Husbandry Manual
For

Black Headed Python

Aspidites melanocephalus

(Reptilia: Boidae)

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1 Introduction

Black Headed Python (Kreft, 1864) *Aspidites melanocephalus*.
The scientific name means “black headed *Aspidites*”. *Aspidites* translates to “shield bearer” and refers to the large scales on its head. (Pythons of the world: Australia by Barker & Barker pg 1)
The Black headed python belongs to the family boidae and like all pythons is non venomous and lays eggs. It and the Woma (*Aspidites ramsayi*) are the only two species of the genus *Aspidites* and both are endemic to Australia. They are also the only Australian pythons that lack heat sensing pits on the rostral and labial scales or lips.
This python is extremely hardy in captivity and generally doesn’t mind occasional handling. They have a placid nature although there are always exceptions. Black headed pythons are becoming more common in captivity both in Australia and over seas. This is most likely due to its hardiness in captivity and the increasing number of studies and research being performed on the species. Also the increase of this snake in captivity may lead to better success in captive breeding.

OH&S:
It is a fairly harmless species and cannot seriously harm or injure a person. Although it can bite and females can become more aggressive when incubating eggs.
The black headed python is capable of delivering a painful bite as this species has moderately long teeth and very powerful jaws. (Pythons of the world: Australia by Barker & Barker pg 1)

2 Taxonomy

2.1 Nomenclature

Class Reptilia
Order Squamata
Sub Order Serpentes
Family Boidae
Genus *Aspidites*
Species *melanocephalus*

2.2 Subspecies

Aspidites melanocephalus adelynensis
Aspidites melanocephalus davieii
(http://www.smuggled.com/pytrev1.htm)

2.3 Recent Synonyms

No recent synonyms

2.4 Other Common Names

Black headed rock snake
Tarpot
(Pythons of the world: Australia by Barker & Barker pg 1)

3 Natural History

The genus *Aspidites* containing both the black headed python and the woma is considered to be the most primitive of all Australia's pythons. Current opinion suggests this genus split quite early from other Australian pythons. They are unique as they lack labial heat sensing pits. It is thought that they once possessed them but gradually lost them over time. (Pythons of Australia: A Natural History by Geordie Torr)

Many studies have been done on the black headed python in recent years as not much was previously known about their habits. Studies have been done on the python's digestive efficiency. It was found that black headed pythons have a lower digestive efficiency than most other Australian pythons. (Pythons of Australia: A Natural History by Geordie Torr pg 20)

Studies have also been done on its preferred body temperature during wet and dry seasons (Bedford 1996). The results showed that black headed pythons preferred a temperature of 28.1ºC during the dry season compared to 31.7ºC during the wet season. (Pythons of Australia: A Natural History by Geordie Torr pg 32)

This means they have different preferred body temps during the year. This change in preferred body temperature could be recreated in captivity as it could stimulate certain types of behaviour.

Black headed pythons average total number of teeth is 90, which is the fewest of the Australian pythons. (Pythons of the world: Australia by Barker & Barker pg 1)

3.1 Morphometrics

3.1.1 Mass And Basic Body Measurements

Average total length 1.5 metres
Maximum total length 2.5-3 metres
Scales are in 50-65 rows at mid-body
Number of ventral scales 315-355
Number of subcaudal scales 60-75
(Reptiles and Amphibians of Australia by Harold Cogger pg 601)

The largest reported wild specimen measures 302.3 cm in total length (Smith,1981) Retes (pers. comm.) reports a total length of a captive female to be 302 cm. Large captive specimens attain considerable girth and may weigh in excess of 16kg. (Pythons of the world: Australia by Barker & Barker pg 2)

3.1.2 Sexual Dimorphism

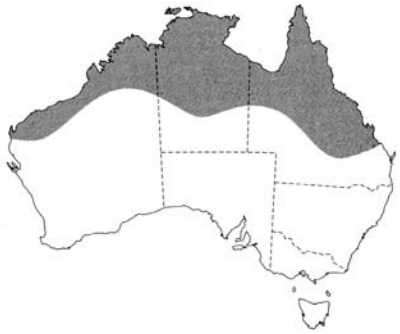
Adult male black-headed pythons are typically smaller than females, both in terms of weight and length. Females are on average 10% larger than males.
Mean adult male SVL = 156.1
Mean adult female SVL = 159.3
(SVL=snout-vent length)
Although there is sexual dimorphism it is only slight.
(Pythons of Australia: A Natural History by Geordie Torr pg 59)

3.1.3 Distinguishing Features

The Black headed python is distinguished from other pythons by the lack of heat sensing pits, premaxilla teeth and prehensile tail. It is easily recognizable by the glossy jet black head and neck. The body colour is light to dark brown dorsally, lighter on the sides, with many dark brown, reddish brown irregular cross bands which are often narrower than the lighter interspaces. The ventral surface ranges from cream to pale yellow. The head scales are large and symmetrical. The head is small and indistinct from the neck. Both sexes also possess small spurs on either side of the vent. (Pythons of Australia: A Natural History by Geordie Torr pg 88)

3.2 Distribution and Habitat

Found in Northern Australia, from Queensland to Western Australia extending into the drier inland areas, except for extremely arid regions.
Black headed pythons are most often encountered in wooded savannah and open forest. However specimens are reported from a wide range of other habitats from wet forests of the northern coast to arid, rocky habitats in the southern areas of its range. The species also ranges through grasslands, shrublands, open sclerophyll forest, seasonally burned areas, and along dry water courses. (Pythons of the world: Australia by Barker & Barker pg 2)



(Pythons of Australia: A Natural history by Geordie Torr pg 88)

3.3 Conservation Status

Black headed pythons are considered common. Only being absent from extremely arid areas within its range.

3.4 Diet in the Wild

This species predominantly feeds on reptiles but will also eat small mammals and birds although these comprise of less than 10 percent of its total diet. The results of a study on stomach contents of museum specimens showed that 92% of their diet was reptiles, 6% mammals and 2% birds. (Pythons of Australia: A Natural History by Geordie Torr pg 67)
The black headed python has a reputation as being ophiophagous, as it preys upon venomous snakes such as the Desert death adder (*Acanthophis pyrrhus*) however snakes make up only a small part of its natural diet (Shine and Slip, 1990). A wide variety of lizards comprise most of the reptilian component of the diet. Blue-tongue skinks, western bearded dragons, spiny tailed monitors and frilled dragons are examples of such prey. (Pythons of the world: Australia by Barker & Barker pg 2)

3.5 Longevity

3.5.1 In the Wild

Unknown.

3.5.2 In Captivity

Like most snakes, captive python life span averages between 20-25 years. (Pythons: Complete Pet owners Manual by Bartlett and Wagner)

3.5.3 Techniques Used to Determine Age in Adults

There are few accurate techniques used to determine the age of adult pythons.

4 Housing Requirements

4.1 Exhibit/Enclosure Design

Black headed pythons are best kept indoors.
A general principal for housing this python is that the minimum length of the enclosure should be at least half the length of the largest python being kept within. The minimum width should be half the measurement of the enclosure length. (Care of Australian Reptiles in Captivity by John Weigel pg 117)
The height is less important for this species as they are almost totally terrestrial.

Interior

The interior surface especially the floor, should be smooth and water resistant to aid in cleaning and hygiene. If wood or particle board is used it can be coated with a few layers of water based paint or a sealant to make it resistant. Avoid using spirit based products. The interior should not contain any sharp edges or protruding objects that could injure the snake.

Heating

The enclosure must be heated either by a light or heat mat. Ceramic globes are good as they produce heat but not light and come in a range of different wattages. A basking spot bulb can be added to give the snake a place to bask during the day. Care must be taken to ensure the spot bulb does not produce any hot spots as it can cause burns on the snake. Heat mats come in various sizes and can be hidden beneath the substrate. Ceramic globes and heat mats can be used to heat the enclosure day and night. To avoid over heating within the enclosure and injury to the snake all heating objects should be controlled by a thermostat. Water bowls should never be placed over heat mats or directly under heat lamps. An enclosure can contain both heat lights and heat mats and the larger the enclosure the more heating objects required. The location of the heat lights/mats should be set up to ensure there is a thermal gradient within the enclosure. This is very important. The python should not be able to touch the heating objects at all. If allowing the snake to burrow it may be wise to avoid using a heat mat under the substrate.

Lighting

Artificial lighting can be achieved using special fluorescent tubes that give off ultraviolet light. Reptiles require UV to stay healthy. These tubes can be switched on during the day to allow the snake to absorb the light given off by the tube. The tubes do eventually run out of gases and need replacing every 6 to 12 months. Glass will filter the light and make it less effective so it should be placed either in the enclosure (where the snake cannot reach it) or outside on a fly screen lid.

Ventilation

The enclosure must be adequately ventilated to ensure excess heat can escape and fresh air can get into the enclosure. This can be achieved by the use of a fly screen lid or large holes drilled in the side and covered with fly screen.

Accessibility

The enclosure can be accessed either by a removable lid or a small door at the back of the exhibit. The door should not be too large to avoid the snake escaping when it is opened. The lid or door should be designed and positioned so that it is possible to access all areas of the enclosure.

Escape proof
Whatever the end design of the enclosure, it must be totally escape proof. So all sides of the enclosure should be secure. Any lids and doors must be secure and can be locked using a latch and padlock. There should be no small holes anywhere within the cage that the snake can squeeze through.
Enclosure decoration
The enclosure can be decorated with a natural substrate, various rocks, tree branches and artificial plants. However it must not over crowd the enclosure. The snake still needs plenty of room to move. Artificial or painted backgrounds can improve the aesthetics of the enclosure. Care should be taken to ensure any decoration is securely fixed to the enclosure to avoid squashing the python.

4.2 Holding Area Design

The design of the holding area enclosure shares the same basic aspects of the exhibit enclosure except far more simple.
An effective way of housing many black headed pythons is to incorporate a series of cages as a unit or bank of cages. For example one or two cages across and four or five cages high. This system allows the fitting of many cages into a small area. Each cage has its own door to access the snakes.
Each individual cage must:

- Have smooth, water resistant interior.
- Have heating either by light or mat. A thermostat will control the temperature of the entire bank.
- Have a thermal gradient
- Be ventilated
- Easily accessible
- Escape proof

UV tubes can be added or instead pythons can occasionally be placed in temporary sunning cages on sunny days.
Cage decoration can be far simpler with just a hide box necessary and paper substrate.

4.3 Spatial Requirements

Black headed pythons engage in combat so it is recommended that they be kept solitary with the exception of breeding. Cannibalism has also been recorded. (The Guide to Owning an Australian Python by John Coborn pg 14)
However Barker & Barker have successfully kept specimens of black headed pythons together and mention their awarness of other situations where specimens are housed together without incident. (Pythons of the world: Australia by Barker & Barker pg 2)
The minimum length of an indoor enclosure must be at least half the length of the snake being housed. The minimum width must be at least half the length of the enclosure. The height is not as important. (Care of Australian Reptiles in Captivity by John Weigel pg 117)
For example to house an adult black headed python that is 2 metres in length the enclosure must be at least 1 metre long, 0.5 metres wide and 0.5 metres high would be sufficient. (1m x 0.5m x 0.5m)

4.4 Position of Enclosures

Indoor enclosures should be positioned so that they can be easily accessed and serviced. They should not be placed in a position where they will receive direct sunlight or near any heaters or air conditioners.

4.5 Weather Protection

Black headed pythons are best kept indoors therefore are totally protected from the weather.

4.6 Temperature Requirements

A thermal gradient is required. The temperature in the middle of the enclosure should be maintained between 24-28ºC. (Care of Australian Reptiles in Captivity by John Weigel pg 118) Humidity levels should be low to medium. (The Guide to Owning an Australian Python by John Coborn pg 14)

4.7 Substrate

If the enclosure is off display then a few layers of newspaper or butchers paper is the best substrate. It is absorbent, cheap and easy to replace and clean.
A shallow base of course river, red desert or beach sand, and/or leaf litter can be used for a more natural look, but must be sterile and free of pathogens.

4.8 Nestboxes and/or Bedding Material

Some form of hide box should be provided. This can be made from wood, plastic or ceramics. It must have an entry/exit and be dark within. Commercial bird breeding boxes make good hide boxes. The size of the hide box depends on the size of the snake. Obviously the larger the snake the larger the hide box. It should be big enough to allow the snake to easily enter/exit and fit securely within it. Whatever the design the snake must be able to be readily accessed by the use of a lid etc. It should also be simple to clean so it may need to be painted with a water based paint. (The Guide to Owning an Australian Python by John Coborn pg 36)

4.9 Enclosure Furnishings

Enclosure furnishings for black headed pythons is fairly basic.
Tree Branch - Although not regular climbers, a tree branch can be provided for exercise.
Rocks - One or more rocks of various sizes can be added. Placed under the heat lights they will absorb and radiate heat. They will also aid in skin sloughing. Rocks can be used to create crevices for hiding.
Water bowl - The enclosure must have a water bowl large enough for the snake to immerse itself in. Sometimes pythons like to soak in the water bowls just before sloughing.
Sand - Using sand as a substrate will allow the python to perform its burrowing behaviour.

Hide box – A hide box will give the python a secure, safe place to hide. This is important as pythons like to spend a large amount of inactive time in dark, secure places especially during digestion.
Artificial plants – Can be provided to give the python more shelter and make the enclosure look natural.
***Note:** A determined black headed python can completely remodel its enclosure over night. Therefore care must be taken not to arrange heavy furnishings such as rocks in a position where a digging python may collapse the object onto itself when digging underneath. (Pythons of the World: Australia by Barker & Barker pg 4)

5 General Husbandry

5.1 Hygiene and Cleaning

The enclosure should be checked daily for faeces and other waste.

- Any faeces should be removed first using a paper towel or disposable rubber gloves to pick it up. Check on, under and around all cage furnishings. If furnishings are badly soiled they should be removed, soaked in disinfectant and dried in the sun before being replaced. If the substrate is sand a sieve can be used filter out the faeces from the sand. It must be disinfected after each use.
- Spray soiled sites with disinfectant. Dilute virkon or ammonia are safe for both people and the python. Methylated spirits and commercial cleaning agents with strong lingering odours should not be used.
- Any food waste and/or old water must be removed. Food should not remain in the enclosure for longer than a day. Water should be changed approximately every 3 days. If water contains faeces it must be removed immediately. The water bowl can either be replaced or disinfected and dried before replacing it.
- Any shed skin should also be removed.
- The snake can be removed and placed in a clean holding bin to make cleaning easier and more efficient. The holding bin should be disinfected once the snake has returned to its enclosure.
- All waste is placed in bin.

2 months:

- Total substrate change
- Rocks and branches replaced
- Entire enclosure disinfected

Virkon S:
Virkon S is a quality disinfectant, proven effective against 18 virus families, bacteria, fungi and spores. It is environmentally friendly and purchased in powder form that can be mixed at an appropriate strength to combat certain diseases, or mixed at normal rates for routine disinfection. The powder is pink which is an indicator of the products activity. Once this colour fades it is time to make a new batch. This product is used by the Australian Reptile Park and is available in 50 gm, 1 kg, 2.5 kg, 5 kg and 10 kg sizes from Intensive Farming Supplies (See Appendix).
(Reptiles Australia Vol. 1 Issue 2 pg 49)

5.2 Record Keeping

Each individual specimen should have its own cage card. Anything of importance should be recorded on the cage card on the date it occurred.
The cage card should include:

- Age if known
- Sex
- Species
- Feeding
- Sloughing
- Mating
- Illness
- Treatments/medications
- Weight
- Length
- Origin of snake

Records should also be kept in daily diaries to keep other keepers up to date with each specimens health.

5.3 Methods of Identification

Microchip – This is one of the most common methods of permanent identification with snakes. Although it requires a scanner in order to read the code on the chip. It is slightly slow however, as the scanner must be very close to the chip in order to read it. Therefore the snake usually has to be handled to attempt to find the microchip.
Scale counts – Can be used as individual identification as not all snakes of the same species have the same amount of scale rows. This is a slow and tedious method however.
Cage cards - Individuals can be given a code or number, which can be written on a cage card and correspond with a microchip.
Individual features – This can be used as a quick way to distinguish individuals using unique features of each specimen. For example colour, markings, patterns, size etc.

5.4 Routine Data Collection

ACQ = ACQUISITION	Any importation from outside the collection, public donation, or capture from grounds or from the wild.
B/H = BIRTH/HATCHING	Date on which the neonate hatches from the egg.
D/30 = DEATH WITHIN 30 DAYS	Death/euthanasia within 30 days of birth, hatching or acquisition.
D/E = DEATH, ESTABLISHED	Death/euthanasia of any animal which has been resident in the collection for longer than 30 days
DIS = DISPOSTITION	Includes exports from the collection, releases, sales, escapes.
BRD = BREEDING	Reproductive details/observations. Any nesting, laying of eggs, oestrus, matings, courtship, sexing of previously unsexed individuals or any other reproductive matter.
INT = INTERNAL MOVEMENT/TRANSFER	Any movement of an animal from its residing enclosure, be within a section or to a different section. Transfers/exports out of the collection not included.
TAG = TAGGING	Animal identification by banding, tagging, notching, tattooing, naming or any other method of identification.
W/L = WEIGHT/LENGTH	Weight or length measurements
Rx/Tx = TREATMENT	Any medical treatment administered to animals, either by vets, or continuing treatments administered by animal care staff. Include observation of anything related to treatment. Flag if veterinary examination is required using VET code.
VET = VET EXAMINATION REQUIRED	Note if veterinary treatment/examination is required.
OTH = OTHER	Any notable observation made in reference to daily routine or animals, e.g. behaviour, change to routine etc. Also anything of interest e.g. animal management procedures, diet change, maintenance etc.

6 Feeding Requirements

6.1 Captive Diet

Adult Black headed pythons can be fed exclusively on rats or mice. Some keepers have fed chickens, quail and pigeons to this species. Larger specimens may accept rabbits (Retes, pers. comm.) however Barnett (pers. comm.) reports that some keepers have experienced problems, including regurgitation, with adult black headed pythons that are fed large mammalian food items. Captive specimens have also accepted reptilian food items such as Burmese Pythons, Boa Constrictors, Iguanas, and Texas Spiny Lizards. Therefore specimens may accept a wide variety of reptile food items. (Pythons of the world: Australia by Barker & Barker pg 2)

Juveniles can be fed on pinkie mice although scent diversion may be required to encourage some individuals to accept them. To achieve this simply rub a pinkie on a skink in an attempt to make it smell more like a reptile. This should only last for a few feeds before the snake accepts unscented pinkies. It is recommended that skinks not be fed as they can carry various pathogens, which the snake will obtain if eaten.
(Care of Australian Reptiles in Captivity by John Weigel pg 40)

The size of a meal for young growing pythons should be approximately 10% of the snakes body weight each meal, and adults about 3-5%. It is better to feed two smaller food items rather than one large item to assist digestibility. In the first year of the pythons life it should be fed once every 5-7 days. You don't want young growing pythons to shed more than once every 6-8 weeks. If they do, then reduce the feeding rate. Likewise if they are only shedding once every 12-14 weeks, increase the feeding rate slightly. Adults should be fed once every 2-3 weeks and its fine for them to only shed 2-4 times a year. Females preparing for breeding should be feed weekly. (Reptiles Australia Vol. 2 Issue 1 pg 6-11)

Black headed pythons should be separated during feeding and several hours afterwards to avoid cannibalism. (Pythons of the world: Australia by Barker & Barker pg 2)

The snake may go off its food if it is opaque or gravid.

Regurgitation: This is usually caused by excessive handling too soon after a meal or from a snake eating a meal which it cannot digest due to low temperatures. However if these are not the cause, the problem could be contagious so the snake should be isolated and its enclosure temperature raised. Contact a veterinarian if the problem persists. Most feeding problems are caused by stress. This is common in wild caught specimens.
(Reptiles Australia Vol. 2 Issue 1 pg 6-11)

6.2 Supplements

Meals can be occasionally supplemented with a calcium and/or vitamin powder that is lightly dusted over the food item before feeding. An example of a commercial brand of powder is Reptivite.

6.3 Presentation of Food

It is illegal to feed live vertebrates to animals so the rats/mice etc must dead before being fed. They can either be euthanased using Carbon dioxide or can be purchased frozen. Care must be taken to ensure the food item is dead before it is fed off. Frozen food must be thoroughly defrosted before feeding. This is best done by just leaving the food out to defrost naturally. A microwave should not be used as it can cook the food.
When the food has been defrosted it can be offered to the snake using forceps or tongs. The food item can be wriggled in front of the snake to catch its attention. Once the snake has grabbed hold of the food it can be released by the tongs/forceps and left with the snake to eat.
If the snake doesn't seem interested, leave the food in the cage for a few hours as it may eat when left alone.
***Note:** Feeding live rodents can be dangerous as they can seriously injure an uninterested snake.
(Care of Australian Reptiles in Captivity by John Weigel pg 42)

7 Handling and Transport

7.1 Timing of Capture and Handling

Black headed pythons can be captured and handled at anytime except after eating. They should not be captured or handled for at least a day or two after eating. Special care should be taken with gravid females as well as during feeding.

7.2 Catching Bags

When caught black headed pythons can be gently placed into a bag. The bag must be made of closely woven, light and durable fabric such as calico or even light canvas. It should be deep enough that the snake placed within cannot climb straight out the top before the bag is tied. So at least two thirds of the snakes length. Once the snake is within the bag it can be securely tied up. Ensure the knot is tight and the snake is clear of the knot.

7.3 Capture and Restraint Techniques

Black headed pythons can simply be caught by hand as they are generally amenable to handling. However if the snake is timid then a snake hook can be used to maneuver the python.

One technique used to slow down a reptile before capture is to switch off its heat source. This will decrease their activity as they cool down. Care must be taken to ensure that it is not over cooled, as this can be dangerous for the animal.

7.4 Weighing and Examination

Whenever administering medication the python should be weighed to accurately determine the correct dosage and avoid poisoning.

New arrivals can be weighed so the initial weight when received is recorded and will allow comparison of future weights and aid in determining healthy growth.

Methods of weighing include either placing the python in a plastic tub and sitting it on electronic scales. Then subtract the weight of the tub from the total weight to give the snakes weight. Or placing the snake in a strong pillow case and attach it to hanging scales. Again subtract the weight of the pillow case from the total weight to get the exact weight of the python. However both these methods will disturb the snake so if the python has a hide box in its enclosure this can be placed on electronic scales and the weight of the box subtracted. The hide box containing the snake can be removed so disturbance is minimised.

(Leon Limberiou, Australian Reptile Park. pers. comm. 17/5/06)

7.5 Transport Requirements

7.5.1 Box Design

They snake should be placed in a bag such as pillow case which is securely tied before going into the transport box. Place the sacked animals into a protective container. A Styrofoam box is good as it has insulating properties. The box must have air holes. Padding such as soft foam or paper can be added for extra protection. The lid must be secured with tape and the box labeled with the following: “live animals”
“This way up” and senders and receivers name, address and contact phone number.
(Reptile and Amphibian Care Compiled by Andrew Titmus TAFE)

7.5.2 Furnishings

The transport box should be totally free of furnishings.

7.5.3 Water and Food

The pythons should not be fed before being transported as they may become stressed and regurgitate the meal. Feeding should cease at least 4-5 days before transportation.

7.5.4 Animals per Box

The number of animals depends on the size of the box. More than one python can be placed in a box but care must be taken to ensure that the animal is comfortable and not over crowded. All specimens within the box should be of similar size and weight to ensure no snakes get squashed. However only one animal per bag within the box.

7.5.5 Timing of Transportation

It is best to transport the animals under reasonable temperatures. Avoid transporting on overly hot or cold conditions. Never leave the transport box containing the animals in direct sunlight. Do not leave the animals in a stationary vehicle on warm days and do not place them near air conditioning or heating as this can seriously stress the reptile.

7.5.6 Release from Box

The python can be released from the box at anytime so long as it doesn’t experience a sudden temperature change, which can be detrimental for the animal.

8 Health Requirements

8.1 Daily Health Checks

Distant Examination:
This can be performed everyday during cleaning or feeding. It is done by simply looking at the animal.

Signs of ill health include:

- Abnormal smells
- Diarrhoea
- Haemorrhage
- Blood
- Regurgitation of food
- Lameness or stiffness
- Dehydration
- Dullness of skin
- Swelling
- Incomplete sloughing
- Deformities
- Injuries or sores
- Discharges from eyes, nose, mouth or cloaca
- Change in behaviour
- Not eating or drinking

If you see anything abnormal in the distant examination, perform a physical examination.
(Reptile and Amphibian Care Compiled by Andrew Titmus TAFE)

8.2 Detailed Physical Examination

8.2.1 Chemical Restraint

Ketamine hydrochloride is an effective and very safe anaesthetic for reptiles, but as it is injected, the animal has to be restrained first.
(Reptile and Amphibian Care Compiled by Andrew Titmus TAFE)

8.2.2 Physical Examination

This type of examination should be carried out periodically (e.g. once a month). It involves actually picking up the animal and having a closer look, feeling and palpating for abnormalities.

Signs of ill health include:

- Teeth abnormalities
- Discharges from eyes, nose, mouth and cloaca
- Poor skin condition. Look and feel for lumps, parasites, ulcers, blisters and foreign bodies
- Any abnormal odours coming from the snake
- Swollen joints
- Any areas of heat, swelling or discharge (sign of infection)
- Abnormal respiratory sounds
- Loss of weight

(Reptile and Amphibian Care Compiled by Andrew Titmus TAFE)

8.3 Routine Treatments

Faecal analysis should be performed twice annually to detect various diseases such as parasites and protozoans.
(Jacki Salkeld, Taronga Zoo pers. comm. 30/05/06)

8.4 Known Health Problems

Specific health problems with this species are canker or mouth-rot, eye infections and scale ailments. This may be due to their nature of digging through the substrate with their heads. (Reptiles Australia Vol. 1 Issue 1 pg 19)
The species is also known for respiratory problems. (Leon Limberiou, Australian Reptile Park pers. comm. 24/5/06)

Infectious:

Canker/ Mouth Rot:
The mouth of a healthy python is blue and slightly pink. There should be no lesions, large areas of redness, bleeding or swelling.
Symptoms: Swelling of tissues in the mouth which prevents mouth from closing properly. Yellow-white/ grey-white "cheesy" matter clinging to the mucous membranes inside the mouth particularly along the gums. Also small reddish spots on the gums (haemorrhages).
Cause: The reptile being kept in less than optimal conditions such as cold or damp conditions and Injury to mouth or rostral area.
Treatment: First step is to rectify the incorrect housing conditions. Carefully scrape away the cheesy matter from the mouth daily, followed by a rinse of the mouth with saline or chlorhexadine then application of antibiotic ointment to the infected areas and finally a course of antibiotic injections.

Prevention: The best way to prevent this disease is to house the snake in the correct conditions for the species such as correct temperatures and correct humidity. Regular cleaning and fresh water will keep bacteria levels low and also help prevent the disease.
(Care of Australian Reptiles in Captivity by John Weigel pg 60)

Respiratory infections:
Symptoms: Gaping, sneezing, discharge from mouth, nose and eyes, audible breathing that sounds like "wet hissing', lethargy, lack of appetite. A common posture of snakes with respiratory infections is an elevated head.
Cause: Kept in excessively cold or damp conditions, incorrect heating and poor hygiene.
Treatment: If caught in the early stages adding warmth and dryness can aid in recovery. Remove water bowls and offer drinks daily. Otherwise diagnosis by a veterinarian is advised generally resulting is a course of antibiotics.
Prevention: Maintenance of correct husbandry. A clean, stress free enclosure with warm temperatures and lower humidity will help to prevent this disease.
(Care of Australian Reptiles in Captivity by John Weigel pg 60)

Inclusion Body Disease (IBD):
Symptoms: A disease that causes regurgitation followed by central nervous system disorders such as abnormal coiling, head tilting, head tremors and inability to right itself. Also loses ability to focus eyes and exhibits a characteristic upward starring behaviour called 'star gazing'. The signs become progressively more obvious until death.
Cause: Thought to be caused by a retrovirus, possibly spread by mites and can easily be spread through the entire collection.
Treatment: No treatment or cure available.
Prevention: Through good quarantine and husbandry. The prevention of mites may help to avoid this disease.
(Pythons: A Complete Pet Owners Manual by Bartlett and Wagner, Reptiles Australia Vol. 1 Issue 6 pg 42-43)

Salmonellosis (Zoonoses):
Reptiles can continually excrete salmonella bacteria without being affected by this disease. It can easily be transmitted to other animals and humans. Can be detected by cloacal smears and faecal examinations. Easily spread by insufficiently disinfected/sterilized equipment or other enclosure components.
Symptoms: Signs are rarely seen in reptiles therefore faces should be examined regularly.
Treatment: 6-10 day treatment with oxytetracycline has proven effective.
Prevention: Regular faecal examinations. Always wash hands after handling any reptile.
(Reptile Diseases by Rolf Hackbarth pg 70)

Endoparasites:

Round Worms
Symptoms: Weight loss, lethargy, regurgitation of food, anorexia. It may be possible to see them in the snakes faeces. To diagnose take a faecal sample to a veterinarian.
Cause: Can be transferred to the snake via prey or contact with other infected individuals and poor hygiene.
Treatment: Injections of ivomectin or panacur administered by a veterinarian.
Prevention: Quarantine new arrivals. Avoid feeding reptiles to the snake. Use food items that have been frozen for 6 weeks as this kills any parasites within the food. Routine faecal analysis twice annually.
(Care of Australian Reptiles in Captivity by John Weigel pg 73)

Nematodes (Nematoda):
Symptoms: Loss of condition, apathetic behaviour, weight loss despite food intake, loss of colouration, diarrhoea, sunken eyes, caved in muscles.
Cause: Caused by worms that invade nearly all organs but seem to prefer the stomach, intestinal tract and lungs. Massive infestations are usually fatal.
Treatment: If found early can be treated piperzine and tetramisole compounds administered by a veterinarian.
Prevention: Regular faecal examination.
(Reptile Diseases by Rolf Hackbarth pg 76-77)

Tapeworms (Cestoda):
Drain on the hosts nutrition if massive infestations or host is weak. Can cause damage to organs and tissue.
Symptoms: Can lead to intestinal inflammation and blockages, loss of weight.
Treatment: Oral administration of niclosamide, bunamide or methyl benzene. Carefully follow dosages prescribed by the veterinarian.
Prevention: Regular faecal examinations.
(Reptile Diseases by Rolf Hackbarth pg 78-80)

Amoebiasis (Protozoan):
A very serious disease due to its rapid progression and can easily wipe out entire collections. Under optimum conditions an infected reptile can die within 2 weeks. Can cause serious liver and kidney damage.
Symptoms: Begins with intestinal inflammations, which leads to small sores or ulcerations. Infected reptile usually lies around lethargically, body extended on the ground, increased water intake, colouration becomes pale or darkens, regurgitates or refuses food, produce slimy or bloody faeces. Presence can be confirmed by faecal examinations of cloacal smears.
Treatment: Treatment must commence immediately. The soon it begins the greater the chance of recovery. reptile should be quarantined immediately. Temperature raised to 30-32ºC and sufficient drinking water made available. Medication is metronidazole, administered orally for up to a week at 25mg/kg of body weight. 4 weeks after treatment, faecal analysis should be done to confirm elimination. Treatment is to be performed by a veterinarian.

Prevention: Regular faecal examinations.
(Reptile Diseases by Rolf Hackbarth pg 70-73)

Ectoparasites:

Mites:
Symptoms: Generally can be spotted by sight of black, white, red, brown or yellowish specks around the eyes, jaw, gular and cloaca. Soaking/submerging in water bowls. Mites can be collected from water bowl to confirm presence. Excessive scale rubbing on enclosure, go off food, anaemia, mites visible on skin, inflammation around the eye, poor sloughing, and tiny white specks on scales, particularly the head (mite faeces), abnormal basking. A method used to confirm the presence of mites is to place the reptile on white paper and brush around scales near head, neck, cloaca and mouth. Another technique is to place the reptile in a white box (plastic or otherwise) and spray the inside of the box with "Top of Descent", wait 5-15 minutes, take the animal out and check the box for mites.
Cause: New arrivals can bring mites into the collection. People can transfer mites with their hands if they touch an infested reptile then handle one in their own collection. They can also be brought into an enclosure on cage furniture collected from the bush.
Control: Act quickly. Suspend trading in/out of collection. Check entire collection and treat all reptiles as mites can hide in cracks/crevices of enclosures. Remove and destroy all enclosure furniture including water bowls, branches, logs, rocks, and substrate. If keeping furniture, treat it outside the enclosure, leave it outside in the sun for 3 weeks, retreat and then place back in enclosure. Enclosures should be reduced to paper substrate, cardboard boxes for shelter and the reptile to minimise hiding spots for the mites.
Treatment: Thoroughly clean cage and wash with boiling water. Dispose of all cage furniture. Spray enclosure and snake with orange medic (dilute 10:1 water to orange medic) repeat in 7-10 days and use pest strips.
Emergency treatment for large infestations – smear soapy water, oil (canola, olive etc.) all over the snakes body.
Do not feed reptiles for a week after treatment to ensure accidental poisoning does not occur.
Products used for treatment:
<u>Top of Descent:</u>
This is an aerosol insecticide with low toxicity that is available and widely used in Australia. It is a derivative of a commercial spray used on international/domestic flights. It contains d-phenothrin which is reported to be rapidly biodegradable and not stored in body tissue, so reptiles can be left in the enclosure at the time of spraying. Any food, water or empty food/water bowl should be removed when spraying. Spray in and around enclosure, covering all surfaces. Aim into fittings, cracks and poorly sealed sections.
Side effects – No reports so far, sloughing reptiles should be treated carefully or not at all.
Cost - $10-$15 per can
<u>Orange Medic:</u>
This product is also used widely and is safe and effective. Dilution is safe even in strong mixes. The spray kills mites on contact without affecting the snake. It can be applied

directly to the snake, enclosures, furnishings and immediate areas outside enclosure. It is one of the cheapest mite control product on the market.
Side effects – Reports of toxicity on sloughing snakes. Be careful when applying around eyes, use a cotton bud for this area. It is a liquid so enclosures need to be dried after application. Reptiles may dislike being sprayed.
Ivermectin:
This product is formulated for horse/cattle and only available on prescription from a veterinarian. It topically controls mites and ticks. Oral/injectable form controls intestinal worms (not tape worms/flukes) and microfilariae (blood borne parasites). It has been noted that after ivermectin injection, mites/ticks are controlled and reinfection is limited for up to a week. Ivermec® should be diluted in water to make a 2% solution (2ml Ivermec to 98ml water) and used as a spray. The spray kills mites on contact without affecting the snake. It can be directly applied to the snake, enclosure and outside area. Care needs to be taken when diluting this product.
Prevention: Wash hands after handling any reptile. Maintain a clean enclosure. Microwave any new substrate or cage furnishing before it goes into the enclosure. Design enclosure with minimum gaps and corners for mites to hide in. Quarantine all new arrivals away from collection.
(Reptiles Australia Vol.1 Issue 3 Jan-Feb 2004 pg. 16-17)

Non-Infectious:

Dysecysis (Incomplete Sloughing):
Can be a common source of stress. May be more problematic during winter when heaters are on and air is drier. When the air is too dry the old skin can become stck to the surface of the new skin underneath. Handing an opaque snake can also cause shedding problems and damage to the new skin leading to scars. Incomplete sheds are a health hazard as they can provide environments for bacteria accumulation and make successive sheds more difficult. Every time a python sheds it should be checked thoroughly. Particularly the sides, along the ridge of the back, the belly, under the chin, the eyes, around the cloaca, tip of the tail and around any previous injury.
Symptoms: Patches of unshed skin still left on the snake after sloughing. Soaking in water.
Cause: Poor humidity, mites, handling during opaque stage.
Treatment: Soak the snake in a container of warm water about 34-35ºC with a dash of liquid detergent to help wet the surface of the skin. The water level should be far enough below the lid to allow the snake to breathe. It can take 20-30 minutes to soften the old skin. Pythons are excellent swimmers and will be fine in the water. Use a damp cloth to gently remove the old skin. Be careful around the eyes. If the old skin around the eye does not come off easily seek veterinarian assistance. Also check the tip of the tail, as if old skin is left to accumulate here, the covered area will die. Apply sorbolene cream.
Prevention: Maintain correct humidity by spraying enclosure or adding water bowl. Spray snake daily when in “blue” or “milky” stage (Pre-shed when eyes go milky and opaque). Place a humidity gauge in enclosure and check daily.
(Reptiles Australia Vol. 2 Issue 1 pg 6-11)

Heat Stress:
Juveniles are particularly susceptible. Enclosures at greatest risk of causing heat stress sre those that are poorly ventilated, wooden style boxes, especially melamine, plywood etc.
Symptoms: Rolling, restless and over active behaviour, soaking in water bowls, twitching and muscular spasms, loss of ability to right itself.
Cause: Exposure to sudden or prolonged temperatures of 45ºC or higher. Poor cage design. It can be fatal within an hour or less.
Treatment: Remove animal immediately, place in a well ventilated cool environment. Gently bathe in cool water, not cold or iced. Contact a reptile veterinarian. Allow reptile to recover in cool room for up to 7-10 day. Successful recovery depends on the period of exposure to heat stress, with long term damage common.
Prevention: Maintain regular observation of both the reptile and the temperatures of the enclosure. Correctly design reptile enclosures with ventilation. Ensure there is a thermal gradient within the enclosure to allow reptile to escape heat.
(Reptiles Australia Vol. 1 Issue 6 pg 20-22)

Stress:
Symptoms: Common symptoms are feeding problems such as regurgitation or shedding problems.
Cause: Incorrect temperatures, insecurity due to lack of privacy, constant lighting, too much handling/interruption, thumping and banging, shedding problems.
(Reptiles Australia Vol. 2 Issue 1 pg 6-11)

8.5 Quarantine Requirements

The quarantine area should be kept as far away as possible from the general reptile collection.
Any newly acquired reptile and any sick or suspect reptile must be quarantined as they are a threat to the health of the general collection. Newly acquired animals may be incubating a disease, but not showing any symptoms.
Sick animals should be treated in quarantine.
Quarantine for reptiles should last for **90 days**. The quarantine facilities should be adequate for the thermal requirements of reptiles and allow for thermo-regulatory behaviour. Faecal examination, direct or flotation, for protozoan (especially *Cryptosporidia sp.* And *Amobea sp.*) and metazoan parasites. Three or more consecutive tests should be negative before introduction to the general collection. Culture faeces for *Salmonella sp.* However since more than 80% of reptiles test positive for *Salmonella sp.* evidence of infection may not prevent release. A complete blood count and PVC should be performed. Blood smears should be examined for haemoparasites. A swab/nasal wash and examintion should be performed for *Mycoplasma sp.* and *Mycobacteria sp.*
(Quarantine and health screening protocols for wildlife prior to translocation and release into the wild, http://wildlife1.usask.ca/wildlife_health_topics/risk_analysis/Quarantine.pdf)
If no signs of ill health are apparent within this time they can be transferred to the general collection.
House each reptile separately in quarantine to minimize the spread of disease within the room. Wash hands and wear and change gloves between cages and handling animals, this will also minimize the spread of disease.

During quarantine periods animals should be health assessed often. Perform distant examinations daily or more often if need arises. Do physical examinations weekly or more often if required. This includes faecal and blood samples.
When attending the animals always attend the quarantine area ***last***.
Never go into the general collection room after being in the quarantine room.
Never mix feeding, watering or other equipment between quarantine and collection or between individual cages in quarantine. Also avoid mixing equipment in the general collection.
If an animal dies in quarantine or in the general collection, a post mortem performed by a vet is recommended.

9 Behaviour

9.1 Activity

Black headed Pythons are primarily nocturnal but occasionally may be diurnally active. It was found that Black Headed Pythons studied near Townsville in QLD were mainly nocturnal. 20 of 24 specimens observed in the field were seen at night.
Foraging and feeding is normally done at night.
Black Headed Pythons will spend time coiling to conserve heat. (Pythons of Australia: A Natural History by Geordie Torr pg 23.)
They usually have a single extended basking period then move to a sheltered site. The length of this period will depend upon the climate and season. The colder it is the longer the basking period.
One method of basking observed in captive Black Headed Pythons is that it will protrude only its head to absorb heat. This is usually done in the morning. After about 30-60 minutes the python will fully emerge to bask. This behaviour allows the snake to heat up the head and ensure the brain and sensory organs are functioning effectively without exposing the entire body to potential predators. The black head also makes this very effective. (Pythons of Australia: A Natural History by Geordie Torr pg 32.)
The Genus *Aspidites* which includes the Black Headed Python are the only known pythons to exhibit burrowing behaviour. When digging, the python lies with the front of its body turned sideways and pushes its head into the sand. It then curves its neck and the sand is scooped out with the chin. The burrowing is not very efficient and may take a few hours to construct a burrow. (Pythons of Australia: A Natural History by Geordie Torr pg 40.)

9.2 Social Behaviour

Black Headed Pythons are solitary animals only coming together during the breeding season either to mate or for male-male combat. (Pythons of Australia: A Natural History by Geordie Torr pg 25.)

9.3 Reproductive Behaviour

Male Black Headed Pythons exhibit courting displays during the breeding season. This involves the male pressing his tail beside and under the females tail. He then persistently rakes his spurs into the side of the females body near the cloaca. The spurs are raked rapidly (approximately 2-3 strokes per second) and vigorously. (Notes on the reproductive biology of Australian pythons, Genera *Aspidites*, *Liasus* and *Morelia*. Neil Charles, Ray Field and Richard Shine, 1985.)

9.4 Bathing

Black Headed Pythons may occasionally immerse themselves in water so a water bowl large enough to accommodate the python should be provided. The water bowl should be filled accordingly so that when the python enters the water it is not spilled out into the enclosure. (The Guide to Owning an Australian Python by John Coborn pg. 39)

9.5 Behavioural Problems

A behavioural problem common in wild caught specimens is that it is very hard to change its diet from reptiles to warm blooded food items such as rats/mice. It is much harder to do this with a black headed python than a woma.
(Leon Limberiou, Australian Reptile Park. Pers. comm. 17/5/06)

9.6 Signs of Stress

Stress in reptiles usually causes a weakness in their natural resistance and is therefore more susceptible to disease. (The Guide to Owning an Australian Python by John Coborn pg. 52. Care of Australian Reptiles in Captivity by John Weigel pg 59.)
So, often the first sign of a stressed reptile is the onset of a disease. For example a stressed snake may become infested with mites due to weakness in its natural resistance.

9.7 Behavioural Enrichment

Perhaps placing the basking site at the top of a pile of secure rocks would encourage climbing.
Occasional misting by hand could mimic a wet season and may increase activity as well as aiding in skin sloughing.
Natural substrates such as red desert sand may stimulate burrowing behaviour.
Tongue flick is a behaviour which sometimes declines in captive snakes over time due to lack of sensory stimulation. Dragging a dead prey item around the pythons enclosure forming a blood trial may stimulate a predatory response and increase tongue flicking. Also placing a rodent in the snakes enclosure for an hour or so while the snake is removed will leave scent trails for the python to pick up on. This could also be done with a reptile as Black Headed Pythons primarily feed on reptiles in the wild. Although this could spread disease so caution is needed.
Varying the feeding schedule could lead to an increase in predatory behaviour and therefore an overall increase in activity as the python doesn't know when it will be fed.
Sensory stimulation can also be achieved with the introduction of a shed skin (parasite free) of another Black Headed Python. A males shed skin may induce combat behaviour during the breeding season.
Rotating the python into other Black Headed Python enclosures perhaps of the opposite sex, can also stimulate senses.
(Suggested Guidelines for Reptile Enrichment Compiled by Cheryl Frederick, keeper, Woodland Park Zoological Gardens AAZK National Enrichment Committee.)

9.8 Introductions and Removals

Care should be taken if introducing a male to a male as this could provoke combat especially during the breeding season and lead to injured specimens. If this is going to be done insure that the enclosure is large enough so one can escape and perhaps include multiple hiding spots. Avoid attempting this in small enclosures.
Introduce the male to the females enclosure as the female can be stressed if done in reverse order due to an overload of male scent within his enclosure. Also this could aid in breeding as the male will ignore exploring the females enclosure and focus on mating where as it may be the reverse if the female is introduced to the male in his enclosure.
When pairing up pythons during breeding season or any other time insure that they are of similar size to avoid cannibalism as black headed pythons are reptile eaters.
(Leon Limberiou, Australian Reptile Park. pers. comm. 17/5/06)

9.9 Intraspecific Compatibility

Male Black Headed Pythons will fight if kept together during the breeding season but most times of the year are fairly tolerant of each other. (Pythons of the world: Australia by Barker & Barker pg 2)
Combat may only occur if a female is present. It is best to keep Black Headed Pythons separately with the exception of introducing the male to the female during the breeding season.
Two males were introduced to the same cage (without females), the larger male immediately began biting and constricting the smaller male vigorously. The snakes were forcibly separated and the small male removed. The two males were reintroduced and instantly resulted in attack by the larger male. This procedure was done once more with the same results. (Notes on the reproductive biology of Australian pythons, Genera *Aspidites, Liasus* and *Morelia*. Neil Charles, Ray Field and Richard Shine, 1985.)

9.10 Interspecific Compatibility

This species is not territorial although it is a predator and may prey upon any species kept with it as its diet includes reptiles, birds and mammals.
There is a possibility of the python spreading salmonella to other animals.

9.11 Suitability to Captivity

Most specimens quickly settle in and become extremely hardy in captivity.
(Care of Australian Reptiles in Captivity by John Weigel)
Black headed pythons are usually amiable and easy going captives. They are generally hardy, resistant to temperature extremes, enthusiastic feeders, tolerant of humidity extremes and without shedding problems.
(Pythons of the world: Australia by Barker & Barker pg 4)

10 Breeding

10.1 Mating System

Breeding Black Headed Pythons as outlined in Reptiles Australia Vol. 1 Issue 1 Sep-Oct 2003 pg. 18:

Multiple males can be used to trigger mating but this results in combat and quite often injured snakes. A single male can also be used, as this would avoid injury to perfectly good specimens.

Inconsistency arises on the topic of cooling. Some have success with, some without. Cooling is done for a few months starting around late April to May. This simulates a cool period before a warm one similar to their home range and helps to trigger breeding response.

The photo period should be shortened during the cooling period. (The Guide to Owning an Australian Python by John Coborn pg. 61)

After the cooling period and both sexes are feeding well, introduce them around August for a period of several days. This is when mating occurs. Copulation lasting several hours.

After copulation occurs the male should be removed from the enclosure. He can be reintroduced 2 or 3 times to insure successful mating. However once fertilized, the female will normally reject any further advances from the male. (The Guide to Owning an Australian Python by John Coborn pg. 61)

While gravid the female will lay belly up. This behaviour is thought to relieve the pressure the developing eggs have on the internal organs. During this time the female will spend plenty of time basking until the eggs are laid approximately 120-145 days later. The eggs are large, 70-115mm in length, 40-60mm in width and weigh between 130-205gms.

One breeder uses the following methods:

Method 1:

During the summer, autumn and spring months (Non-cooling period) the temperature of the hot end of the enclosure is maintained between 33-34°C. Cool both male and female for a few months over winter (May-August). During winter (cooling period) the temperature is dropped to 26ºC. Food is still offered during this period although it may not be accepted. Introduce the male to the female after cooling.

The female will lay eggs in November-December and they will hatch between January-February.

He has had 2 successful clutches on this method.

Method 2:

The male is introduced to the female before the cooling period in March. He observed mating immediately. If no mating is observed, remove the male and reintroduce him a few days later. After mating the male is removed. The male and female are then cooled for a few months as done in method 1. The female will lay eggs in September. She will have a pre-lay slough about a month before laying. The eggs will hatch in November.

This is his preferred method that he currently uses and so far has had 1 successful clutch using this method.

With both methods, he says the females condition is the most important factor of the whole process. This is because the female may not eat for up to 6 months out of the year due to cooling, being gravid and laying. So he only breeds every 2 years and only if the female is in immaculate condition.
He usually breeds the same pair or at least uses the same female.
His female first bred at 4 years old and produced 6 fertile eggs. 2 years later they were bred and she produced 11 fertile eggs. 2 years after that they were bred again and she layed 9 fertile eggs. (Jacki Salkeld, Taronga Zoo pers. comm. 28/03/06)

Another technique:
Feed up both male and female before the breeding season to insure they are both in good condition for breeding. Keep the male and female separate at this time.
During the first 2 weeks of May give both sexes plenty of heat. E.g. A heat light and heat mat on during the day and heat mat at night so there is heat during both night and day.
In the second 2 weeks of May half this heat so its just a heat light during the day and nothing at night. This time during the month of May allows the snakes to clear their digestive tracts and prepare them for cooling.
Begin cooling at the start of June for at least a month. There is no heat during this period.
Then after the cooling period introduce the male to the female while they're both cool.
Wait until the female ovulates (obvious midbody swelling) then introduce the male.
(Leon Limberiou, Australian Reptile Park pers. comm. 31/05/06)
Mating should occur. If not remove the male and reintroduce him a few days later.
Remove male after observation of mating.
Once mating has been observed begin to slowly warm them both up.
(Liz Vella, Australian Reptile Park. pers. comm. 3/5/06)

Notes on breeding from Barker & Barker:
As is typical for pythons, there is an obvious midbody swelling in this species, lasting for 12-24 hours, at the time of ovulation. Barker (1984) reports that shedding occurs 1-2 weeks before egg deposition. Females will deposit eggs in a suitably large nest box filled with slightly damp sphagnum moss. They should be given access to the nest box after completion of the pre-lay shed.
This species should be given supplemental heat for basking at temperatures of 35-40ºC, several hours daily from late spring to early autumn. Gravid females should be supplied with a basking spot providing these temperatures during the day as gravid females may bask intensively. Gravid Black headed pythons often bask lying belly up with the head and neck oriented upright. (Pythons of the World: Australia by Barker & Barker pg 3)

Sex Determination:
Both sexes have small spurs. The sex of the specimen can be determined by cloacal probing to discover the presence of hemipenes. Males probe to a depth of 10-12 subcaudals, while females probe to a depth of 2-5 subcaudals. (Pythons of the world: Australia by Barker & Barker pg 2)

10.2 Ease of Breeding

Breeding Black headed pythons has proven more difficult than breeding *A. ramsayi* (Woma). (The Guide to Owning an Australian Python by John Coborn pg. 14, Reptiles Australia Vol. 1 Issue 6 pg 18)

10.3 Reproductive Condition

10.3.1 Females

The females condition prior to breeding is ***most*** important as reproduction has a high cost on the females health. This is due to the high amount of energy required to produce a clutch of large eggs and brood them (if not artificially incubating). The female usually does not eat during this process therefore is running off her fat reserves she has accumulated in the months before the breeding season.

If a female is allowed to brood her clutch, she will be very emaciated after the eggs have hatched and can take up to 2-3 years to regain the weight lost and be ready to safely breed again. Brooding is especially energetically costly due to the female shivering (thermogenesis) to keep the eggs at a constantly warm temperature. (Australian Snakes A Natural History by Richard Shine pg 106)

Therefore a female should only be used for breeding if she is healthy and not at all underweight. If there are any health problems or she is underweight, breeding should be delayed until the following season.

Because of the strain of reproduction, it is recommended that females allocated for breeding have not been bred in the previous year i.e. breed individual females every second year.

10.3.2 Males

The condition of the male is also important but not nearly as important as that of the female. Obviously because he doesn't have to deal with the high cost of reproduction. It still would be best to only use healthy males for breeding but a male that is not totally 100% can still breed without any major repercussions.

10.4 Techniques Used to Control Breeding

A simple technique would be to separate the sexes all year round. Also not providing environmental cues such as cooling will inhibit breeding.

10.5 Occurrence of Hybrids

Black Headed Pythons are not known to hybridise.

10.6 Timing of Breeding

Breeding in Black Headed pythons is seasonal and is triggered by environmental cues such as temperature and day length.

In Australia, both in captivity and in the wild, this species is reported to copulate from July through to September. In U.S and European collections, black headed pythons typically copulate January through March.

(Pythons of the world: Australia by Barker & Barker pg 2)

10.7 Age at First Breeding and Last Breeding

Sexual maturity is attained at 70-75% of the mean adult length. In general it takes 18-24 months in large python species such as the Black Headed Python to reach sexual maturity. As females are larger than males, they will take longer mature than males. (Pythons of Australia: A Natural History by Geordie Torr pg 57.)

One breeder first bred his female at 4 years of age and she produced 6 fertile eggs. She is now 12 years old and still breeding.
(Jacki Salkeld, Taronga Zoo pers. comm. 28/03/06)

10.8 Ability to Breed Every Year

It appears that the females of many species of Australian pythons probably do not reproduce every year. This is hardly surprising given the high cost of reproduction for a female python.
Although males will attempt to reproduce every year. (Pythons of Australia: A Natural History by Geordie Torr pg 43/53.)
One breeder does not breed his Black Headed Pythons every year due to the stress reproduction puts on the female. He believes breeding every year could possibly shorten the females lifespan as well as produce infertile eggs. (Jacki Salkeld, Taronga Zoo pers. comm. 28/3/06)

10.9 Ability to Breed More than Once Per Year

Black Headed Pythons lack the ability to breed more than once a year.

10.10 Nesting, Hollow or Other Requirements

The conditions of the enclosure should be set up to prevent the eggs from desiccation, abrasion and movement.
Therefore the female should be provided with a choice of two suitable egg deposition sites that is dark, warm and humid. This can simply be a large plastic Tupperware type box or hide box with a reasonably large entry hole in the front. It should be a third to half filled with a substrate of slightly dampened peat moss or vermiculite. The box can be occasionally opened to see if eggs have been laid and will help to ensure the eggs do not desiccate before being discovered.
(Care of Australian Reptiles in Captivity by John Weigel pg 87. The Guide to Owning an Australian Python by John Coborn pg 61.)

10.11 Breeding Diet

The diet does not change during the breeding season but the frequency of the females meals should be increased prior to breeding to ensure she is in good condition once the season arrives. About one month before the eggs are laid most females will cease feeding but will drink regularly, so fresh water should always be available. However as the time of laying approaches, the water bowl should be removed from the enclosure when unattended, as the eggs may be deposited in the water drowning the embryos. (The Guide to Owning an Australian Python by John Coborn pg 61. Care of Australian Reptiles in Captivity by John Weigel pg 86.)

10.12 Incubation Period

Egg laying occurs from October through November and hatching is from November through January. In U.S and European collections eggs are laid from February through June and most hatching occurs in June and July. The average duration of incubation is 64.7 days. (Pythons of the world: Australia by Barker & Barker pg 2)
The incubation period of the eggs is about 62-85 days. (Reptiles Australia Vol. 1 Issue 1 pg. 18)
Eggs that fail to show signs of hatching after the expected incubation period should be left in the incubator, particularly if none of the eggs in the clutch have hatched. As long as the eggs are not slimy or solidified, they are possibly still viable and may hatch in due course.
The only exception to this lack of intervention is when one or two eggs in a clutch remain unhatched and show no signs of slitting by the young. This could be due to incomplete development of the egg tooth therefore the neonate is trapped inside the egg. In this case a razor blade can be used to delicately etch a slit of appropriate length into the egg.
(Care of Australian Reptiles in Captivity by John Weigel pg 89.)
One breeder has found the incubation period to be between 51-60 days. (Jacki Salkeld, Taronga Zoo pers. comm.)

10.13 Clutch Size

Average clutch size is about 5-10 eggs. (Reptiles Australia Vol. 1 Issue 1 pg. 18)
Mean clutch size: 8.6
Range: 3-18
(From Greer, 1997)
(Pythons of Australia: A Natural History by Geordie Torr pg 53.)
The eggs are large, 70-115mm in length, 40-60mm in width and weigh between 130-205g. (Reptiles of Australia Vol. 1 Issue 1 pg 18.)
Black headed python eggs are large. The average length of an egg is 86 mm and average diameter is 50 mm. The average egg weight is 116.3 g. The eggs in a clutch typically adhere together. (Pythons of the World: Australia by Barker & Barker pg 3)
One breeder says his eggs weigh 115g on average. (Jacki Salkeld pers. comm. 28/03/06)
When looking at the range and variation of clutch sizes within Australian python species, there is usually a pattern of larger females producing larger clutches. (Pythons of Australia: A Natural History by Geordie Torr pg 52.)

10.14 Age at Weaning

Hatchlings can be weaned on to warm blooded prey as soon as they begin feeding after their first sloughing. (See Weaning 11.12 for techniques)

10.15 Age of Removal from Parents

If the clutch has been left with the female to incubate within the enclosure, hatchlings should be removed as soon as possible after hatching to avoid any cannibalism.

10.16 Growth and Development

In Black Headed Pythons, growth in weight appears to be faster than growth in length as it is a heavily bodied species. (Pythons of Australia: A Natural History by Geordie Torr pg 57.)
The average total length of hatchlings was 58.8 cm and the average weight was 83.9 g. (Pythons of the World: Australia by Barker & Barker pg 4)
A Hatched clutch of Black Headed Pythons averaged 68.6 cm in total length (range 66-70cm), 61.9 snout-vent length (SVL) (range 60-63cm) and 94.4g in weight (range 89-98g).
At three months they averaged 76.6cm SVL (range 71-84cm) and 258g in weight (range 195-280g).
At twelve months of age they averaged 124cm SVL (range 96.5-144) and 748g in weight (range 425-1080g).
At 24 months of age they averaged 174cm SVL (range 132-198) and 2150g in weight (range 1100-3700g).
(Notes on the reproductive biology of Australian pythons, Genera *Aspidites, Liasus* and *Morelia*. Neil Charles, Ray Field and Richard Shine, 1985.)
In the first year of the pythons life it should be fed once every 5-7 days. You don't want young growing pythons to shed more than once every 6-8 weeks. If they do, then reduce the feeding rate. Likewise if they are only shedding once every 12-14 weeks, increase the feeding rate slightly. Adults should be fed once every 2-3 weeks and its fine for them to only shed 2-4 times a year. Females preparing for breeding should be feed weekly.
One way to tell if a python is growing too quickly is to look at the head size in relation to its body. The bones in a snakes head can't grow as quickly as the bones in its body. This gives the snake a pinheaded appearance. This can cause organ stress and failure. Pythons may also become stunted if fed too little. (Reptiles Australia Vol. 2 Issue 1 pg 6-11)

11 Artificial Rearing

If a clutch of eggs is expected, the incubator and incubating material should be prepared in advance and the incubation temperature stabilised at the desired level.
If artificial incubation is to be carried out, the eggs must be removed from the female as soon as possible after laying. They tend to adhere to each other as soon as the mucous coating dries out, and then cannot be separated without damaging them. In the case of the eggs adhering to each other, it is best to leave them in this condition and incubate without separation of the eggs. (The Guide to Owning an Australian Python by John Coborn pg 61.)
Once removed from the female, the eggs should be half buried in a thick layer of vermiculite substrate within a plastic container of suitable size. (More on vermiculite in 11.2)
Half burying the eggs in the substrate as appose to totally burying them is the preferred method as this allows for visual examination of the eggs during incubation. (Reptilian Incubation: Environment, Evolution & Behaviour Edited by D.C Deeming pg 260.)
A window can be cut in the container lid, and a sheet of "glad wrap" plastic sandwiched between the lid and container to allow observation of the eggs during incubation without opening the container. (Care of Australian Reptiles in Captivity by John Weigel pg87.)
The container of eggs must then be placed in an incubator. (See 11.1)
The eggs should be regularly checked during incubation.

Keepers have reported more problems with the incubation of black headed python eggs than with the eggs of any other Australian python species commonly kept in captivity. Black headed pythons eggs are no different from other python eggs. It has been reported that black headed python eggs cannot be incubated on vermiculite and are adversely affected by handling. Both of these are untrue. In most cases the result of incubation failure is due to incorrect amount of water mixed with the incubation media (usually vermiculite), and a too small egg container with too little incubation medium. This is common with people unfamiliar with large eggs and large clutches. Many people incorrectly choose an amount of incubation medium water based on the size of their egg containers, rather than the mass of the eggs. This is suspected to be the single most common problem which is black headed python eggs are incubated in conditions that are too moist. (Pythons of the World: Australia by Barker & Barker pg 4)

Microbial infections:
The moist conditions, which are optimal for reptile incubation, also promote growth of many fungal and bacterial organisms. Although many reptile eggs are tolerant of fungal growth on the shells and shell membranes of development due to anti fungal properties (Movchan and Gabaeva, 1967; Chapter 3), preventative measures should still be taken.
Incubators and incubation containers and media should be sterilised before use.
Containers can be swabbed with commercial disinfectant or 70% alcohol. Incubation media such as vermiculite can be baked in an over at 100°C for several hours. Water that is to be added to the vermiculite to provide moisture should be boiled before hand.
Covering the incubation containers a loose fitting lid or plastic cling wrap will prevent the spread of microorganisms and also retain moisture in the medium.

Many reptile eggs have highly porous shells so it is not recommended treating eggs with anti-microbial treatments.
In order to minimise the chance of microbial infections, handling of the eggs during incubation should be kept to a minimum. Infrequent handling also appears to increase hatching success (Frye, 1991: Douglas 1993). If obvious indication of death of the embryo or eggs show signs of growth or secretion of substance on the shell surface, the egg should immediately removed from the incubator container. If not removed, the infection may spread to other eggs within the same container (Manolis and Webb, 1991; Booth and Astill 2001). This is particularly true for fungal infections.
(Reptilian Incubation: Environment, Evolution & Behaviour Edited by D.C Deeming pg 262.)

11.1 Incubator Type

Reptile eggs can be incubated in still air or forced air incubators.
Various incubators can be purchased or easily made out of old fridges, eskys and wooden boxes lined with Styrofoam. The key is that the end result is insulated and air tight. The temperature can be controlled by a thermostat and thermometers will aid in checking the temperature.

A Simple Plan for an Incubator:
You will need:
1 x Insulated box (Can be self-constructed, esky, old bar fridge, etc.)
1 x Heat cord (from horticultural supply shops)
1 x Thermostat with probe
1 x Themometer
1 x Eyelet screws or hot glue gun and glue for securing heat cord.

STEP 1.
Make sure that your incubator will be well insulated and very clean. This is especially true if you are using an old fridge as these may contain fungal spores that could kill off your clutch.
STEP 2.
Thread the probe of the thermostat through a pre-drilled hole in the wall of the incubator. If using an old fridge, cut a section out of the door seal to thread through as some old fridges may contain asbestos in their casing. Position probe centrally. Having a shelf in the middle of your incubator can make this easier. See figure 1.
STEP 3.
Thread heat cord through a second pre-drilled hole and attach to the wall and floor of the incubator. Zig zag up and down sides and position with either eyelet screws or heated glue. See figure 2.
STEP 4.
Place thermometer inside incubator and plug heat cord into thermostat. Set required temperature on the thermostat and run for a few days before use. Adjust temperature if needed.
STEP 5.
Place lidded boxes of eggs (sitting in an appropriate medium) inside the incubator.

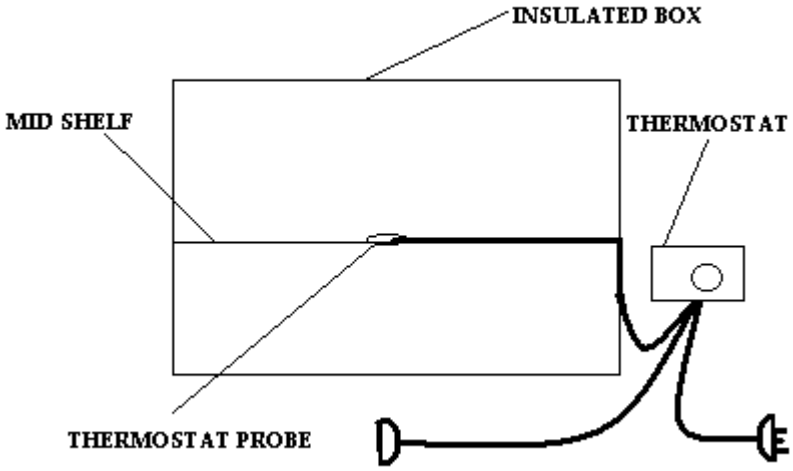


FIGURE 1. POSITIONING OF PROBE IN THERMOSTAT

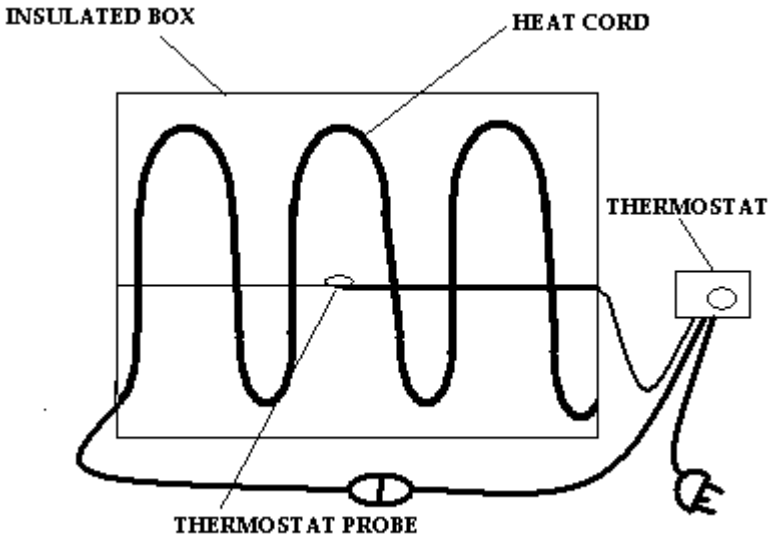


FIGURE 2. POSITION OF HEAT CORD IN INCUBATOR

NB. If making a large incubator, consider using a small fan to move heated air around in the larger area.
Also could have a Clear Perspex door to allow observation of eggs without having to open the door and release heat.
(Ultimate Reptile Suppliers www.ultimatereptiles.com.au)
One breeder has had success using an industrial incubator. It is airtight and he removes the lid every 2 days and fans it. (Jacki Salkeld, Taronga Zoo pers. comm. 28/3/06)

Example of a reptile incubator from Care of Australian Reptiles in Captivity by John Weigel:

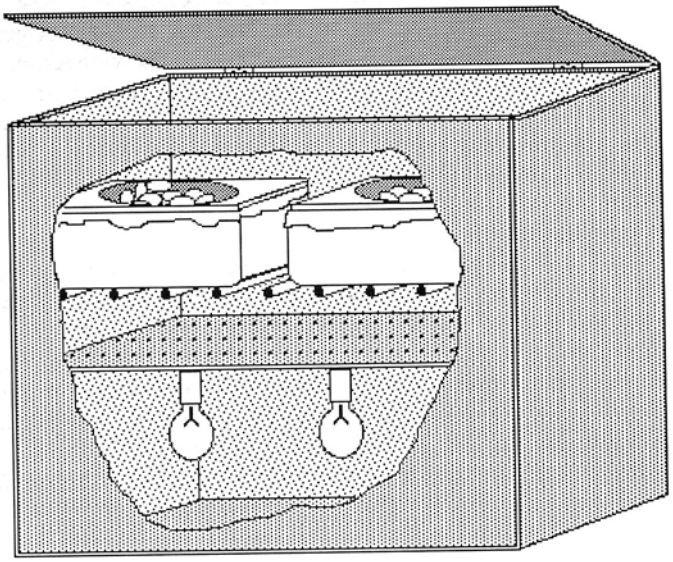


Figure 18 Cutaway view through the front of a home made reptile egg incubator. Heat produced by light globes in the lower chamber passes upwards through a sheet of pegboard to the upper chamber where the egg containers rest upon wooden dowels. Termperature is controlled by a thermostat mounted in the upper chamber.

Kimani Repti-hatch Incubator:
This model incubator measures 490 mm high x 450 mm wide x 440 mm deep, which is good desktop size. The unit comes with a removable tray of 2 shelves of 410 mm x 350 mm. It is a fully insulated, moulded fibre-glass unit with a powder coated steel exterior. It has a one piece heavy Perspex door which allows easy viewing of the entire incubator contents without having to open it. This is useful for maintaining stable temperatures. The heating system is housed externally to the hatching space, with a fan circulating heated air evenly throughout incubator. This means the electrical components don't get in the way when cleaning/ maintaining the interior. However they are still easily accessible for inspection/ cleaning. They are fully sealed so all exposed components can be disinfected. The unit is quiet with the insulation eliminating external audible noise.
The basic model (KM-REP1) comes with a digital temperature readout. The advanced model (KM-REP2) is fitted with a digital thermostat. It has dual display allowing you to see both programmed temperature and actual temperature. It uses a dual display digital microprocessor that allows you to set the precise target temperature for incubation. Using fuzzy logic, the unit is able to self regulate, i.e. it makes continuous minimal adjustments to compensate for changes in the ambient temperature of the surrounding environment. The thermostat also includes overheating protection, which can be set to cut power to the element.
The base model retails for approximately $700 plus freight.
The deluxe model retails for approximately $990 plus freight.

The digital microprocessor can be purchased at a later date to upgrade the basic model. (See appendix)
(www.kimani.com.au)

11.2 Incubation Temperature and Humidity

Artificial incubation of reptile eggs is generally performed under constant temperature and humidity.

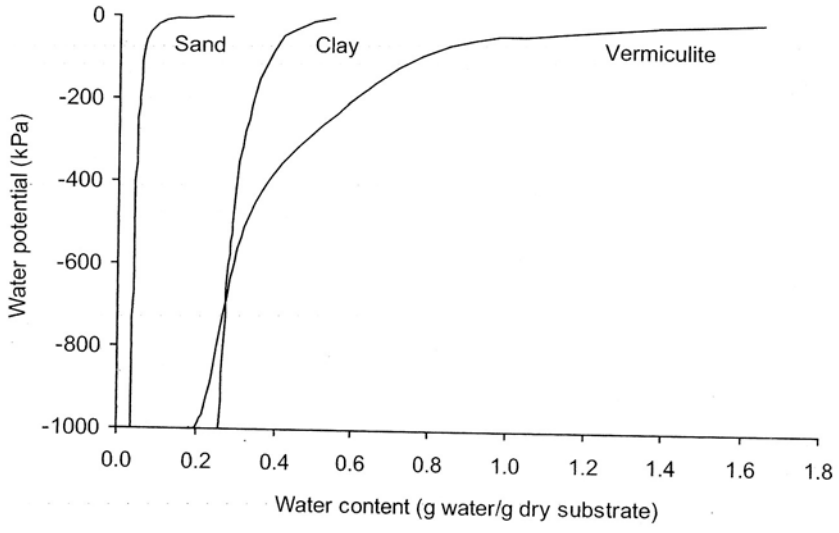
Temperature: 29-33°C. (Reptiles Australia Vol. 1 Issue 1 pg. 18)

One breeder has successfully incubated multiple clutches of Black Headed Python eggs at a temperature of 31.2°C. (Jacki Salkeld Taronga Zoo pers. comm. 28/03/06)

Naturally, reptile eggs are laid in relatively moist environments therefore they do best when incubated in moist conditions.

The best incubation medium is vermiculite (Care of Australian Reptiles in Captivity by John Weigel pg87; Reptilian Incubation: Environment, Evolution & Behaviour Edited by D.C Deeming pg 260; The Guide to Owning an Australian Python by John Coborn pg 61.) as it holds water better than most other substrates such as sand or clay. This is what provides the humidity.

Incubation resulting in hatching has occurred at steady temperatures ranging from 31-32.8ºC, and daily varying temperatures of 30-32.5ºC. The average duration of incubation at this temperature is 64.7 days. The best judgment of the proper amount of water in the incubation environment is based upon the weight of the eggs therefore eggs should be weighed on a regular basis. Rapid or extreme changes in weight, such as a 10% increase or decrease within a week, would indicate water balance problems within the egg container. When its necessary to change the amount of water in the egg container, its important to gradually make adjustments in the moisture content of the incubation medium. (Pythons of the World: Australia by Barker & Barker pg 3-4)



Relationship between water content and water potential of typical sand, clay and vermiculite: (Reptilian Incubation: Environment, Evolution & Behaviour Edited by D.C Deeming pg 260.)

It is preferable to use a course granular vermiculite over a fine granular or flaked vermiculite because the former does not compact as easily, is leas messy and does not adhere to the surface of shells (Douglas, 1993) (Reptilian Incubation: Environment, Evolution & Behaviour Edited by D.C Deeming pg 260.)
Vermiculite is available at nurseries and gardening supply shops.
Vermiculite is usually mixed with an equivalent *weight* (not volume) of water (The Guide to Owning an Australian Python by John Coborn pg 61. Care of Australian Reptiles in Captivity by John Weigel pg87). Ratio of 1:1.
Some hobbyists believe that a drier mixture is more suitable, mixing vermiculite to water at a ratio of 6:4 or 7:3 for arid zone species, respectively by *weight*. Make sure the vermiculite is in the dry form before mixing. (Care of Australian Reptiles in Captivity by John Weigel pg87).
One breeder has successfully incubated multiple Black Headed Python egg clutches using a ratio of vermiculite to water of 1:1 (Jacki Salkeld, Taronga Zoo pers. comm. 28/3/06)

11.3 Desired % Egg Mass Loss

It is normal for eggs to lose some weight in the last 2-3 weeks of incubation.
(Pythons of the World: Australia by Barker & Barker pg 4)

11.4 Hatching Temperature and Humidity

Same as incubation temperature and humidity.

11.5 Normal Pip to Hatch Interval

Once fully developed, the young pythons will slit the eggshell with the egg tooth. This is a small, sharp projection on the snout that is discarded at the first shedding.
You will notice tiny droplets of clear fluid oozing from these slits prior to hatching.
They may take several hours or even days to leave the egg (Weigel, 1988; Coborn).
The young should not be disturbed unless they are having some obvious difficulty.
Occasionally the albumin in the egg dries out too quickly and causes the python to adhere to the shell.
This problem can be solved by gently swabbing the spot with a cotton bud moistened in lukewarm water. (The Guide to Owning an Australian Python by John Coborn pg 63).

11.6 Diet and Feeding Routine

Neonates normally will not feed until after the first shedding, usually at least 3-10 days after hatching. (The Guide to Owning an Australian Python by John Coborn pg 63).
Hatchlings Black Headed Pythons can be stubborn feeders. (Reptiles Australia Vol. 1 Issue 1. pg 18)
Hatchlings can be fed on a diet of pinkie mice. Although they are not always initially accepted as Black Headed Pythons naturally eat other reptiles.
As a guide, hatchlings should be fed a single pinkie every week for the first 3-4 weeks. This can increase to 2 pinkies a week until the snake is about 6 months old. Thereafter the snake can be fed one adult mouse per week if it is large enough. (The Guide to Owning an Australian Python by John Coborn pg 49)

If they do not feed within to 4-6 weeks of hatching, and you have checked to make sure the have correct captive conditions, force-feeding may have to be adopted. (Care of Australian Reptiles in Captivity by John Weigel pg 90).
In captivity, hatchling black headed pythons are notoriously difficult to induce to feed voluntarily on rodents. So long as body weight remains normal, it is recommended that attempts to feed black headed python hatchlings not begin until they are out of the egg for at least 10 weeks. There is substantially higher feeding success at this time with no apparent detrimental effects on the hatchlings. (Pythons of the World: Australia by Barker & Barker pg 4)

One breeder said in his experience hatchlings are stubborn feeders and may not feed willingly for up to 6 months in which case he will force feed. He says they normally wont feed for the first 6 weeks. If they haven't eaten after the first 8 weeks he will gently force feed them by carefully opening the mouth and placing a pinkie inside making sure the teeth puncture the pinkies skin. The snake will usually then finish eating the pinkie on its own. This is all done very gently and slowly as not to stress the snake. He has never scented pinkies. (Jacki Salkeld, Taronga Zoo pers. comm. 28/03/06)

11.7 Specific Requirements

Hatchlings should be housed separately and care should be taken to monitor their progress. (Reptiles Australia Vol. 1 Issue 1. pg 18)
Young can be housed individually in small tupperware containers with a newspaper substrate.
Hatchlings should be kept under similar conditions to the adults. (The Guide to Owning an Australian Python by John Coborn pg 63)
For a short period after hatching the young are susceptible to desiccation and should be kept in conditions of increased humidity, with a constant source of water. Make sure the young can easily get in and out of the water source. (Care of Australian Reptiles in Captivity by John Weigel pg 90).

11.8 Data Recording

Data should be regularly recorded for each individual hatchling either in a diary or on a cage card.
Data to be collected could be sex, date of hatching, regular weighing and measurements.
Events to record would be sloughing of skin, date of feeding, quantity of accepted food, what the accepted food was, unaccepted food and what it was.

11.9 Identification Methods

Each individual hatchling can be given a number, code or name that can be written on cage cards.
Photos or descriptions detailing markings, patterns, colour or unusual features can also be used for identification.

11.10 Hygiene

Similar to that of adults. (See 5.1)

11.11 Behavioural Considerations

Hatchling Black Headed Pythons should be housed separately to avoid cannibalism (See 11.7 Specific Requirements). Also hatchlings can be stubborn feeders when attempting to feed them warm blooded prey (See 11.12 Weaning).
(Leon Limberiou, Australian Reptile Park pers. comm. 24/05/06)

11.12 Weaning

Hatchling Black Headed Pythons may require Scent diversion in order to get them feeding on warm blooded food items.
To do this, rub the pinkie over a lizard in an attempt to transfer the lizards scent on to the pinkie, then offer it to the snake. If the pinkie is accepted repeat this process during the next few feeds using a bit less lizard scent each time, until the pinkie is accepted unscented.
The advantage of weaning young snakes onto warm blooded prey is that it is widely available and will reduce the risk of introducing internal parasites.
If reptiles are going to be used as food items they should be frozen for at least 60 hours in order to kill some of the parasites they harbour. Ensure they are properly thawed out before feeding. (Care of Australian Reptiles in Captivity by John Weigel pg 40).

12 Acknowledgements

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Jacki Salkeld TAFE

Craig Turner

Liz Vella Australian Reptile Park

Leon Limberiou Australian Reptile Park

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14 Glossary

Cloaca The common chamber in reptiles and amphibians into which the reproductive, intestinal, and urinary ducts open. The external opening of the cloaca is the vent or anus.

Copulate Sexual intercourse.

Dorsal Back or upper surface of an animal.

Gravid Carrying developing young or eggs.

Gular Pertaining to the throat but usually referring to the scales of the throat.

Hemipenis One of the paired copulatory organs found in male snakes and lizards. Each hemipenis lies in a cavity at the base of the tail, and either (not normally both) is extruded for insertion into the cloaca of the female during mating.

Labial Of the lips

Mid-body In snakes, the number of scales along an imaginary line around the middle of the body. Excluding the large ventral scales.

Ophiophagous Feeding on snakes.

Premaxilla Either of two bones located in front of and between maxillary bones in the upper jaw of vertebrates.

Rostral Scale found at the tip of the snout, its lower edge bordering the mouth.

Scent Diversion The method of rubbing the scent of a reptile such as a skink onto a pinkie in order to get the snake to eat it.

Slough The dead outer skin shed by a reptile or amphibian.

Snout Vent Length (SVL) Length from tip of the snout to the cloaca. Doesn't include tail.

Subcaudal Under surface of tail

Thermogenesis Generation or production of heat, especially by physiological processes.

Total Length Distance from the tip of the snout to the tip of the tail.

Vent The external opening of the cloaca

Ventral Lower surface of an animal.

15 Appendix

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