



## HIBERNATION IN MEDITERRANEAN TORTOISES

**Hibernation in tortoises is an adaptation used to survive cold winters within their natural range. Since tortoises are ectothermic (cold blooded) reptiles, they rely on warmth from the sun to maintain their body temperature at around 30C (88F). During winter periods, tortoises are no longer able to adequately control their body temperature, and normal activity cannot be sustained. Hibernation is a dormant period for tortoises, enabling them to survive the cooler temperatures of winter.**

**Hibernation in captivity:** All healthy Mediterranean species of tortoise require some form of winter cooling to remain healthy in captivity. There are several different species of Mediterranean tortoise, and it really depends on their natural range, to determine how long hibernation should be, or whether they should hibernate at all.

### **Which species do and which don't?**

1. **Hermanns** Tortoises and *Testudo hermanni*. These are both found across Europe, and require a hibernation period, of approximately 10 to 12 weeks.
2. **Marginated** Tortoises – *Testudo marginated*, are found throughout southern Greece and require hibernation of approximately 10 to 12 weeks.
3. **Turkish Spur Thighed** Tortoise – *Testudo ibera*, is found across Europe and the Middle East. It is the most common spur thighed tortoise in captivity and requires a hibernation period of approximately 10 to 12 weeks.
4. **North African Spur Thighed** Tortoise – *Testudo graeca*, lives in a wide variety of habitats across Mediterranean Africa. Larger specimens will generally require a short hibernation of 6 to 12 weeks. Small specimens should be protected from cooler temperatures and provided with heat and UV light during winter; hibernation is not necessary.
5. **Horsfield** Tortoise – *Testudo horsfieldii*. Although not really a Mediterranean tortoise species, they are closely related and are common in captivity. These tortoises are the most northerly living tortoise in the world and hibernate for very long periods in the wild. This species certainly requires a hibernation period in captivity of approximately 10 to 12 weeks.

**IMPORTANT Only healthy animals should ever be hibernated. Never hibernate sick or underweight animals. If in any doubt as to health or what type of tortoise(s) you care for, please consult a knowledgeable vet or expert.** This could be combined with a recommended annual health check! Hibernation in captivity needs to be controlled to be safe for your tortoise. Tortoises are too precious and rare now to be just placed in a cardboard box with straw and left in a shed, and not checked, for 6 months. This would most likely lead to a very sick, if not, dead one.

**Preparation for Hibernation:** It is important to remember that tortoises do not need a long period of hibernation. **A tortoise should never be hibernated for more than 20 weeks, less long is desirable.** Temperatures during hibernation need to be cool, around 4.5C and 8C, normal for late November and up to late February, so this is the best time to consider hibernation. Tortoises kept out of doors will begin slowing down in late August as the day length begins to shorten. This generally begins with lower appetite levels and shorter activity periods during the day. By the end of September, early October, activity will have almost completely stopped during the day, to just a few hours sunbathing (weather permitting). Tortoises which live indoors in heated conditions rarely show signs of hibernation at all, generally only beginning with intervention from the animal's owner. Preparation should really begin around 3 to 4 weeks before and begins with fasting. **Tortoises must not enter hibernation with food in their gut**, since it's digestion grinds to a halt and food would decompose, killing the hibernating tortoise. Reptiles have a very slow metabolism and to fully empty a tortoise gut of food may take up to 4 weeks for a large animal, 2 – 3 weeks for smaller and juvenile tortoises. **During this fast period it is important to give tortoises access to a bit of heat during the day**, approximately 4 – 5 hours of access to a heat lamp. This allows

the tortoise's gut to remain functioning and able to clear out its contents. Hydration is also very important and during the fasting time **tortoises should be bathed daily in shallow lukewarm tap water**. An old washing up bowl or new cat litter tray is ideal. Fill the tray up to the tortoise's outer scutes and leave it to soak for 10 – 15 minutes. Bathing tortoises is the best way to get them to drink, and tortoises often urinate and defecate when placed in water, clearing the animal out and re-hydrating them. **After 3 to 4 weeks the tortoise should no longer be producing faeces and urine should be clear**. The tortoise is now ready for hibernation. At this stage, cool the animal to room temperature to make it sleepy and torpid. Once they have dug in, a layer of straw or dry fallen leaves can be placed across the floor of the house, for extra insulation. **Make sure predators cannot get into the greenhouse and check all entrance points regularly throughout hibernation**. Tortoises can only be allowed to hibernate in this way if they are extremely healthy since it is much more difficult to check them through hibernation.

**Weighing your tortoise:** It is important to weigh your tortoise regularly. Before hibernation it is essential to determine if the tortoise is healthy. You need to check its **bone density ratio**. To do this, **weigh your tortoise in grams and measure its length in cms**. All measurements must be VERY accurate. The easiest way to weigh a tortoise is to turn it on its back on the scales; this will give you a steady reading and will not harm the tortoise. To measure length, place it on a piece of paper and mark with a pencil the front of the shell, with the head in. Then mark the back of the shell. Remove the tortoise and measure between the two lines in centimetres.

**To calculate the bone density ratio, use the following formula:**

$$\text{Bone Density Ratio} = \frac{\text{Weight in Grams}}{(\text{Length in Cm})^3}$$

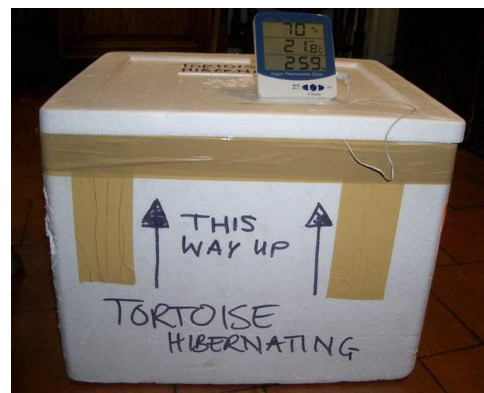
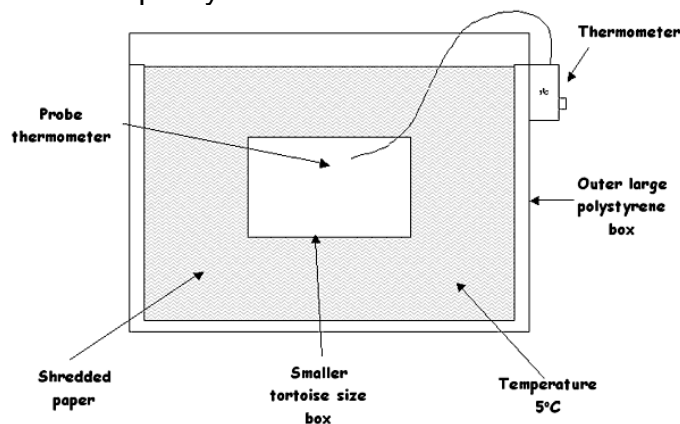
e.g. Tortoise no.1  $\frac{1310}{(20.4)^3} = \frac{1310}{20.4 \times 20.4 \times 20.4} = \frac{1310}{8489.66} = 0.15 = \text{Bone density ratio}$

Tortoise no.2  $\frac{1720}{(20.4)^3} = \frac{1720}{8489.66} = 0.20 = \text{Bone density ratio}$

If there are no known illnesses and as long as the bone density ratio is in the range 0.20 and 0.25 the tortoise may be hibernated.

**The Hibernation Period:** There are 3 main ways to artificially hibernate a tortoise.

1. **The Box Method** – This is basically a great improvement on the original method of hibernating tortoises in captivity.

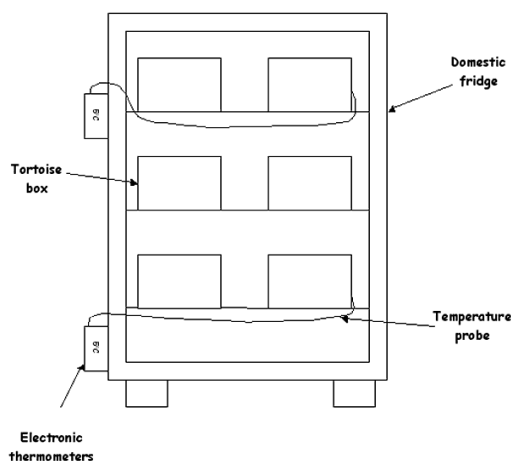


The **best type of box to use is a large polystyrene fish transport box**, easily obtained from most good aquatic retailers. These boxes are well designed for insulation and are ideal for the job. The tortoise should be placed in a small cardboard or wooden box just a little bigger than they are (shoeboxes are ideal), with a small amount of shredded paper in the box with the

tortoise for bedding. This box can then be placed inside the polystyrene box, suspended in the centre of the box by surrounding with shredded paper packed well around the box for good insulation. The centre of the poly-box is the most insulated place for the tortoise to be and keeping it there is very important.

This method has the least control of external temperature and being well **insulated from extremes of temperatures is very important**. A digital thermometer with probe can be used to monitor hibernation temperatures throughout. Place the probe of the thermometer in the inner box with the tortoise, placing the digital read out on the outside of the poly box. The entire box setup can then be placed in an outhouse, garage, shed or cool spare room. **Temperatures during hibernation must stay at around 4 - 8C mark**. Within this range tortoises will only lose approximately 1% of their body mass per month. Lower temperatures and the tortoise will freeze to death. Higher temperatures will burn its reserves too quickly and may even wake the animal up. Wherever the box is placed it must be protected from damp, and also from rats and mice, which may eat the tortoises. **During the 10 – 12 week period check temperatures daily**.

**2.The Fridge Method** – In this method a fridge is used to control temperatures accurately during hibernation. **Although a good method, it is not without risk**. Only ever use new fridges, old ones are less reliable and may accidentally freeze your tortoise to death. **Ventilation** is very important inside the fridge. So cut a small hole in the top and bottom of the door seal to allow some air movement. The tortoise itself can be placed in a cardboard box just slightly larger than the tortoise, with a small amount of shredded paper for bedding. The box can then placed in the fridge set at **5C**. Keep a digital thermometer on the fridge reading the internal temperature permanently and **check temperature daily for the 10 – 12 week period**.



**3.The Natural Method** - This method is probably the best method for the tortoise but the most controversial captive method of hibernation. In the wild, tortoises bury themselves in dry sandy soil usually under shrubs. Buried beneath the surface they are fully protected from the harsh weather above ground. It would not be wise to allow tortoises to burrow anywhere they liked in the garden, since it would be hard to protect where the tortoise would dig making it difficult to tell whether the animal would be safe during hibernation. Tortoises must be protected from waterlogged soil and predators like rats. If this method is to be used then it should only be allowed to take place within the confines of a greenhouse, with a soil base. Dig over the floor well before and add plenty of sand to loosen it. The greenhouse will protect the tortoise from extremes of weather. **Once the tortoise has been properly fasted, they can be allowed to dig down below the surface**.





*Tortoise being soaked in 5-8cm of tepid warm water*

**Waking Up:** Hibernation is generally controlled by temperature. Temperatures below 10C keep tortoises in hibernation. Temperatures above 10 – 15C will waken the animal. Since tortoises should not be allowed to hibernate for more than 10 – 12 weeks at a time it is important to wake the animals up, rather than wait for them to awaken themselves.

Once the 12 week period is up the box can be brought indoors into a room with a temperature of around 18 – 20C. Open the box up to allow the internal temperature to rise. After an hour or so the tortoise can be checked. **Tortoises which are in hibernation move, but do not open their eyes.** Once the tortoise has woken up, its eyes will be open and it can be placed in a heated environment with access to a heat lamp and UVB lamp during the day. Offer the tortoise it's favourite food. A bit of junk food like tomato and cucumber can often be good to get animals started. A healthy tortoise will feed within 24 hours if good temperatures are provided. An ideal temperature can be obtained by using a 100 watt basking lamp. Make sure you follow all instructions carefully to avoid damage to the animal and your home when doing this. You should be aiming for radiated temperatures of around 25C to get the animal functioning properly after hibernation.



**Regular daily baths are essential within the first week to re-hydrate the tortoise and stimulate urination** to get rid of toxins like urea built up during hibernation. Good calcium supplementation is essential now to boost calcium levels. Remember to weigh your tortoise regularly to check its general condition.

**Please note hibernation is a vital, but risky process for tortoises. With the correct care, risks are still possible. Baby tortoises and animals which have had health problems, will need individual assessment.**