Use of incubators with exotic species

An information sheet for veterinarians and nurses working with exotic species in clinical practice

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***Figure 1**: A picture demonstrating an incubator (Vetario T50M) with the ability to allow safe use of oxygen and provide nebulisation*

***Figure 2:** A digital read out*

Why use an incubator

Incubators are an essential addition to the veterinary care of exotic species in clinical practice.

Exotic species have a comparatively higher anaesthetic risk, when compared to traditional companion animals – most significantly in the post-operative recovery period, often associated with uncontrolled hypothermia. Also, many exotic species, are adept at hiding clinical issues until they are physiologically incapable to continuing to do so, resulting in the patient often presenting in a collapsed state, again, often associated with hypothermia, requiring not only thermal support (ideally via an incubator), but frequently, an oxygen rich environment with the addition of nebulisation therapy, especially if respiratory disease is present (Figure 1).

How to choose an incubator

An incubator should have the ability to accurately control its temperature, ideally with a digital read out showing the current temperature being obtained (Figure 2). It should be made from a sturdy, easily disinfected material. Incubators should be lightweight to allow portability, ideally with a clear plastic front, that allows adequate observations of the patient within. Oxygen therapy as well as the option for nebulisation therapy are essential. The size of incubator you chose, should be best suited to your average size of patient there are several sizes available for purchase.

Keeping exotic species warm

Exotic mammals and avian species are homeothermic, meaning they maintain their body temperature through the metabolic actions of their bodies. Reptiles are poikilothermic, meaning they have a variable body temperature, which depends on their environmental temperature. They will regulate their body temperature by moving within a temperature range (preferred optimum temperature zone - POTZ), to warm up and cool down. This temperature range will vary depending on the species and is the range in which their metabolism is optimised. **Further species specifics on ideal temperature ranges can be found in the free to download care sheets via www.justexotics.co.uk**

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Figure 3: *A picture demonstrating a heliothermic species basking under a radiant heat source which mimics the sun.*

Figure 4: *A picture demonstrating a thigmothermic species obtaining heat from a warm surface, which has been heated by a radiant heat source.*

Species (adult)	Temp (°C)	Temp (°F)
Rabbit	18 – 21	64.4 – 69.8
Guinea Pig	18 – 24	64.4 – 75.2
Chinchilla	15 – 21	59 – 69.8
Ferret	25 – 27	77 – 80.6
Rat	28 – 30	82.4 – 86
Medium-Large Birds (500g)	15 – 25	59 – 77
Small Birds (50 - 500g)	20 – 30	68 – 86
Very Small Birds (5 - 50g)	25 – 35	77 – 95

Table 1*: Mammalian and avian thermoneutral temperature ranges*

Species (adult)	Temp (°C)	Temp (°F)
Rabbit	38.5 – 40	101.3 – 104
Guinea Pig	37.2 – 39.5	98.96 – 103.1
Chinchilla	37 – 38	98.6 – 100.4
Ferret	37.8 – 40	100.04 – 104
Rat	38	100.4
Avian	40 – 42	104 – 107.6

Table 2*: Mammalian and avian rectal /cloacal temperatures*

The way in which heat is presented to the reptile should ideally be based on whether that species is a heliotherm or thigmotherm. Heliothermic species derive radiant heat from basking in the sun's rays; for this reason, thermostatically controlled heat lamps and other radiant heat sources are the preferred heating method (Figure 3). Thigmotherms include the more crepuscular species that gain heat via conduction from basking on warm objects; thermostatically controlled heat mats, or items placed underneath a radiant heat source from which the individual can gain heat, are therefore more suitable for these species (Figure 4). As such incubators are not ideal long term, or hospitalisation environments for reptilian species, the opposite is true for mammals and birds. Incubators are however OK to use with reptiles for short periods until a better heat source can be provided.

Homeothermic species such as birds and mammals should be provided with an environmental temperature is within their thermoneutral range. This is a range of temperatures in which the species expends no energy to maintain its body temperature. Due to the large surface area to volume ratio of many of the exotic species seen in practice, most notably exotic mammals and avian species, lose heat incredibly quickly. As such, when sick, anaesthetised, or recovering from anaesthesia, they will struggle to maintain their body temperature, and require thermal support, such as that provided by an incubator. See **Table 1** for suggested mammalian and avian thermoneutral temperature ranges.

It must be remembered that many of our exotic species, especially exotic mammals, do not tolerate high environmental temperatures, and are prone to heat stress. As such, the environmental temperature and that individual's rectal temperature (using a digital thermometer) should be monitored closely to ensure they do not become hyperthermic (Table 2). The interval of which should be tailored to the individual case. It should be born in mind that minimal handing of sick individuals is imperative to minimise stress.

It is important to remember that many exotic species that are hypothermic may also be dehydrated or in hypovolaemic shock. As such appropriate analgesia, fluid and nutritional therapy, alongside active warming must be considered. Any fluids and feeding provided should be warmed to that patient's body temperature prior to administration **(Table 2)**.

Figure 5: *A picture of a rabbit post anaesthesia utilising an incubator to provide thermal support.*

The importance of humidity

Incubators that are used should have the ability to humidify the air within the incubator. Most will have a reservoir on the side that should be filled with water or an appropriately diluted disinfectant, to ensure this. As incubators utilise warm air, over time, and without humidity, this can be incredibly drying, specifically, to the eyes and respiratory mucosa. Humidity should be monitored using the incubator's humidity readout, if it has one, or by using a hygrometer with a digital read out. Any oxygen that is used should also be humidified.

Rabbits:	below 60%
Rodents:	45–60%
Ferrets:	40–65%
Birds:	40–60%
Terrestrial reptiles:	30–60% (very species specific)
Rainforest reptiles:	60-80% (very species specific)

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Providing warmth to exotic species

There are multiple methods in which thermal support can be provided to sick exotic species, or those under or recovering from anaesthesia. Methods including preventing heat loss in homeothermic species, such as wrapping extremities in bubble wrap, using foil blankets and minimising the clipping of fur, removal of feathers, and application of surgical spirit or topical fluids that will increase evaporative losses. External heat sources such as warm air or water blankets, with thermostatically controlled rooms, alongside thermostatically controlled radiant heat sources for reptile species, work well during anaesthesia, but post operatively, an incubator (alongside appropriate vivaria with an appropriate heat source for that species, for reptiles) should be considered (Figure 5). An incubator will provide a thermostatically controlled environmental temperature, with a digital display of that temperature.

Hot hands, water bottles and microwavable grain bags can be used as a temporary heat source, but they can initially be incredibly hot, often cooling rapidly, drawing heat away from that individual. Electrical heat sources, run the risk of electrocution if chewed, and therefore should only ever be used with very close monitoring.

Use of oxygen

As has been previously discussed, many of the exotic species that present in practice, do so in a debilitated condition, and as such, like when recovering from anaesthesia, require oxygen supplementation. Safety-certified incubators into which oxygen can be piped are incredibly useful for use in exotic species practice. These allow the patients to be observed whilst receiving oxygen in a stress-free environment. The temperature of these enclosures can rise quickly. Therefore, the temperature within the incubator, as well as the patient's body temperature should be monitored regularly. Extreme flow rates of around 1 L per minute supplied to an incubator can maintain approximately 40 to 45% oxygen concentration in most cases. Remember opening the door of the incubator will cause the oxygen concentration to fall and should be limited to essential monitoring of the animal only. Patients with respiratory problems will benefit from being placed in sternal recumbency, with hind gut fermenting species being placed with their chest elevated (Anti-Trendelenburg position) to prevent compression of the diaphragm by the large gastrointestinal tract. If used for extensive periods of time, oxygen supplementation can be incredibly drying to the individual and the individual's airway. A humidifier, a sealed reservoir filled with saline, should be connected to the oxygen cylinder, and in some instances can be part of the incubator. Regular corneal lubrication should be performed. Some incubators will have a digital display that allows the humidity to be recorded, if this is not the case, calibrated digital hygrometers are available.

Nebulisation

Nebulisation is when a liquid is converted into a vapour, and that vapour is breathed by an individual. The droplets taken into the respiratory tract and deliver the ingredient directly to the source of inflammation or infection. It is most commonly performed with antiseptic solutions such as F10, however, antibiotics can also be delivered in this way. Respiratory disease is a common problem and exotic species and as such nebulisation can be used in avian, reptilian or small mammal species. Nebulisation is useful for both upper and lower respiratory tract disease. It not only allows penetration of ingredients to the site of infection, but it acts as an excellent expectorant and aids greatly in the clearing of discharges and will hydrate mucus membranes.