

Winter Management for Reptiles in Indian Zoos



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WINTER MANAGEMENT FOR REPTILES IN INDIAN ZOOS

Overview of Reptiles

In India, the class Reptilia includes three orders: Crocodylia (crocodiles, gharial), Testudines (turtles and tortoises), Squamata (lizards and snakes).

Reptiles are vertebrates with organ systems like those of mammals. However, they are ectothermic and rely on environmental temperature and associated behavior to control their core body temperature. Reptiles that are unwell tend to seek out the high end of their Preferred Body Temperature (PBT) commonly referred to as ('behavioural fever').

Reptiles require a range of ambient temperature to be able to thermoregulate, which is essential for optimal physiological functioning, such as, movement, feeding, digestion, reproduction, and immunocompetence.

Their metabolic rates are approximately 7–10 times lower than those of mammals. All reptiles exhibit ecdysis—a normal process by which the outer skin is periodically shed. Fertilization is internal, and females may produce eggs (oviparous) or live young (viviparous).

Reptiles are not considered highly social creatures, and multiple-male groups can lead to intraspecies aggression. Single-male, multiple-female groupings can work well for certain species, but the solitary reptile is often the healthiest. The life span of many reptiles can exceed 10–20 years, requiring a long duration of captive care.



Environmental stress (including inadequate husbandry) predisposes an animal to infection, by reducing the efficiency of its immune system. It is important to be able to identify the species in our care so that its correct housing and feeding requirements can be met.

Most diseases of reptiles are caused by an incorrect diet and/ or incorrect housing conditions.

Cage dimensions vary with species; arboreal species require height, terrestrial species floor area, aquatic species water and basking platform. Items that can be ingested e.g., small stones must be avoided. A 'hide' area is important. A body of water is required for aquatic and semi-aquatic species for hydration including a full body soak. Water should always be available to all reptiles in a form that is acceptable to them e.g., chameleons will only lick droplets, tortoises need to immerse their mouth and nose and so should be placed in shallow water 3 times per week. Adequate filtration and heating should be provided. **Primary heat Source**- for background/ ambient heat (at the low end of the POTZ). Use heat tapes, mats, or radiant heat from incandescent bulbs, ceramic lamps.

Always provide a heat source that is not a light source to provide an appropriate period of darkness whilst maintaining the enclosure temperatures.

Secondary heat source- specific areas can be provided with a higher temperature.

Monitoring is important to check the range of temperatures. The ambient temperature should not exceed the PBT; the temperature under the hot spot should not exceed the maximum tolerated. Thermometers and thermostats that provide maximum & minimum readinds are essential. The reptile should be denied direct physical contact with the heat source, as deep burns are common.

Reptiles in Winter

The body temperature in reptiles is determined by external ambient temperature. In winter months, low external temperatures cause lowered metabolism and activity rates. Reptiles in the wild have developed several different adaptation strategies for lower temperature, and seek suitable hibernacula such as burrows, dens, tree hollows, leaf litter, etc. for insulation, brumation and regulation of physiological processes.

In the wild, reptiles gravitate to an area having the temperature they need. Since the environment of captive reptiles is artificially managed, they often do not have access to the kinds of choices they would have in the wild.

The enclosure should provide a temperature gradient to enable reptiles to choose the temperature they prefer, and hence its monitoring is essential.



The light & shade method © https://www.arcadiareptile.com/lighting/light-shade-method/

Thermal gradients must be artificially provided to them based on species-specific natural history.

The immune response of reptiles can also vary seasonally, and hence, is intricately linked with the temperature range available to captive reptiles. Maximum immune response appears to occur in reptiles housed within their Preferred Optimum Temperature Range (POTR). Immune responses appear to be measurably lower in winter months, during which they may be far more susceptible to infections and diseases. This is the responsibility of the zoo and keepers to ensure optimal welfare of these animals through these winter months.

It is also important to ask how the cage is heated. Are there basking areas, hot spots, hot rocks, heating pads, incandescent bulbs, ceramic heaters, or other heat sources? Heat sources should be placed out of physical reach of the reptiles to avoid burning.

Temperate zone reptiles hibernate at temperatures of 5-15°C. Reptiles in cold climates hibernate at the lower end of this range. Subtropical reptiles may also hibernate but require some source of warmth, while tropical reptiles do not hibernate. Some snakes in desert areas have a 'summer rest' to escape the hottest temperatures.

Hibernating animals must be healthy and in a good condition. Those that are ill or weak are predisposed to problems after hibernation or death during hibernation.

During hibernation they loose approximately 1% of body weight each month. Temperatures below 0°C can lead to irreversible retinal degeneration and death.

The ideal environmental temperature will depend on the climate the natural distribution of the species. For e.g., Mediterranean tortoises should be kept in a 20— 28 degree C temperature range with a relative humidity of between 30-50%. Depending on the species, POTR for snakes may range from 21-30 degrees with relative humidity ranging from 50-80%; that for Lizards and Geckos ranges from 25-30 degrees with relative humidity between 30-40%; Crocodiles POTR ranges from 30-33 degrees.

Recommendations for winter management of captive reptiles

Provision of Indoor Housing

Reptiles require a range of temperatures to be able to thermoregulate, known as the Preferred Optimum Temperature Range (POTR). For most reptile species the POTR is known and can be found in literature. Providing these temperatures for reptiles housed outdoors can be difficult during winter months. Closed dens or shelters, where temperatures can be regulated using artificial heat, are recommended.

Since these conditions can make the ambient environment dry, humidity must be maintained by using moss, damp substrate/hides and frequent misting in order to prevent dehydration.

Most species will do well when humidity is maintained at 50-70%. Reptiles housed in enclosures with access to natural light, like those with windows and skylights, will respond more strongly to natural light than to an artificial light source.

However, it is advisable to look up humidity requirements for individual species where available. For large crocodiles, alligators and lizards, water bodies Subtropical reptiles may hibernate but require some source of warmth, while tropical reptiles (most Indian species) do not hibernate. Some snakes in desert areas have a 'summer rest' in order to escape the hottest temperatures. Hibernating animals must be healthy and in a good condition.

Hibernating animals are from temperate regions, such as Australia, the United States, and Europe. Tropical animals, such as iguanas, ball pythons or boa constrictors, generally don't hibernate, so any display of hibernation behaviour needs to be monitored.

Hibernation in reptiles is a dormant physiological state in reponse to low temperature. Often "brumation" is the term used to describe this activity in reptiles and amphibians. From a scientific standpoint, brumation describes a certain metabolic process present in temperate reptiles during their winter sleep.



All light sources should be above a reptile's head — not to the side © Frances M. Baines



Diurnal species require broad-spectrum light containing UVB (290-300 nm) for vitamin D3 synthesis and calcium homeostasis.

can be artificially heated and maintained at 29-30°C.

Regulation of Photoperiod

The amount of light received in a day, or photoperiod, is important for the welfare of reptiles and should be suitably altered during winter months. In general, day length and temperatures should be decreased during the winter. This reduces the chance of reproductive failure and disease in most reptiles. Exposure to 13 hours of light during the summer and 11 hours of light during the winter is recommended for tropical reptiles. In such cases, the artificial photoperiod can be altered to mimic that which is naturally occurring outside. Electric timers are economical and widely available. They can be adjusted and set to particular times or to mimic the natural photoperiod. The light source should be independent of the primary heat source.

Regulation of Feed

Lower ambient temperatures in winter, causes decreased metabolism leading to poor appetite hence reptiles should be fed realatively less to prevent dietary complications and obesity.

Less appetite also does not mean that they will not eat at all. Food must always be provided. Variety and method of presentation matching natural feeding cycles is a crucial aspect to consider for promoting some feeding activity.

Frequent Weight Checks

A seasonal change in feed schedule may cause fluctuation in weights of captive reptiles. It is likely that weights will drop during the winter months, and this is expected within a reasonable limit. These limits will vary based on the size of reptiles. Feeding will normalize again post winter season, and the animal will resume regular growth rates.

Primary Heat Source

This heat source should be used to maintain an appropriate background temperature in the enclosure. Male boas and pythons will often seek out the cool side of the enclosure during breeding season. If the primary heat source is inadequate, the snake can develop bacterial infections.

A good rule is to provide a hot spot with a temperature near the upper end of the Preferred Optimum Temperature Range (POTR). Nighttime temperatures should be slightly lower.

It is advised to maintain background temperatures at 24–35°C for most diurnal reptiles, with a basking area that is above 40°C. Nocturnal reptiles prefer a temperature of 21–27°C, and with a warmer area that is 32–35°C. Use thermometers at various locations within the enclosure to monitor temperatures.

Secondary Heat Sources

1. Soil heating cables

Intended originally for agricultural purposes, soil heating cables can be safely used to heat up enclosures. Cables come in a range of sizes and prices, and can heat the soil between 8-15°C above ambient air temperature. For the safety of reptiles, it is advised that the cables are placed 1.5-2 inches below the substrate, free of dry leaf litter or anything inflammable. Alternatively, a setup of {cable – 1 inch substrate – wire mesh – 1 inch substrate} can be used as added protection, especially for burrowing species.

They can be used in confined spaces without concern of overheating the space, since the thermostat will turn the cable off once that target temperature is reached. Further it is durable and requires little maintenance. Cables must be placed in half of the enclosure, so the animal has the choice to move to a cooler space if needed.

Heating Cable Sizes

- 12' cable (32 watts) 3 square foot heating area
- 24' cable (84 watts) 6 square foot heating area
- 36' cable (126 watts) 9 square foot heating area
- 48' cable (140 watts) 12 square foot heating area





Ceramic heater



2. Polystyrene boxes

Polystyrene boxes can be used as hides over the winter months due to their excellent insulating properties. Additionally, they are light, economical and easy to clean (though often not aesthetically pleasing). They can be painted or covered by enclosure furniture/ plants to fit the naturalistic aesthetic.

3. Ceramic heat

Ceramic heat is preferred over infrared light, since red is still within the reptile visual spectrum. Ceramic heat emitters produce infrared heat, and so can be used for 24 hours without disrupting a reptile's nocturnal activity. Made from porcelain, they screw into a socket, often also porcelain (rather than aluminium, such as those found in some dome fixtures). Ceramic heat emitters are popular in highhumidity spaces because they are less drying than standard incandescent bulbs. Heaters must be covered with a wire mesh to prevent any contact with the animal.

4. Mercury vapour lamps

Mercury vapour lamps have the benefit of providing both important UVB rays as well as heat and are therefore preferred for heat during the day. It is important to get the proper wattage based on the enclosure space, since these bulbs lack a rheostat. They are also fragile and must be handled with care.

5. Heat pads

Heat pads come in a variety of configurations and sizes. They can heat a wider area, and in some cases are able to be placed directly into the enclosure. In this case, make sure that the heat pad is waterproof. Larger plastic or fiberglass heat pads are manufactured for the farm and seedling industry. They are extremely useful with larger reptile species like, such as monitor lizards, Iguanas, tortoises and pythons. It is strongly advised that these are connected to a regulatory device like a thermostat. Pet heating mats are easily available to provide additional warmth over smaller areas.

Heat pads cannot be used for burrowing species. They can be placed on the outside of the enclosure as well, however heat output will be low in such cases. Heat pads generally produce a gentle warmth, and so are insufficient in areas that experience a drastic drop in temperatures.



Heat pad

6. Radiant heat panels

Radiant heat panels are expensive. However, they can provide heat by way of heat transfer, warming animals directly instead of warming the air. Radiant heat panels are a good choice for arboreal species, because the panel can be placed immediately adjacent to a perching area. Unlike ceramic heaters and light bulbs, the surface area of a heat panel does not pose a danger of burns upon physical contact.

7. Multiple sources of heat

Where single units of heat emitters aren't sufficient, use multiple sources of heat.

In these cases, make sure that there still is a cool side to the enclosure, so the animal has a choice to retreat from heat. Heat sources should be independent of the primary light source.

8. Reduce ventilation

Clear plastic can be used to partially block off mesh grills as an effective way to trap heat. In this case be sure to keep a closer eye on the cage than normal, and never block off all ventilation. This method is extremely useful for enclosures housing turtles and crocodilians.

9. Oil-filled radiator

Radiators can be used to heat the room and maintain an ambient temperature between 16-20°C. This will ensure that an appropriate temperature gradient is maintained in the enclosure. Artificial heating like bulbs, pads and wires can provide the necessary heat. Oil-filled radiators are expensive but are preferred for their ability to retain humidity.



Use of heating cable on the floor. It may be wiser to use heat lamps for the day and use the heat cable for night or at times of lower temperatures outside.



Thermostat and probe for regulating temperature & humidity in reptile enclosure





Thermo hygrometer



Temperature and Humidity gun

Heating Pad

Points to remember

i. All enclosures must be fitted with digital thermometer with probe – a minimum of 2 per enclosure, on each end - so that temperature and thermal niches can be monitored and regulated through the winters.

ii. A temperature gun can be used to assess different areas of the enclosure to ensure they are suitable.

iii. Make sure the heated areas are concealed/ hides are provided so the reptile does not shy away from using spaces that might be too exposed for their liking. iv. Use thermo-hygrometers to monitor both temperature and humidity, so that humidity levels do not drop during the winters. Additionally, frequent misting, addition of moss, etc can be used to combat low RH.

v. All electrical fittings must be fitted with rheostats or thermostats to regulate temperatures and prevent excess heating or fire hazards.

vi. Always provide a cool side so the animal does not overheat.

DOS	DONTS
Monitor temperature - Zoos that maintain reptiles in the colder regions of India must monitor the tem-	The ambient temp should not exceed the PBT; the temperature under the hot spot should not exceed the
peratures all throughout the day and night	maximum tolerated
Provide temperature gradient -To enable reptiles to choose the temperature they prefer. Closed dens or shelters, where temperatures can be regulated using artificial heat, are recommended.	Not keep light bulbs on all day and night as they affect photoperiods essential for physiological cycles.
Photo periodicity -Exposure to 13 hours of light during the summer and 11 hours of light during the winter is recommended for tropical reptiles	Do not use infra red-light bulbs as heat source as this is still within the reptile's visual spectrum
Basking Spots - Provide a hot spot with a tempera- ture near the upper end of the POTR. Night-time temperatures should be slightly lower.	Do not use Heat pads for burrowing species
Regulate temperature & humidity - All electrical fittings must be fitted with rheostats or thermostats to regulate temperatures and prevent excess heating or fire hazards	Avoid air conditioners for warmth since these reduce RH in the enclosure.
Heat source - Use ceramic bulbs or mercury lamps with appropriate fittings for heat	

Winter Management for Reptiles in Indian Zoos



CENTRAL ZOO AUTHORITY

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