Dispelling myths to ensure safer tortoise hibernation

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It's that time of year when heaters are being primed, people are wearing cosy jumpers and all good owners are shaking in their boots at the thought of hibernating their beloved tortoises. The reality is that done properly, hibernation should start and end with a happy, healthy tortoise (Figure 1). **Incorrect hibernation practices can, however, lead to blindness, disease and, not uncommonly, death.**

Not all tortoises need to be hibernated – species that do include Hermann's, Horsfield's and Mediterranean spur-thighed tortoises. The aim is to replicate conditions found in the wild as closely as possible.

Most tropical species never encounter such chilling temperatures as occur in the UK and, although they may slow down with shortened days and cooler temperatures (Morris, 2002), they usually need to overwinter with supplemental heat and light provided, rather than be hibernated. Hibernating these species can result in death.

Long periods of warm weather in the wild often prepare hibernating species for a short hibernation period (Calvert, 2004). Replicating this exactly is very difficult, but hibernating tortoises is a significant aspect of their captive husbandry and it is important to hibernate healthy tortoises annually once they reach an appropriate age and size (two to three years old and at least 10cm plastron length).

Preparation

The UK summer is much shorter than in southern Europe, where many of our captive tortoises originate. Therefore, we should aim to mimic a longer summer by using artificial heat and light. Without this, some tortoises may try to start hibernating in early September when the temperatures start to drop, which would lead to a prolonged hibernation period, or a tortoise waking up mid-winter.

Tortoises must be 100 per cent healthy before hibernation. A sick tortoise may not survive the event and, instead, should be overwintered with supplemental heat and light to prevent hibernation. For this reason, every tortoise should be taken to a vet for a pre-hibernation check up and faecal examination for parasites at least six weeks before hibernation to allow treatment if necessary.

Pre-hibernation examination should consist of a thorough physical exam, including eyes (Figure 2), nose (Figure 3), mouth (Figure 4), cloaca (Figure 5), skin (Figure 6) and overall health. If there is any sign of ocular, nasal, oral or cloacal damage or discharge (Figure 7), the problem must be diagnosed and treated prior to hibernation. Tympanic membranes should be flat or concave (Tortoise Protection Group, 2008), a convex shape may suggest auricular abscesses. Similarly, skin or shell lesions must be completely healed. Sunken eyes are often a sign of dehydration or hypovolaemia, which must be corrected.

During hibernation, the tortoise's immune system does not function properly (Morris, 2002). As a result, a hibernating tortoise that is not healthy will deteriorate rapidly and, as discussed later, will be compromised on recovery from hibernation as well.

To begin preparation for hibernation, reduce thermostatically controlled heat gradually until temperatures are around 15°C (59°F). As temperatures drop, feeding decreases and this is vital for hibernation. It takes two to four weeks for a tortoise's gut to empty, so do not hibernate a tortoise that has eaten large amounts within the past month or the accumulation of static digesta will rot during the hibernation period, causing gas production and resulting pressure on the lungs (Tortoise Protection Group, 2008) and gastrointestinal disease. Tortoises should naturally reduce their food intake as temperatures and light decrease.

Daily bathing

During the wind-down to hibernation, tortoises should be bathed daily for 20 minutes to ensure good hydration, defecation and urination. The bath should be at the same heat as the core body temperature. Food should be removed but ensure the tortoise does not eat the substrate. By week two, heat and lighting should be reduced to approximately eight hours a day and faecal production should have decreased significantly (Tortoise Protection Group, 2008). During week three, heating and lighting should be reduced gradually from eight to four hours a day. The tortoise should become inactive once its body temperature drops to around 13°C (55°F). At the end of week four, the tortoise's ambient temperature should be around 10°C (50°F) and the tortoise can be moved to its hibernation box, usually around early November.

Hibernation methods

Two main options are available for hibernation – within a hibernaculum in an outbuilding, such as a shed or garage, or inside in a refrigerator.

For outbuilding hibernation, a hibernaculum should be made from two boxes, with an inner, smaller box big enough to contain the tortoise plus an inch or two of insulation on all sides – shredded, compressed paper is ideal (Figure 8aFigure 8b). The outer box should be lined with polystyrene or similar material for further insulation. Boxes must be rodent-proofed, using chicken wire, over the ventilation holes, as rodents can do severe damage to hibernating tortoises (Cousquer, 2007).

Temperature is the key to success in hibernation and should be monitored and maintained accurately using a maximumminimum thermometer. The optimum temperature for hibernation is around 5°C (41°F), and always between 4°C and 7°C (39°F to 44°F). The environment must be frost-free, remaining above 0°C (32°F) at all times. Tortoises kept below this temperature range may suffer frost damage to their eyes (the aqueous humour can freeze solid) and toes, suffer serious metabolic compromise or even die. Tortoises kept above this range may wake or become torpid, using fat reserves necessary for survival during true hibernation.

Tortoises may be kept in a refrigerator in a single box. For example, a small drinks fridge is perfect for a single tortoise or a larger fridge for several tortoises (Figure 9aFigure 9b). If this method is used, a strong cardboard, wooden or plastic box, with ventilation, is adequate, with a shredded paper substrate – do not be tempted to use straw or hay, as fungal spore development and subsequent infection may occur (Tortoise Protection Group, 2005).

Temperature control is much finer in a fridge, therefore this method is more reliable and generally safer, but the fridge door should be opened at least twice a day to allow appropriate ventilation (Tortoise Protection Group, 2005). If using the refrigerator method, it is important to place the tortoise's box and substrate in the fridge some time before hibernating the tortoise. This allows temperatures to stabilise and the owner to use a maximum-minimum thermom eter to get a feel for temperature fluctuations that may occur. When the tortoise is introduced to the fridge, there will be a slight elevation in temperature due to the tortoise's mass (and every time the door is opened), but if the set up is stabilised prior to hibernation, temperatures within the fridge will vary much less.

Environmental temperatures influence those in a shed or garage and may vary significantly. Whichever method is used, daily to twice-daily temperature measurements should be taken.

Weekly weigh-ins

It is also important to weigh the tortoise prior to hibernation and weekly during it (Figure 10). In the past, it was suggested that a hibernating tortoise should not be disturbed in any circumstances, but accurate weight measurement on a regular basis is vital and if the weight of the box is calculated prior to hibernation, there is no need to move the tortoise itself. The nose and eyes should be dry and free from discharge, and gentle movement should occur if the tortoise's limbs are touched (Tortoise Protection Group, 2005).

An adult tortoise will lose approximately one per cent of its bodyweight per month during hibernation. If a tortoise in hibernation loses more than two per cent per month (or more than eight to 10 per cent over the hibernation period), the animal should be brought out of hibernation immediately and taken to the vet. At each check, look for signs of movement or urination. If either has occurred, the tortoise should be woken immediately.

Waking up

Natural rousing from hibernation occurs in the late spring, around May, which may result in overlong hibernation. The overall hibernation period in captive tortoises can last 20 weeks from the start, but may be as short as four weeks in juvenile animals. As the weather becomes warmer, garage-hibernated tortoises may start to move around in their boxes. Once signs of movement are detected, the box should be moved to a warmer area and left at room temperature for several hours, then the tortoise removed from the box and gradually warmed to summer temperatures (26°C to 28°C [low 80°F]) over four to five days. Fridge-hibernated tortoises, or those that are still sleepy by the end of the planned hibernation period, need to be actively woken using the aforementioned technique. Once awake, the tortoise should be placed in a lukewarm bath for at least 30 minutes to rehydrate it before moving it to an area with artificial light and heat sources.

During hibernation, the kidneys in particular accumulate high levels of toxins. To allow excretion of these toxins, bathe the tortoise twice daily for the first few days and daily for a further 10 days or so. During this period, normal food should be offered.

Extra heating

Stress, seasonally related hormonal changes or poor prehibernation health can lead to leukopaenia (Calvert, 2004). If hibernation is prolonged, white cell numbers may drop to dangerously low levels, leading to a compromised immune system, which can cause problems because bacterial, fungal and viral agents replicate as body temperature increases during awakening, often resulting in systemic infections, stomatitis and rhinitis (Calvert, 2004). For this reason, a post-hibernation veterinary visit is valuable.

Throughout spring, supplemental heating is important as temperatures in the UK can be highly variable at this time of year and a frost can kill hibernating/ post-hibernation tortoises.

If the tortoise does not drink within 48 hours of waking, is not eating within five days or has not urinated within the first week, it should be taken to a vet for advice immediately.

Summary

• A tortoise must be 100 per cent healthy before hibernation.

• Artificial heating and lighting are vital to extend “summer” and reduce hibernation time.

• Ensure the tortoise has emptied its stomach prior to its hibernation.

• Ensure hibernation boxes are rodent-proof if hibernation is in an outbuilding.

• Monitor temperature con– stantly throughout hibernation.

• Weigh and examine the tortoise weekly during hibernation.

• Bathe the tortoise to rehydrate it both before and after hibernation.

References

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