

MANAGEMENT, CARE AND COMMON CONDITIONS OF LEOPARD GECKOS

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Marie Kubiak considers the husbandry needs of one of the most popular lizard pets and lists some of the common problems that can affect its health

Summary

Leopard geckos are one of the most common captive lizard pets in the UK. Husbandry is relatively straightforward, handling is accepted and breeding is easily attained, making them very appealing pets for reptile enthusiasts. As with all reptiles and exotic animals, providing correct husbandry conditions is essential in keeping these animals healthy, and any clinical evaluation requires a thorough appraisal of environmental conditions. The husbandry requirements and common medical conditions are discussed.

Key words

leopard gecko, husbandry, metabolic bone disease

THE ground leopard gecko (*Eublepharis macularius*) is a small lizard species native to desert regions of India, Afghanistan and Vietnam. The species is tolerant of captive conditions, handling and readily breeds in captivity ([Figure 1](#)).

A variety of colour morphs and patterns, with new morphs regularly emerging from captive breeding projects, ensure leopard geckos remain popular with both new and experienced

herpetoculturists ([Figures 2](#) and [3](#)).

Housing

Wooden vivaria with glass doors are most frequently used, as these provide sufficient insulation to maintain appropriate temperatures while permitting ventilation via mesh or plastic vent inserts. Fish tank-type enclosures are not suitable due to the lack of ventilation.

Leopard geckos require a minimum floor size of 2ft x 2ft for a single gecko and 2ft x 3ft for a pair or trio. This species of gecko does not have adhesive toe pads, so vertical space is of limited benefit.

Adult male leopard geckos will fight, leading to significant injuries, so males should never be housed together. Geckos can be kept singly, in female groups or as a male with multiple females.

They will readily breed in a mixed group and even single females may lay eggs, so a laying site should always be provided to avoid egg retention problems, even if eggs are not to be incubated. This laying site should be an enclosed box, and contain a damp substrate to keep any eggs hydrated until they are removed for incubation.

A moist hide should also be provided to aid skin removal during shedding and this should be enclosed with a single entry/exit hole and contain moist substrate.

Substrate

Substrate choice remains a contentious issue among owners. Sands and particulate substrates risk inadvertent ingestion and potential intestinal obstruction, while synthetic alternatives are not aesthetically pleasing.

The substrate choice remains the choice of the owner and the pros and cons of each should be considered.

- Sand. This is hygienic as it is biologically inert and faeces can easily be removed, but it risks intestinal impaction if taken in with food. To minimise this risk, live food may be fed in a separate tank or placed in a deep bowl, though crickets and locusts will invariably escape. Fine reptile or children's play sand is superior to coarse grains. Calcium-based sands are often advertised as digestible, but impactions are still frequently seen so these should be used with caution.
- Paper/kitchen roll. This is cheap and hygienic, but is not an attractive substrate for a vivarium. It is very useful for minimalist hospital or quarantine tanks, and is recommended for juveniles who are at higher risk of impaction.
- Reptile carpet. This is relatively easy to clean in entirety, but spot cleaning is difficult. Varieties

with loops of fibre should be avoided, due to risk of toe trauma.

- Bark chips, corncob, gravel. Any large particulate substrate should be avoided as inadvertent ingestion carries a high risk of obstruction.

Daily spot cleaning is simple as this species tends to use only one corner of the tank for toileting. Leopard geckos will often take cover in rocky crevices during the day to avoid intense heat so it is beneficial to provide multiple small hides or fixed rock arrangements to allow this normal behaviour.

Heating

Leopard geckos are a crepuscular species (active predominantly at dawn and dusk) and do not frequently bask in sunlight, but will instead lie on rocks that have been heated by the sun during the day. This means they are adapted to absorb heat from ventral sources so a heat mat under the tank is the most appropriate heat source. The heat mat should cover one third to half of the floor area and be placed outside the tank. The temperature must be controlled with a thermostat and the thermostat probe placed on the substrate overlying the heat mat to prevent overheating.

Daytime temperatures should be 26°C to 30°C (79°F to 86°F) over the heat mat and 20°C to 21°C (68°F to 70°F) at the cool end. Overnight, the temperature should not drop below 20°C (68°F).

Lighting

Leopard geckos will tolerate absence of ultraviolet lighting if adequate dietary calcium and vitamin D supplementation are provided. Although crepuscular, they are still exposed to low levels of ultraviolet light, so it is preferable to provide a low intensity UVB light with plenty of shaded areas to mimic their natural conditions. This is important particularly in breeding females where calcium demands are higher. If ultraviolet light is not used then a bulb providing visible light should still be provided during the day to maintain normal circadian rhythms.

Diet

Leopard geckos are entirely insectivorous. Hatchlings will begin feeding on pinhead crickets after they have completed their first shed and are voracious feeders. A variety of gut-loaded insect prey should be offered, with small locusts, crickets, mealworms, silkworms and occasional waxworms suitable and readily available from reptile pet shops.

Calcium and multivitamin supplementation should be provided daily in juveniles and every other day in adults. A small container of calcium carbonate powder can be left in the vivarium and geckos may be observed taking calcium powder from this.

A shallow dish should be provided in the cool end of the tank, but geckos will rarely make use of this, instead obtaining all their fluid from food. Water should be changed daily to prevent pathogen accumulation. Bathing is not required.

Handling

Leopard geckos are generally docile, but if threatened they may bite and will grip firmly.

They should be restrained from above with a finger firmly placed either side of the head and their body held with the rest of the fingers ([Figures 4](#) and [5](#)). Never grasp the tail as this can be dropped. Gentle handling is necessary as the skin of gecko species is thin and can tear with forceful restraint.

Sexing

This is straightforward in mature leopard geckos. From around four months of age males will have visible development of pores in a V-shape cranial to the vent, and hemipene swellings caudal to the vent ([Figure 6](#)). Females will have poorly developed pores, a flat tail base and may be smaller in size ([Figure 7](#)).

Common conditions of leopard geckos include parasites, metabolic bone disease/ nutritional secondary hyperparathyroidism, dysecdysis, hemipene infections, egg binding and autotomy.

Parasites

- Helminths

Oxyurids (pinworms) are frequently found in small numbers on faecal examination of leopard geckos and are rarely overtly pathogenic ([Figure 8](#)). They should only be treated if clinical signs are present or if high numbers are present. Diarrhoea, weight loss, anorexia and reduced growth are consistent with excessive oxyurid loads. It should be noted that oxyurid number increases may be an indication of concurrent health problems. Treatment is fenbendazole at 25mg/kg once daily for three days. Oral medication is often simple as most leopard geckos will gape defensively when firmly restrained ([Figure 9](#)).

- Cryptosporidia

Cryptosporidium saurophilum has been associated with small intestinal epithelial hypertrophy in leopard geckos. Clinical signs include failure to grow, diarrhoea and typically a rapid weight loss. Diagnosis is by demonstration of the organism on acid-fast stain of faecal material or gastric flush, or from intestinal histopathology.

Paromomycin has shown promise in experimental treatment, but is not readily available and does not necessarily eliminate disease. Clinically affected geckos should be euthanised due to chronic progression and high transmission potential.

Asymptomatic cagemates should be considered as infected and not permitted to contact other reptiles. Screening is complicated by intermittent shedding of oocysts, and the ethical considerations of performing enteric biopsies on clinically well reptiles. Reptile cryptosporidia have not demonstrated zoonotic potential.

Metabolic bone disease/nutritional secondary hyperparathyroidism

Metabolic bone disease (MBD) is a frequently seen problem in many captive reptiles. Failure to provide the requirements for appropriate calcium metabolism leads to demineralisation of the bones.

MBD is a common pathology in leopard geckos as they are frequently kept without UVB lighting, vitamin and calcium supplementation, or appropriate heating. Homeostatic mechanisms are designed to maintain blood calcium levels within a narrow range and increased parathyroid hormone levels lead progressive demineralisation of bone.

Geckos present with pathological fractures, twisted or bent long bones, inability to feed due to mandibular softening and pain, neurological symptoms or chronic wasting.

Radiographs are useful in determining the severity of demineralisation ([Figure 10](#)), but, often, palpation of long bones and mandibles will demonstrate the deformities and abnormal flexibility typical for MBD. Blood calcium levels may be normal even in advanced cases, but phosphorous levels are often elevated.

Advanced cases should be euthanised due to permanent damage to bones and compromised feeding and mobility. Less marked changes can be treated with high potency oral calcium and vitamin D liquid supplementation, UVB lighting, appropriate temperatures and removal of vivarium furniture to avoid injury. Even if other cage mates appear normal they are likely to be subclinically affected if kept under similar conditions and husbandry changes must be implemented for all.

Dysecdysis

The failure to shed normally is a common problem in leopard geckos. Juveniles shed frequently, up to every 10 days during rapid growth phases, and adults typically shed every six to eight weeks. Fluid is secreted between the old and new skin to encourage separation of the old skin. The shed skin should be removed in large pieces over a short period of time (one to two hours) and most will be eaten by the gecko.

When dysecdysis occurs, shed skin tends to be retained on the toes, with skin drying, shrinking and constricting, leading to avascular necrosis and loss of toes if untreated ([Figure 11](#)). Treatment is removal of retained skin by soaking the affected area in warm water and gently teasing loose fragments away with damp cotton buds and atraumatic forceps.

Dysecdysis affecting the eyes leads to conjunctivitis and keratitis and predisposition to secondary bacterial or fungal infections ([Figures 12](#) and [13](#)). The eyes should be gently bathed in warm water and any caseous debris removed from underneath the eyelids. Cytology of material is necessary to identify infections and guide treatment choice. Topical antibacterial or antifungal preparations are often sufficient for localised infections but recovery can be prolonged with recurrences occurring at subsequent sheds unless the underlying causative factors are addressed.

Prevention is by ensuring adequate hydration and humidity to prevent dehydration of the skin before removal. A humid hide should be provided during shedding.

Vitamin A deficiency has been reported to contribute to dysecdysis. Crickets are unable to store vitamin A hepatically so geckos living on a non-gutloaded, non-supplemented diet of crickets will invariably develop clinical or subclinical hypovitaminosis A. This results in squamous metaplasia of epithelium, which reduces fluid secretion by the skin and affects separation of the old and new layers.

It is easy to overdose these small animals with vitamin A, which leads to iatrogenic skin pathology, so gradual replenishment of vitamin A stores using correct nutrition and long-term low dose oral supplementation is the safest treatment.

Hemipene infections

Poor hygiene, trauma from nonreceptive females and vitamin A deficiency can lead to hemipene infections (**Figure 15**). These can develop to abscesses with a swollen erythematous tail base, lethargy, anorexia and straining commonly noted.

Analgesia and antibiotic therapy should be initiated and removal of inspissated purulent material carried out under anaesthesia. The author suggests this can be induced using alfaxalone at 5mg/kg to 10mg/kg by IM injection and then material removed via the hemipene orifice, which is located in the caudal aspect of the vent. Extreme cases may require two incisions, lateral to each hemipene, to remove impacted material. Hemipene amputation can be carried out without compromise to the urinary system as the ureters enter the cloaca separately.

Egg binding

Pre-ovulatory stasis is unusual in this species. Retention of formed eggs due to failure of an appropriate nesting site, or inability of the oviduct to contract due to calcium deficiency is more

common. Geckos will often present with a distended coelom, indiscriminate digging, straining or lethargy. The large eggs are often clearly visible through the ventral coelomic wall.

Administration of oral calcium syrup or intramuscular calcium gluconate (50mg/kg to 100mg/ kg) followed an hour later by oxytocin (one to 10 IU/kg IM) is often successful in lizards with oviductal inertia alone.

However, if the gecko is collapsed and weak then this is unlikely to be effective. In these critical cases fluid therapy, analgesia and calcium administration is necessary, followed by surgical removal or percutaneous ovocentesis performed on the retained eggs to deflate them and allow passage more readily.

Ovariectomy after resolution, to prevent recurrence, is technically challenging due to the small size of the patient but is generally well tolerated.

Autotomy

Leopard geckos are able to autoamputate their tail when threatened. The vertebrae have lines of weakness that cleave with intense muscular contractions causing the tail to separate from the body. The ongoing muscular contractions cause the dropped tail to continue to twitch, thus distracting the predator and allowing the gecko to escape.

Autotomy can be stimulated by rough handling, particularly of the tail, acute stress or trauma from a cage mate or other animal. The remaining stump will bleed very little but appears as an open wound.

Surgical closure or excessive interference at the stump will hinder regeneration. The gecko should be moved on to paper towel to keep the wound clean and housed separately until the tail has regenerated. Feeding of crickets should be avoided as it may cause further trauma to the open wound. As the gecko has lost its store of energy and fluid it should be fed daily to prevent tissue catabolism.

The tail will regrow over a period of five to eight weeks, but will not be an exact replica of the original.