and allows evaluation and identification of food, objects, or other lizards. Tongue-tasting may also be performed by alpha males upon other males prior to performing the head-bobbing display. *(Herp Library 2001)*

## ***Reproductive Behaviour***

About three to four weeks after the end of winter shutdown, bearded dragons begin reproductive activities, including courtship, territorial and competitive behaviours and copulation. In bearded dragons, copulation is typical of what is observed for most lizards. A male bites the fleshy portion of a female's nape, places part of his upper body on her, then scratches her with his hind leg to encourage her to position herself for copulation. The male then twists his lower body and inserts a hemipenes. The sexual act lasts several minutes.

*(Herp Library 2001)*

## ***Bathing***

Bathing a bearded dragon once a week will help keep them hydrated and will also aid in shedding. Bath water should be warm on your wrist and **not hot**, much like bath water for a small child. Make the water only as deep as your bearded dragons chest or half way up their front arms. **Never** bearded dragons unattended in the bath, accidents only take a second to happen. You **MUST** disinfect the tub when the bath is over because bearded dragons will often defecate in the water.

[www.draconian.com/dragons/bearded-dragon-care.php](http://www.draconian.com/dragons/bearded-dragon-care.php)

## ***Behavioural Problems***

- **Mutilation/Cannibalism:**

Juveniles of all the popular species may mutilate cage mates. This behaviour is most readily performed by stage 2 of animals, usually by larger individuals toward more passive ones when not enough food is available. Tail tips, toes, and sections of limbs may be bitten off by hungry and more assertive individuals. In extreme cases, when a smaller dragon is of gobbling size, larger, more dominant juveniles may attempt cannibalism.

## ***Signs of Stress***

Stress may be insidious and not immediately obvious to dragon owners. For example, stress can arise from chronic excessive exposure to vibrations or light, too much handling or rough handling, or unwanted attention by the family dog or cat.

*(Herp Library 2001)*

## ***Behavioural Enrichment***

To encourage bearded dragons to do natural behaviours such as arm waving, tail curling and head bobbing you could put two bearded dragons together to encourage social dominancy and behaviour, if you do not have access to another bearded dragon a mirror is suggested.*(No Known Source)*

## ***Introductions and Removals***

None Known.

### **Intraspecific Compatibility**

Hybrids of the Eastern Bearded Dragon and Lawson's Dragon are called the Vittikin Dragons.

*(Herp Library 2001)*

### **Interspecific Compatibility**

Animals that can be housed with *Pogona's*:

- Centralian Blue Tongue
- Western Blue Tongue
- Shingleback
- Hosmer's Skink
- Gidgee Skink
- Ridge Tailed Monitor
- Black-spotted Ridge Tailed Monitor
- Kimberley Rock Monitor
- Spotted Tree Monitor
- Northern Blunt-spined Monitor
- Black-tailed Monitor
- Frilled Lizard

*(Brooks, 2007)*

## ***6.13 Suitability to Captivity***

Most experts correctly rank the Bearded Dragon as one of the very best reptile pets. These lizards are attractive, active, entertaining, moderately sized, easy to handle, naturally tame (with a few exceptions), and relatively easy to keep. Compared to smaller reptiles, they are robust and hardy. Compared to larger reptiles, they are relatively safe for children, although basic hygiene habits such as hand-washing must be practiced. As adults, these space-loving lizards require an enclosure of at least 48 inches long, although 72 inches is preferable.

*(Herp Library 2001)*



## **7. Breeding**

### ***Mating System***

The first requirement for breeding bearded dragons is to have at least one healthy young adult male and one healthy young female. The second is to keep them together. The third requirement, usually after the first breeding season, is to allow them a winter shutdown or rest period (brumation). When they're mature they will tend to brumate no matter what is done. In captivity, breeding starts after winter shutdown is over, beginning in the spring and often continuing into fall.

Many keepers claim they have their best breeding success when they keep bearded dragons in individual pairs, and this may be true when they're kept in small indoor enclosures. However, it is possible to keep trios, one male and two females, with good breeding results. For commercial breeders, the expense of maintaining any more males than necessary can become cost prohibitive. In larger enclosures, 72 x 30 inches minimum, ratios are kept of two males and four females and have found this to be the most effective ratio for commercial-scale breeding.

*(Herp Library 2001)*

### ***Ease of Breeding***

Very Easy.

### ***Reproductive Condition***

#### ***Females***

Increase food source.

Decrease mealworms (High in Fat). Increase Cockroaches (Protein).

This reduces the chance of obesity and increase humidity.

*(Clark, 2007)*

#### ***Males***

Increase food intake (protein and zinc) and temperature.

*(Clark, 2007)*

### ***Techniques Used to Control Breeding***

Freezing the eggs.

Same sex exhibits (eg Male/Male exhibits and Female/Female exhibits)

*(Clark, 2007)*

### ***Occurrence of Hybrids***

None Known.

### ***Timing of Breeding***

Brumation, often referred to as hibernation, is a must do to breed bearded dragons. This can be accomplished at any time of the year though most breeders use the natural seasons and brumate their dragons during the winter months. Once a male and female are together, nature will take its course. Some breeders have said that the act of breeding in bearded dragons can be best described as rape.

[www.double-d-reptiles.tripod.com/beardiecare](http://www.double-d-reptiles.tripod.com/beardiecare)

Breeding season is during the warm summer months of September through March.

[www.nationalzoo.si.edu/animals/reptilesamphibians/facts/factsheets/inlandbeardeddragon.cfm](http://www.nationalzoo.si.edu/animals/reptilesamphibians/facts/factsheets/inlandbeardeddragon.cfm)

### ***Age at First Breeding and Last Breeding***

Bearded dragons reach sexual maturity at 1 to 2 years of age. Females older than four years of age will lay fewer eggs per clutch and less clutches per season.

*(Green and Larson)*

### ***Ability to Breed Every Year***

In captivity, females should lay every five to seven weeks if kept in optimal breeding condition, and may lay four to five clutches with between five to 30 eggs in each clutch, per season.

*(Green and Larson)*

Females have been known to store sperm and are able to lay many clutches of fertile eggs from one mating. They can also lay up to nine clutches per year.

[www.nationalzoo.si.edu/animals/reptilesamphibians/facts/factsheets/inlandbeardeddragon.cfm](http://www.nationalzoo.si.edu/animals/reptilesamphibians/facts/factsheets/inlandbeardeddragon.cfm)

### ***Ability to Breed More than Once Per Year***

Normally two clutches of eggs are produced in this period, roughly a month apart.

In the wild, it seems likely females do not breed every year. However, in captivity, where conditions are likely to be ideal, females can reproduce twice a season, but, first clutches tend to be significantly larger than second clutches.

*(Clark 2007)*

### ***Nesting, Hollow or Other Requirements***

A female will dig a shallow nest into sandy soil. The eggs should be removed once she has covered and left them and placed into an incubator on moist vermiculite, perlite or sterile potting and incubated at 78-84 degrees. Babies hatch in approximately between 69 to 79 days and are ready to eat within the first 2 to 3 days. [www.peteducation.com](http://www.peteducation.com)

### ***Breeding Diet***

- Females should be fed up to 12% of their body weight.
- Males should be fed up to 10% of their body weight.
- One small mouse (*preferably pinkie to weaner*) per week, added to a normal diet of insects such as crickets, cockroaches, mealworms (*note mealworms are over 30% fat*) so ration diet accordingly.
- Fresh dark leafy green vegetables e.g endive (*not ice berg lettuce*) small cubed carrot high in vitamin C, B1.

(Clark 2007)

### ***Oestrous Cycle and Gestation Period***

Gestation, the period between copulation and egg-laying, can be difficult to accurately determine in reptiles because females of many species can store sperm for extended periods of time. As a rule for bearded dragons, the interval between a first breeding and egg laying will be about four to six weeks. Subsequently the interval between clutches during a breeding season can vary depending on a number of factors and be as short as three weeks considerably longer.

(Herp Library 2001)

### ***Clutch Size***

In Inland Bearded Dragons, clutch sizes have ranged from as few as seven to as many as forty-six eggs, with most clutches ranging between twenty and thirty eggs. Clutch size varies depending on size, age, morph, and line of the parents. As a rule, younger smaller females lay smaller clutches and old females eventually lay smaller and fewer clutches. Numbers of clutches can also vary from as few as one in first-year breeders to as many as seven in second- to third-year breeders.

(Herp Library 2001)

### ***Age at Weaning***

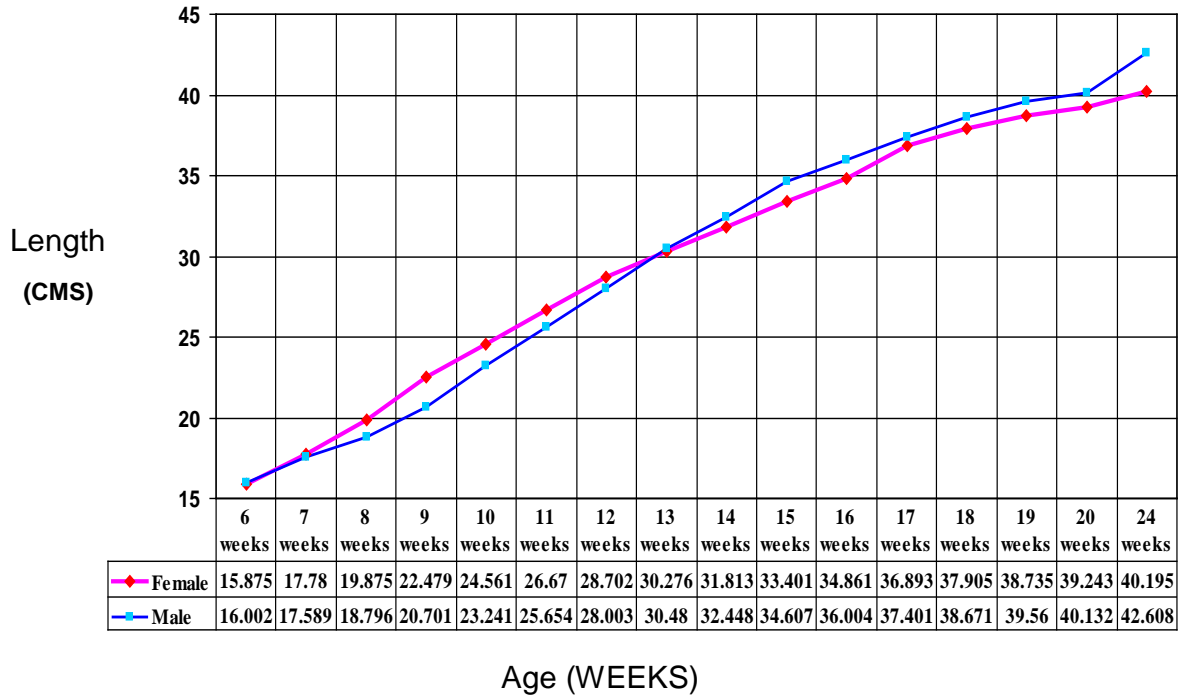
N/A

### ***Age of Removal from Parents***

N/A

## Growth and Development

### Bearded Dragon Growth Chart



(Growth Chart with reference from)  
[www.dachiu.com/care/charts.html](http://www.dachiu.com/care/charts.html)  
 (Chart Compiled By Howard Nelson)

## **7. Artificial Rearing of Reptiles**

### **Incubation Requirements**

After the female Bearded Dragon lays her eggs, carefully dig through the soil using your fingers or a tablespoon to expose the egg clutch. Then transfer the eggs to an incubation container such as a plastic storage box or an incubator containing 1 ½ inches of incubating medium. The media most commonly used by breeders are coarse vermiculite. Perlite can be used as a incubating medium for Bearded Dragon eggs. Add water to the medium until it feels moist but not soggy, until it barely clumps when held in the hand but does not drip water if squeezed. (This is about 4 parts incubating medium to 3 parts water by weight not volume.) Exposing part of the eggs allows proper monitoring. (Herp Library 2001)

The ideal incubation temperature for Bearded Dragon is 27.7°C - 29.4°C. Large – Scale breeders construct heated cabinets using either light-bulbs or heat tape controlled by a thermostat. Careful calibration is critical to prevent overheating. Temperatures that are too warm (31.6°C) will result in the death of the embryo as will temperatures that are too cool (long-term at less than 23.8°C or short-term at cold temperatures, such as low as 15°C and below). Another important step is to check for hot and cool spots in the incubator. A thermometer and thermostatic control are essential to good monitoring. (Herp Library 2001)

It is very important to monitor moisture content in the incubation substrate. Most breeders do this by picking up a clump of substrate, rolling it between the fingers and pressing it into a ball. If the substrate feels damp, it is probably fine. If it feels almost dry, then the substrate surface should be misted lightly. Substrate can be checked weekly, but if it is found to be too dry, check daily for a while and mist as necessary. (Herp Library 2001)

Humidity within the incubator can be monitored as well. For a simple incubator with substrate placed directly on its floor, adding a small container of water helps to maintain appropriate humidity levels. If using a thermostatically controlled incubator, there should be little condensation on its sides. However, if you are incubating eggs in a room with fluctuating day/night temperatures, there can be considerable condensation. Usually this is not a problem if the substrate is appropriately moist. Adding ventilation holes to the sides of the egg container can reduce condensation but will hasten the rate of substrate drying as well.

(Herp Library 2001)

Incubation time varies depending on the species. *Pogona vitticeps* eggs range from fifty-five to seventy-five days depending on temperature. Lawson's Dragon (*Pogona henrylawsoni*) eggs will hatch in forty-five to fifty-five days, and Eastern Bearded Dragon (*Pogona barbata*) eggs will hatch in sixty-nine to seventy-nine days. With most clutches, all eggs will hatch within twenty-four hours of the first hatching, but in some, the clutch may take as long as six days.

(Herp Library 2001)

### ***Specific Requirements***

Do not brumate (winter shut down) juvenile Bearded Dragons during their first winter, because the dragons are so small their body temperature can quickly rise and drop and any sudden extended cooling period may cause undigested food to rot in the stomach, resulting in death. Similarly, they do not have large fat reserves to help them through winter. Therefore, juveniles are best kept at optimum temperatures all year round.

*(Clark 2007)*

### ***Data Recording***

A key to the success of any commercial breeder is record keeping. This means, at the very least, giving each animal a number, recording the parents of a particular clutch, the number of eggs laid by a female, and the number of eggs successfully hatched. Keeping digital photographic records of individuals, labeled with their record number, can also allow you to keep digital files in a computer that can be readily accessed when planning breeding projects. It saves time and allows a broader overview than examining individual animals in a collection.

Egg clutches should be labeled with their parentage and date laid. Records should also be maintained on incubation temperature and duration. Often dragons are good producers for about three years before the numbers produced start declining significantly.

*(Herp Library 2001)*

### ***Identification Methods***

A marking system is useful to avoid the risk of turning the eggs. A common practice is to mark a small cross in a black marker on the top of the egg as it is placed into the incubator box.

*(Clark 2007)*

### ***Use of Foster Species***

None needed.

### ***Weaning***

None Needed

## 8. Acknowledgements

- **Australian Reptile Park** – Elizabeth Vella, Amanda Woodbine, Billy C – for their help and knowledge of Bearded Dragons and helping me better understand the concepts by putting what they were saying into demonstration. Their time and effort towards helping me is much appreciated.
- **Tobias Clark** – For all his help and efforts in the process of my Husbandry Manual.
- **Timothy Brooks** – For all his help and efforts in the process of my Husbandry Manual.
- **Howard Nelson** – For his help on the Bearded Dragon Growth Chart and other bits and pieces of this Husbandry Manual.
- **Andrew Jarrett** – For all his help and support during the preparation of this Husbandry Manual.

## 9. References

### Books:

- (*Raferty 2002*)- Pet Owners Guide to the Bearded Dragon – Aidan Raferty (MVB cert 200 med MRCVS) 2002.
- (*Green and Larson 2001*)- Keeping Bearded Dragons – Revised Edition – Darren Green and Ty Larson 2001.
- (*Bartlett 1999*)- Reptile Keeper's Guides – Bearded Dragon – R.D Bartlett and Patricia Bartlett 1999.
- (*Mazorlig 1998*)- Success with a Reptile Pet – Bearded Dragon – Tom Mazorlig 1998.
- (*I.A.T.A*) - International Air Transport Association.
- (*E.A.P.A*) – Standards for Exhibiting Reptiles in New South Wales. Exhibited Animals Protection Act.
- (*Herp Library 2001*) – The Bearded Dragon Manual – Philipee de Vosjoli, Robert Mailloux, Susan Donoghue, V.M.D., Roger Klingenberg, D.V.M, & Jerry Cole – The Herpetocultural Library - ALL NEW!
- (*Steve Grenard 1998*) – Guide to a happy healthy pet – The Bearded Dragon Book – Steve Grenard 1998.
- (*Titmuss 2005*) – Pages 81-84. Reptile and Amphibian Care 2005.
- (*Hauschild and Bosch 2005*) – Andree Hauschild and Hubert Bosch – Bearded Dragons and Frilled Lizards.
- (*The Really Useful Handbook Of Reptile Husbandry by Caroline Gosden*) Published in 2004.
- 

### Websites:

- [www.peteducation.com/article](http://www.peteducation.com/article)
- [www.en.wikipedia.org/wiki/Bearded\\_Dragon](http://www.en.wikipedia.org/wiki/Bearded_Dragon)
- [www.beardeddragons.co.za/beardeddragon\\_caresheet.htm](http://www.beardeddragons.co.za/beardeddragon_caresheet.htm)
- [www.petco.com](http://www.petco.com)
- [www.repcal.com/BDragon.htm](http://www.repcal.com/BDragon.htm)
- [www.repcal.com/supp.htm](http://www.repcal.com/supp.htm)
- [www.undergroundreptiles.com](http://www.undergroundreptiles.com)
- [www.blagdonreptilehouse.co.uk](http://www.blagdonreptilehouse.co.uk)
- [www.biology.Isa.umich.edu/research/labs/ktosney/file/BDcare.html](http://www.biology.Isa.umich.edu/research/labs/ktosney/file/BDcare.html)
- [www.vanjdivers.com/bdcare.html](http://www.vanjdivers.com/bdcare.html)
- [www.draconian.com/dragons/bearded-dragon-care.php](http://www.draconian.com/dragons/bearded-dragon-care.php)
- [www.geocities.com/borderviewdragons](http://www.geocities.com/borderviewdragons)
- [www.lihs.org/files/caresheets/sheet19.htm](http://www.lihs.org/files/caresheets/sheet19.htm)
- [www.peteducation.com](http://www.peteducation.com)
- [www.double-d-reptiles.tripod.com/beardiecare](http://www.double-d-reptiles.tripod.com/beardiecare)



- [www.nationalzoo.si.edu/animals/reptilesamphibians/facts/factsheets/inlandbeardeddragon.cfm](http://www.nationalzoo.si.edu/animals/reptilesamphibians/facts/factsheets/inlandbeardeddragon.cfm)
- [www.environment.gov.au/biodiversity/trade-use/invitecomment/pubs/pogonavitticeps-importing.pdf](http://www.environment.gov.au/biodiversity/trade-use/invitecomment/pubs/pogonavitticeps-importing.pdf)
- [www.michiganreptileshow.com/Bearded%20Dragon.html](http://www.michiganreptileshow.com/Bearded%20Dragon.html)
- [www.lizardrescue.co.uk/html/inland\\_bearded\\_dragon.html](http://www.lizardrescue.co.uk/html/inland_bearded_dragon.html)
- [www.aronline.net.au/herpetology/research/pdf/agamidae.pdf](http://www.aronline.net.au/herpetology/research/pdf/agamidae.pdf)
- [www.ucuca.umich.edu/forms](http://www.ucuca.umich.edu/forms)
- [www.epa.qld.gov.au/nature\\_conservation/wildlife/caring\\_for\\_wildlife/carers\\_kit/reptiles/diseases/](http://www.epa.qld.gov.au/nature_conservation/wildlife/caring_for_wildlife/carers_kit/reptiles/diseases/)
- [www.images.beardeddragon.org/images/sexing\\_male.jpg](http://www.images.beardeddragon.org/images/sexing_male.jpg)
- [www.images.beardeddragon.org/images/sexing\\_female.jpg](http://www.images.beardeddragon.org/images/sexing_female.jpg)
- [www.dachiu.com/care/charts.html](http://www.dachiu.com/care/charts.html)
- [www.naturama.ca/en/catalogue/product\\_sheet/incubators.htm](http://www.naturama.ca/en/catalogue/product_sheet/incubators.htm)
- [www.ifsaustralia.com.au/default.aspx](http://www.ifsaustralia.com.au/default.aspx)
- [www.petuniversity.com/reptiles/lizards/species/bearded-dragon/natural-history.htm](http://www.petuniversity.com/reptiles/lizards/species/bearded-dragon/natural-history.htm)
- [www.111reptile.com/info/library/animal-care-sheets/lizards-and-monitors/-bearded-dragon/](http://www.111reptile.com/info/library/animal-care-sheets/lizards-and-monitors/-bearded-dragon/)

### **Other:**

- (*Class notes*) - Teachers - Graeme Phipps, Jacki Salkeld, Andrew Titmuss.
- (*Titmuss and Brooks*) – Teacher - Andrew Titmuss and Student Tim Brooks.
- (*A. Titmuss*) – Teacher - Andrew Titmuss.
- (*Clark 2007*) – Tobias Clark – Tafe Student, 2007.
- (*Brooks 2007*) – Timothy Brooks – Tafe Student 2007.
- (*Howard Nelson*) – My Father with the knowledge of Microsoft Excel (Charts)

## 10. Bibliography

- Pet Owners Guide to the Bearded Dragon – Aidan Rafferty (MVB cert 200 med MRCVS) 2002.
- Keeping Bearded Dragons – Revised Edition – Darren Green and Ty Larson 2001.
- Reptile Keeper's Guides – Bearded Dragon – R.D Bartlett and Patricia Bartlett 1999.
- Success with a Reptile Pet – Bearded Dragon – Tom Mazorlig 1998.
- International Air Transport Association.
- Standards for Exhibiting Reptiles in New South Wales. Exhibited Animals Protection Act.
- The Bearded Dragon Manual – Philippe de Vosjoli, Robert Mailloux, Susan Donoghue, V.M.D., Roger Klingenberg, D.V.M, & Jerry Cole – The Herpetocultural Library - ALL NEW!
- Guide to a happy healthy pet – The Bearded Dragon Book – Steve Grenard 1998.
- Pages 81-84. Reptile and Amphibian Care 2005.
- Andree Hauschild and Hubert Bosch – Bearded Dragons and Frilled Lizards.
- The Really Useful Handbook Of Reptile Husbandry by Caroline Gosden Published in 2004.

## 11. Glossary

- **Autotomy:** Loss of all or part of the tail, either as a result of spontaneous contraction of the tail muscles, or the tail being seized by a predator.
- **Brumation:** is where a reptile slows its body metabolism down to virtually no activity during periods of cold weather. Brumation is the correct term used for winter dormancy (winter shut down) in reptiles.
- **Caudal:** Pertaining to or toward the tail.
- **Cloaca:** The common chamber in reptiles and amphibians into which the reproductive, intestinal and urinary ducts open.
- **Clutch:** The number of eggs laid by an individual.
- **Cranial:** Pertaining to or toward the head.
- **Crepuscular:** Active at dawn and dusk.
- **Cryptozoic:** Living in hidden places, such as in leaf or under rocks or logs.
- **Digit:** A finger or toe.
- **Distal:** The part of a structure lying furthest from the body.
- **Diurnal:** Primarily active during the day.
- **Ecdysis:** The process where all reptiles slough the outer layer of their skin after having outgrown the old one.
- **Ectothermic:** Regulation of the body temperature by means of external sources of heat.
- **Endemic:** Restricted to a particular region.
- **Egg Tooth:** A small, true tooth protruding from the mouth of hatchlings, used to slit open the egg shell.
- **Form:** An informal term for a subspecies or other variant of a species.
- **Gestation:** The period between copulation and birth.
- **Gravid:** Pregnant; carrying either undeveloped eggs or young.
- **Habitat:** The environment where an animal or plant lives and grows.
- **Hemipenis:** One of the paired copulatory organs found in lizards and snakes.
- **Herbivorous:** Plant Eater.
- **Herpetology (Herp):** The area of science concerned with the study of reptiles and amphibians.
- **Intergrade:** An animal found where distinctive geographical populations or subspecies meet and where characteristics of each population occur or merge.
- **Kg/Bw:** Per kilogram of body weight.
- **Lateral:** Relating to the sides.
- **Littoral:** Pertaining to the shore line.
- **Loreal:** Pertaining to those scales on the side of the snout, between the nostril and the eye.
- **Mandible:** The lower jaw.
- **Maxilla:** The upper jaw.
- **Microhabitat:** The space occupied by an animal within a given habitat.

- **Mid-body scale rows:** In lizards the number of scales counted in an imaginary line passing transversely around the middle of the body. In snakes the number scales along an imaginary line around the middle of the body, excluding the large ventral scales.
- **Neonate:** Hatching or new born.
- **Nocturnal:** Active during the night.
- **Omnivorous:** Meat and plant eater.
- **Oviparous:** Egg laying.
- **Ovoviviparous:** Producing eggs which are retained in the body until they hatch.
- **Pineal Gland:** An out growth of the forebrain, which acts as an endocrine gland (stimulating reproduction).
- **Pineal Scale:** An external sensor which detects light cycle changes and sends messages directly to the pineal gland.
- **Plantar:** Referring to the underside of the hind foot.
- **Precocial:** The young being at least partially self sufficient soon after birth or hatching.
- **Prehensile:** An ability to grasp.
- **Sexual Dichiomatism:** Difference in the shape between male and female of the same species.
- **Sexual Dimorphism:** Difference in the shape between male and female of the same species.
- **Sexual Reproduction:** Reproductive process by which a new individual develops from gametes produced by two parent individuals.
- **Slough:** The cast off skin of a reptile.
- **SVL Snout-vent Length:** The distance between the tip of the snout and the cloaca.
- **Spinose:** With spines.
- **Taxonomy:** The study of classification of living things.
- **Terrestrial:** Living on land.
- **TL Total Length:** The distance between the tip of the snout and the tip of the tail.
- **TLL Tail Length:** The length from the cloacal opening to the tip of the tail.
- **Tympanum:** The ear drum.
- **Ventral:** Pertaining to the lower surface of an animal.
- **Viviparous:** Giving birth to live young.
- **WT:** Weight

(Titmuss 2005)

## Appendix

---

Pisces Enterprises Pty Ltd  
PO Box 200  
Kenmore QLD 4069  
Australia

Phone 1800 351 839  
Fax (07) 3374 2393

Cricket (Large, Medium, Small and Pinhead)  
Meal worms  
Frozen Rats (Pinkie to Jumbo)  
Frozen Mice (Pinkie to Adult)

---

Merrylands Produce  
Cnr Victoria Road and Parramatta Road  
Parramatta NSW 2150

Old Address:  
274 Merrylands Road  
Merrylands NSW 2160

Phones: (02) 9637 2311  
(02) 9637 2312  
Fax (02) 9897 1967

Cricket (Large, Medium, Small and Pinhead)  
Meal worms  
Frozen Rats (Fuzzie to Extra Large)  
Frozen Mice (Pinkie to Adult)

---

BioSupplies – Laboratory Grown & Naturally Fed!  
PO Box 141,  
Morisset NSW 2264

Phone: 0401 618 970

Cricket (Large, Medium, Small and Pinhead)

---

Animal Attraction Reptile Supplies  
Matt Stockdale (Owner)  
Unit 6 75-85 Elm Park Drive  
Hoppers Crossing, Victoria  
Australia 3029

[sales@animalattraction.com.au](mailto:sales@animalattraction.com.au)

Phone: (03) 8742 1283  
Fax: (03) 8742 1284

---

DoLittle Farm  
“Oxenthorpe”  
Molong NSW  
Australia 2866

Phone: (02) 6366 9550  
Fax: (02) 6366 9551

Email: [dolittlefarm@dolittlefarm.com.au](mailto:dolittlefarm@dolittlefarm.com.au)  
Website: [www.dolittlefarm.com.au](http://www.dolittlefarm.com.au)

Frozen Rats (Pinkie to Extra Large)  
Frozen Mice (Fuzzie to Adult)

---

Livingstone Premium Examination Gloves  
Livingstone International Pty Ltd  
106-116 Epsom Road  
Rosebery NSW 2018

Phone: 1300 780 078  
Fax: 130 780 008

Website: [www.livingstone.com.au](http://www.livingstone.com.au)

---

Australian Fauna Supplies  
PO BOX 7034  
Wilberforce NSW 2756  
Phone: (02) 4576 3491  
Fax: (02) 4576 3491  
Brad Walker  
Email: [bradw@ausfauna.com.au](mailto:bradw@ausfauna.com.au)

## Multiquip Incubators

260 Tenth Ave. & Kelly Street

Austral N.S.W. Australia 2171

Phone: (02) 9606 9011

Fax: (02) 9606 0557

Website: [www.multiquip.com.au](http://www.multiquip.com.au)

Correspondence to:

P.O. Box 4 Austral N.S.W. Australia 2171

E-mail to: [info@multiquip.com.au](mailto:info@multiquip.com.au)

---

## Intensive Farming Supplies Australia

Unit 4 / 9 Cardiff Court,  
Cavan, South Australia, 5094

Phone: (08) 8349-8077

Fax: (08) 8349-8098

Website: [www.ifsaustralia.com.au/default.aspx](http://www.ifsaustralia.com.au/default.aspx)

## Incubators



Model 0200



Model ME3A Incubator

