

## **Brumation (Hibernation) in Chelonians and Snakes**

### **What is Brumation?**

Often referred to as hibernation, which is a mammalian process, brumation is the term used to describe the period of dormancy where cold-blooded animals become physiologically less active. This is different from hibernation in mammals: hibernation involves deep sleep through a period of dormancy with very few physiological processes taking place within the body (true hibernation); during brumation, the reptile is still awake and functional, but all normal bodily processes are reduced to their absolute minimum.

### **Should I allow my tortoise, terrapin or turtle to brumate?**

Chelonia (tortoises, terrapins and turtles) should always be in excellent health prior to brumation. They should be a healthy weight for their size and species, and should not be showing signs of respiratory problems, weight loss, injury or any malady such as diarrhoea. It is essential that they do not brumate if any major stress has occurred within the last year e.g. major illness, surgery or trauma. It is recommended that you book your chelonian in for a general health check with a vet if you are considering brumation.

In most cases, and for the remainder of this section, brumation will be considered in reference to tortoises.

### **Causes of brumation**

Brumation behaviour is induced by a reduction in environmental temperatures (by 5-15°C depending on species) and daylight hours. This is guaranteed in the UK, so most tortoises will attempt to brumate if left to their own devices. **More importantly, it is a gradual increase in temperature and daylight hours that brings reptiles out of brumation.** This can take several months in the UK, and it is paramount that tortoises are woken up long before they would naturally do so in the UK to avoid severe health conditions or death. Different species should brumate for different lengths of time, so it is important to correctly identify the species and to seek advice as to whether it should brumate at all, and for how long.

### **Considerations prior to brumation**

#### **❖ Does this species of tortoise usually brumate?**

Not all species of tortoise brumate in the wild – some originate from very hot climates with constant temperatures and would not normally brumate, whereas species from more temperate climates are more likely to experience a temperature change dramatic enough to induce brumation behaviour.

In the UK, the most commonly kept species of tortoises include Horsfield (Russian) tortoises, Hermanns tortoises, Marginated tortoises and Mediterranean Spur-Thigh tortoises. All of these species can safely brumate and would do so as part of their natural behaviour.

#### **❖ Is there a safe environment available for my tortoise to brumate in?**

Brumation environments should be securely protected against predators, well ventilated with moist air available, and should also be in an area where the temperature will not drop below 2°C (at which temperature tortoises' eyes will freeze). A fan-assisted fridge is ideal, but this must also be kept in an

area that will not drop below freezing, and the fridge temperature must be carefully monitored. The different methods of brumation will be discussed below.

❖ **Has my tortoise experienced any ill health in the last year?**

This includes:-

- parasitic disease such as gastrointestinal worms
- systemic disease such as pneumonia, septicaemia, egg coelomitis, gout, viral infections, stomatitis (mouth rot), skin infections
- fractures or dislocations, including shells
- burns or cold damage
- major trauma such as dog attack or lawnmower injuries
- **any** surgical interventions or conditions requiring anaesthesia

If the answer is 'yes' to any of the above, the tortoise should not brumate until the following year at the earliest.

❖ **Is my tortoise large enough to brumate?**

Less emphasis is placed on size and age now than used to be the case, but the surface area to volume ratio of the tortoise is important in determining how long a tortoise may safely remain in brumation for. Young tortoises may still brumate, but for less time than older or larger tortoises. Veterinary help should be sought when deciding length of brumation.

## **Tortoise brumation planner**

### **5 to 6 weeks before brumation**

Weigh your tortoise (this should be done each month throughout the year) and organise a general health check with your vet to ensure that your tortoise is healthy enough to survive brumation.

Ask your vet to perform a faecal worm egg count. A faecal sample is required to do this, so make sure you collect one in advance of the appointment! This is to ensure that your tortoise does not have a parasite burden, which will cause them to become unwell during brumation and is usually a sign of another underlying illness.

### **3 to 4 weeks before brumation**

Stop feeding your tortoise to ensure that the gastrointestinal tract is fully empty by the time brumation starts. Any food remaining in the gastrointestinal tract will ferment during brumation, causing significant disease to your tortoise.

Keep the temperature warm for 1 week, then slowly start to reduce it.

Increase bathing frequency to twice a day to ensure that your tortoise is fully hydrated and that their bladder is completely flushed. Tortoises rely on a clean, full bladder to provide their necessary fluid for survival during the brumation period. The bath water should come up to the top of the skirt (the first row of scutes on the carapace) and should be a comfortable temperature to have a bath in!

### **2 to 3 Weeks before brumation**

Start to cool the temperature down by around 5-7°C per week. Brumation will start to occur at less than 10°C – you should aim to keep your tortoise at 5°C once in brumation, and the temperature should never drop below 2°C, as temperatures this low can cause their eyes to freeze.

Continue bathing your tortoise twice a day in hand-hot water

Continue to monitor for any health changes

Monitor faecal output – your tortoise should not brumate until there have been no droppings (apart from white ones) for over 1 week.

**Once one week has passed without any faecal output from your tortoise, the gastrointestinal tract can be considered as being empty and your tortoise can be put into brumation.**

**Top tip:** if your tortoise is usually outdoors, allow the British weather to start the brumation process by for you! When your tortoise starts to eat less and slow down towards the end of summer, start bathing it twice a day and monitor it closely to ensure it doesn't dig in to a flowerbed somewhere! Your tortoise will naturally prepare itself for brumation, but still requires the checks for parasites etc. If your tortoise will not be brumating, it is best to bring it indoors at this time.

### **During Brumation**

Tortoises should ideally be kept individually in a box, and this box should be placed inside a larger box. A mixture of sand and soil is the best substrate to use inside the inner box to try to mimic the

natural environment, allowing the tortoise to dig in. The remaining space in the inner box, as well as the space between boxes, should be filled with newspaper to act as an insulating layer.

The ideal place to keep your tortoise (in its box) during brumation is inside a fan-assisted fridge because the ambient temperature can be kept constant. The fridge door must be opened on a daily basis to allow air changes, and a bowl of water should be placed in the fridge to humidify the air.

In the absence of a fridge, tortoises may be hibernated in garages, outbuildings or sheds, providing they are rodent and predator-free and that the ambient temperature can be monitored and maintained.

The ambient temperature during brumation should remain at around 5°C and should never drop below 2°C. Temperatures should be checked at least twice daily, and the maximum and minimum temperatures should be noted. It is very important to monitor the temperature even when using a fridge, because fridges are affected by ambient temperatures so may have temperature changes in accordance with the environment.

**Do not allow your tortoise to brumate in the garden.** They will be at greater risk from predators and rodent attacks, and injuries caused from gardening tools and extreme cold temperatures are common. It may not be easy to find your tortoise once it has 'dug in', so there is a high risk that it will brumate for too long.

Visually inspect your tortoise every day to check for any signs that it has 'woken up' and moved around, and for any signs of urination.

Weigh your tortoise on a weekly basis as a minimum. Tortoises should not lose >1% bodyweight (1g for every 100g tortoise, or 100g per 1kg tortoise) per month. Keep a record of your tortoise's weight to help you monitor this.

### **When to reverse brumation**

Tortoises should **never** brumate for longer than 8-12 weeks, with most species brumating for 8 weeks (with the exception of Horsfield tortoises, which can manage 16 weeks). This is a stark difference to the many tortoises in the UK that are left for up to 6 months in this state! These tortoises often suffer severe and chronic pneumonia in later life as a result of excessive brumation in earlier years.

Tortoises should be brought out of brumation if their weight loss is >1% initial bodyweight per month, and certainly if weight loss is >5% starting bodyweight at any time (immediate veterinary attention should be sought).

Tortoises rely on a full bladder to supply vital water during their brumation, so if the bladder is voided (the tortoise urinates) at any time, the tortoise should immediately be warmed up and given a bath to prevent dehydration. They should **not** be placed into brumation again once recovered.

### **How to wake your tortoise up**

Raise the temperature over 2 days to the optimum preferred temperature for the species. For most species, this will be around 28°C (with a hot-spot of 35-40°C under a heat lamp). Keep the tortoise in a suitable enclosure such as a tortoise table or vivarium, where supplemental heat can be provided.



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Bathe the tortoise twice a day in warm water to replace fluids lost during brumation and flush out toxins that have accumulated.

Once warm enough, offer food. Tortoises should wake up, warm up and want to eat after their first bath, but occasionally hand-feeding may be required initially. Invariably if the bath temperature and surrounding temperature is increased **and maintained** (this particularly applies to those on a tortoise table where supplementary heat simply dissipates into the environment), the tortoise will start to eat.

Tortoises must be closely monitored for the first week, during which time they must eat, drink, urinate and defecate. It is important that they are kept at the optimum preferred temperature for them to achieve this.

Always book your tortoise in for a post-brumation check with your vet. If the tortoise has not eaten, had a drink (via the bath), urinated or defecated within the first week of waking up, **immediate** veterinary care should be sought.

## **Brumation in snakes**

### **Prior considerations**

As with tortoises, snakes should only brumate if they are in the peak of health. They should have a general health check with a vet before considering brumation. It is recommended that as with tortoises, a faecal worm egg count is performed to check for parasites that may cause disease or be a result of a pre-existing disease. Your snake should be weighed to check that it is at a healthy enough weight for brumation and to give a baseline weight for the brumation process.

### **How to induce brumation**

Food should be withheld from at least three weeks before brumation, longer depending on the size and usual feeding frequency of the snake. Maintain a normal temperature during these few weeks to allow normal gut transit of food. Once the snake has produced no faeces for >1 week, the gastrointestinal tract is empty (eliminating the risk of food fermenting within the tract).

The vivarium should be cooled by 3°C per day over 4-5 days, so that a total temperature reduction of 10-14°C is achieved. Snakes do not need to be cooled to the same degree as tortoises, and tropical boas should have their temperature reduced by a total of 5°C only.

A bath (at ambient temperature) should be available in the vivarium at all times to allow the snake to drink if desired, and to increase humidity in the vivarium. The bath should be large enough for the snake to immerse itself completely, and water should be changed on a regular basis.

### **During brumation**

Monitor and record the ambient temperature on a daily basis to ensure a constant temperature.

Visually inspect your snake every day for any signs of ill health or disease.

Monitor and record the weight of your snake each week. The acceptable weight loss per month can vary between species, but as a rough guide, a corn snake should not lose >15% bodyweight throughout the brumation process.

Brumation should **never** exceed 12 weeks.

### **When to reverse brumation**

Brumation should always be reversed within 12 weeks of its starting

Snakes showing any signs of illness should be warmed up and veterinary attention sought immediately.

Any snake that has lost an excessive amount of bodyweight should immediately be warmed up, bathed, tempted to eat, and should see a veterinarian immediately.

### **How to reverse brumation**

Slowly raise the temperature over 1 week to the optimal preferred temperature for the species.

Keep the snake in a suitable enclosure such as a vivarium, where supplemental heat can be easily provided and adjusted as required.



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Ensure that the snake has free access to fresh drinking water. Baths can be given or provided in the enclosure.

Feeding should be delayed by 2-3 weeks from the initial temperature rise to ensure all body systems are working well

An appointment with a vet for a post-brumation check should be organised. If there are any concerns about the snake following brumation, this should be arranged immediately.