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Abstract

The sulcata tortoise is a popular reptile species native to Africa that has seen an increase in popularity as a pet in India in recent years. Proper captive care and husbandry are essential for the well-being and health of sulcata tortoises, and it is important to consider the specific needs and requirements of these animals in Indian conditions. This article provides a comprehensive overview of the captive care and husbandry of sulcata tortoises in Indian conditions, including considerations for different weather conditions and seasons, common health problems and their prevention measures, and other relevant topics. The article also discusses the importance of environmental enrichment, and the need to provide a stimulating and varied environment that meets the physical, social, and behavioural needs of the tortoises.

Introduction

The sulcata tortoise *(Centrochelys sulcata)*, also known as the African spurred tortoise, is a large and popular reptile species primarily native to the Sahel region of Africa spanning several countries such as Benin, Burkina Faso, Central African Republic, Chad, Eritrea, Ethiopia, Mali, Mauritania, Niger, Nigeria, Saudi Arabia, Senegal, Sudan, and Yemen (Rhodin et al., 2020). and in recent years, there has been an increasing trend of keeping these animals as pets in India (TOI, 2016). As with any exotic pet, proper captive care and husbandry are essential for the well-being and health of sulcata tortoises, and it is important to consider the specific needs and requirements of these animals in Indian conditions. This article aims to provide a comprehensive overview of the captive care and husbandry of sulcata tortoises in Indian conditions, including considerations for different weather conditions and seasons, common health problems and their prevention measures, and other relevant topics. By following these guidelines, owners can help ensure the long-term health and happiness of their sulcata tortoises and provide the best possible care and management for these unique and fascinating animals.

Housing and Enclosure

Sulcata tortoises are large, active animals that require a spacious enclosure to move around and explore (Stauffer, 2003). These tortoises are known for their large size, adult males commonly reaching up to 30 inches in length and weighing up to 45 kg. Females are typically smaller reaching up to 24 inches in length and weighing up to 35 kg (Gurley, 2012). The largest sulcata tortoise ever recorded was a male measuring 42 inches in length and weighed more than 100 kg (Flower, 1928). The minimum recommended size for a single adult sulcata tortoise is 500 square feet, although larger enclosures are preferred. The enclosure should have a dry, well-draining substrate such as dry mulch or sand and soil mixture, and should be equipped with hiding places and climbing structures to provide mental and physical stimulation. sulcata tortoises will typically dig burrows or borrows in areas with a dry, well-draining substrate, and they may use these burrows for shelter, thermoregulation, and reproduction. To provide for the burrowing behaviour of sulcata tortoises, it is important to provide a substrate that is suitable for digging, such as sand and soil mixture of the appropriate density. It is also important to ensure that the enclosure is large enough to allow for adequate space for the tortoises to dig and move around. In addition, it is important to regularly assess the

burrows and remove any debris or other materials that may pose a hazard or cause injury to the tortoises.

It is essential to provide sufficient shade and shelter to protect the tortoises from the hot sun and extreme weather conditions. A shaded area should be provided to allow the tortoises to escape the heat and regulate their body temperature. In the winter months, a heated basking area may be necessary.

Lighting and Heating

Sulcata tortoises require access to natural sunlight or UVB lighting to synthesize vitamin D and maintain proper calcium metabolism (Klaphake, 2010; Mans & Braun, 2014; Wilkinson, 2015). In the absence of natural sunlight, a UVB lamp should be provided for at least 12 hours a day. In the absence of abundant natural and unfiltered sunlight, the enclosure should include a basking area with a heat lamp to provide the tortoises with a warm, comfortable environment. The basking temperature should be around 40°C, while the ambient temperature should be around 30°C.

In the winter months, when temperatures may drop significantly, it is important to provide additional artificial heat to ensure that the tortoises have a warm and comfortable environment. If temperature drops below 10°C, a heated basking area can be provided using a heat lamp or other heating source, and the enclosure should be equipped with a thermostat to monitor and control the temperature. At night, a ceramic heat bulb that only provides heat but no light can be provided.

Behaviour and Socialization

Sulcata tortoises are also known for their exploratory and curious nature (Gurley, 2012), and they benefit from having a varied and stimulating environment to explore. This can be achieved through the inclusion of climbing structures, hiding places, and other interactive elements in the enclosure. Providing hides and hide boxes can also help regulate the tortoises' body temperature and provide a sense of security in the environment.

Sulcata tortoises are sociable animals who benefit from interaction with their owners (Hedley et al., 2018). In the wild, however, they are primarily solitary animals that only congregate for breeding (Gurley, 2012; Kischinovsky et al., 2017). They can be kept alone or in small groups (1m:2-3f) in captivity, but the enclosure must be large enough to accommodate all of the tortoises comfortably. To prevent aggression and competition, it is critical to provide plenty of space and resources.

It is important to note that male sulcata tortoises can exhibit aggressive behaviour, particularly during the breeding season (Gurley, 2012; Kubiak & Pellett, 2020). This can manifest as territorial fights with other males or aggressive behaviour towards females. Less often, females may also exhibit similar behaviours. Thus, it is important to provide a spacious and well-ventilated enclosure with enough resources and hiding places. This can include the provision of separate areas or enclosures to house males individually to prevent aggressive behaviour towards females or other males. In addition, it is important to monitor the animals' behaviour and intervene to prevent injury or harm.

It is also important to only keep similar-sized tortoises together to prevent injuries to smaller individuals by larger ones, and to prevent competition during feeding.

Sexing and Breeding

Male sulcata tortoises can be distinguished by their longer and thicker tails, as well as their concave plastron (lower shell). Female sulcata tortoises have shorter and thinner tails and a flat or slightly convex plastron (Rhodin et al., 2020).

In terms of breeding biology, sulcata tortoises typically reach sexual maturity at around 5-10 years of age. In the wild, mating occurs from September to April, and females lay 14-44 eggs in 2-3 clutches from September to May (Rhodin et al., 2020). In captivity, breeding can occur year-round, although it is important to provide the proper conditions for breeding, including a spacious and well-ventilated enclosure, a varied and balanced diet, and access to natural sunlight or UVB lighting.

Diet in Captivity

It is essential to provide a species-specific, varied and balanced diet to prevent nutritional deficiencies and health problems. Sulcata tortoises are herbivorous and require a high-fibre, low-protein diet(Kubiak & Pellett, 2020; Williams, 2017). In their natural habitat, they primarily consume grasses and other plant matter (Gordon et al., 2019). In captivity, they can be fed a variety of leafy greens, vegetables, and grasses, as well as hay and a very small amount of fruit.

Staple (80-90% of the diet): Grasses such as Napier grass, Bermuda grass, lawn grass, orchard grass, etc. You may need to cultivate these in a large area to allow free grazing.

Add-ons (10-20% of the diet): Amaranthus leaves, peas, beetroot, capsicum, alfalfa greens, bottle gourd, fenugreek leaves, pumpkin, carrot, broccoli, okra, mustard greens, etc. This mixture should include more fibrous vegetables (chopped) and less

root vegetables (grated). This can change depending on the availability of greens and vegetables.

Occasional treats: Watermelon, hibiscus flowers and leaves, mulberry leaves, apple, lettuce, banana, papaya, cactus pads, etc.

Supplements: Calcium powder to be sprinkled on food twice a week. Reptile multivitamins to be added to food once a week.

It is important to note that reptiles are ectothermic animals, meaning that their body temperature is largely regulated by the environment. As such, it is beneficial to feed them after the morning temperature rises up to 30°C, as this becomes a more conducive environmental condition for optimum food consumption. This is especially important if heat and UV provisions are not made artificially, as the higher ambient temperature can help stimulate the tortoises' digestion and metabolism.

Sulcata tortoises also require access to clean, fresh water at all times. In Indian conditions, it is essential to provide adequate hydration to prevent dehydration and other health issues.

Common Health Problems and Prevention Measures

Sulcata tortoises are prone to several health problems due to poor husbandry and hygiene, and incorrect diet, including metabolic bone disease, respiratory infections, and shell rot (Gurley, 2012; Kischinovsky et al., 2017; Stauffer, 2003). These problems can be prevented through proper captive care and husbandry practices, including providing a proper diet, access to sunlight or UVB lighting, and maintaining a clean and healthy environment.

Metabolic bone disease is a common health problem in sulcata tortoises due to a lack of calcium and vitamin D in the diet (Mans & Braun, 2014). This can result in weak bones, pyramiding of the carapace, limb deformities, muscle weakness etc. To prevent this, it is essential to provide a diet rich in leafy greens, vegetables, and other calcium-rich foods, as well as access to natural sunlight or UVB lighting.

Respiratory infections are another common health problem in sulcata tortoises, particularly in environments that are too dry or too humid (Studer & Di Girolamo, 2021). To prevent respiratory infections, it is essential to maintain the proper humidity levels in the enclosure and provide a clean, well-ventilated environment.

Environmental enrichment

Environmental enrichment is an essential aspect of captive care and husbandry for sulcata tortoises. By providing a stimulating and varied environment, owners can help prevent negative behaviours and promote overall health and well-being in these animals (Newberry, 1995). This refers to the provision of a stimulating and varied environment that meets the physical, social, and behavioural needs of the tortoises. Environmental enrichment can help prevent boredom, stress, and other negative behaviours, and can promote overall health and well-being (Blackett et al., 2017).

There are many ways to enrich the environment for sulcata tortoises, including providing hiding places, climbing structures, and interactive elements in the enclosure. Owners can also offer a variety of different foods and feeders to stimulate the tortoises' natural foraging behaviour. Additionally, providing social interaction with other tortoises or even humans can also be a form of enrichment.

Sulcata tortoises are known to enjoy soaking in water, and it is important to provide a water pool deep enough for the tortoises to soak completely (Mcleod, 2022). This can help promote hydration and overall health, and can provide a source of enjoyment for the tortoises. However, it is important to take appropriate care when providing a water pool for sulcata tortoises, particularly if the animals are kept in a group. It is best to keep similar-sized tortoises together to prevent smaller individuals from being prone to drowning. It is also important to regularly clean and maintain the water pool to prevent the build-up of bacteria. In addition to providing a water pool, it is also important to ensure that sulcata tortoises have access to clean, fresh potable water at all times.

It is important to regularly assess and update the environment to ensure that it continues to meet the needs of the tortoises and prevent boredom. This can be achieved through observation of the tortoises' behaviour and the incorporation of new elements into the enclosure as needed

Conclusion

Sulcata tortoises are popular pets in India, but proper captive care and husbandry are essential for their well-being and health. This includes providing a spacious, well-ventilated enclosure with a dry, well-draining substrate, access to natural sunlight or UVB lighting, a varied and balanced diet, and good enrichment. By following these guidelines, owners can help prevent common health problems such as metabolic bone disease, respiratory infections, and shell rot and ensure the long-term health and happiness of their sulcata tortoises.

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About the Author

Soham Mukherjee is a herpetologist and wildlife biologist who specialises in crocodiles and venomous snakes. He has worked as a full-time wildlife rehabilitator with a wide range of taxa, including reptiles, mammals, birds, and arachnids. He has worked on endangered species conservation management projects both in-situ and ex-situ. He is particularly interested in conservation breeding, behaviour and cognition, enrichment in captivity, and human-wildlife interactions. He has extensive experience in snakebite and human-crocodile conflict mitigation, and is a member of the IUCN-SSC Crocodile Specialist Group, Viper Specialist Group, and Snake Specialist Group. He currently works as a specialist consultant for zoos and conservation centres.