



## The Fridge Method of Hibernation

In recent years, the milder winters in countries such as the UK have proved problematic for many tortoise keepers who previously used the box hibernation method, particularly for those who keep young tortoises, who are not as resilient as adults. Many new and experienced keepers are therefore now opting for fridge hibernation as an alternative. This method can create the optimum environment for tortoise hibernation. It does, however, require advance planning and precautions should be taken.

### Equipment

#### The Fridge:

Providing the fridge thermostat is reliable and temperature fluctuations are acceptable, almost any type of fridge can be used, from small desktop fridges to the large commercial double door drinks fridges. It is recommended that the doors to any glass-fronted fridge be insulated with thick polystyrene for additional insulation. If a fridge does not hold a stable temperature, it is not suitable for tortoise hibernation. The TPG recommend that you **do not use a fridge that has the ability to reach freezing point** (for example, a fridge that has a frozen area, e.g. an icebox), as this can make it difficult to stabilise internal temperatures. There is also greater risk of fatality should the thermostat fail on a fridge that can readily attain a temperature below freezing point. All being well, the tortoise will be spending several months inside the fridge. In order to monitor the fridge temperatures over an extended period of time, **it is extremely important to set up the fridge at least several weeks prior to hibernation taking place.**



**Hibernation Boxes:** Strong cardboard, wood or plastic boxes are all suitable, as long as they are not air-tight. Perforate the hibernation container with a sharp object before placing the tortoise in to allow for ventilation. The box should be large enough to accommodate substrate, permit the tortoise to turn around and should be secure enough to prevent any tortoise escaping from the box, potentially injuring itself (please note that Horsfield (Russian) tortoises are often able to dig their way through a cardboard box, so it is not recommended that cardboard be used for this species – see Hibernating Russian Tortoises below).

**Substrate:** Shredded paper or a 50/50 sand/soil mix is recommended. The preferable, denser sand/soil mix offers additional protection, a more natural hibernation environment and will aid in keeping the tortoise at a stable temperature. It is, however, messier when checking the tortoise. Do not use hemp, straw or hay as these can encourage spore development, and hemp and straw have sharp ends which may injure the tortoise.

**Thermometers & Alarms:** Good quality, accurate, in/out, max/min digital thermometers are absolutely essential for both setting up a fridge and for checking temperatures during hibernation. Preferably use an additional thermometer in case the first fails: these can be purchased with an audible alarm. A good thermometer and alarm may well save a tortoise's life. If more than one tortoise is to be hibernated then one thermometer per



box or per shelf should be used. A useful way to test the accuracy of the thermometer is to fill a glass with ice cubes and water, and wait five minutes. Then put the probe of the thermometer into the ice water and wait several more minutes. It should read 0°C (32°F). If it reads more or less than this temperature, the thermometer can still be used but adjust the reading accordingly.

**Hygrometer:** It is recommended a hygrometer be used to check the humidity in the fridge.

**Bottles of Water:** Bottles of water may be added to a not so full fridge, as this helps to maintain more stable temperatures. (See section on “Setting up the Fridge” below).

### Fridge Location

Whilst most fridges are well insulated, stable temperatures within the fridge will not be achieved if the fridge is located in an area that is either constantly too warm or too cold. If the external temperatures are too warm, the fridge will not be able to achieve the optimum temperatures internally. Ensure the fridge is situated away from heat sources (e.g. radiators, boilers); conservatories are not suitable at all. Likewise, if the surrounding area is too cold, the temperatures in the fridge will become erratic and may drop below the required temperatures, even as low as freezing point. External temperatures in the area where the fridge is located should not fall below 10°C (50°F) to ensure that the fridge operates effectively.

### Hibernation Temperatures:

The ideal hibernation temperature to aim for is 4°C to 5°C (39°F to 41°F).

Acceptable hibernation temperatures within the hibernation box are between 3°C and 7°C (37°F to 45°F). If temperatures fall much lower than this (as they head towards freezing) there is a risk of sight damage or worse. Temperatures rising towards 10°C (50°F) will result in a tortoise starting to become active and begin using up vital reserves.

### Setting Up the Fridge



Stabilising the temperatures in a fridge is a time-consuming, but vital, task and fridges do not run efficiently or effectively when empty. It is recommended that the fridge is set up **at least** several weeks prior to hibernating the tortoise. This will permit time to stabilise and monitor the fridge temperatures.

Add the hibernation box filled with sufficient substrate to permit the tortoise to burrow down. Add bottles of cold water to the fridge, ensuring there are not too many bottles added that could interfere with the airflow. The bottled water, being far denser than the air within the fridge, will help stabilise the temperatures. Place the thermometer probe into the hibernation box and affix the unit, showing the temperature readings, to the outside of the fridge (assuming you have an in/out thermometer), so that you can view the temperature inside the fridge without opening the door, or on the hibernation box where it can easily be seen. Ensure that the



thermometer is registering the temperatures recorded by the probe and not the unit itself (these will be designated by 'in' and 'out' on the thermometer).

### **Temperature Spot-check**

The temperature should stabilise after 3-4 hours, or possibly longer, depending on the size of the fridge. Take a reading from the in/out max/min thermometer to check that the temperature falls within the 3°C to 7°C (37°F to 45 °F) range. If necessary, adjust the fridge thermostat control up/down and repeat the process.

### **Checking the Temperature Range**

Check for temperature fluctuations and reset your max/min thermometer to record again by pressing the re-set button. Wait 3-4 hours and check both the maximum and minimum readings on the thermometer to ensure both readings fall within the 3°C to 7°C (37°F to 45°F) range, preferably 4°C to 5°C (39°F to 41°F). If necessary, repeat the process until the desired temperatures are achieved.

The process may take several days before the temperatures are set up properly. If the desired range is not met, try adding further water bottles to stabilise the temperatures, ensuring the airflow within the fridge is not impeded.

A fridge's humidity can be extremely low. Russian Tortoises (*Testudo horsfieldii*) thrive on low humidity in hibernation (around 40%). Most other hibernating species prefer a humidity of around 50% to 60%. Check the humidity using the hygrometer. If the humidity is too low add an open water-filled container to increase the humidity.

Monitor the max/min temperatures over as long a period of time as possible before adding the tortoise to the fridge. As the tortoise will be spending months in the fridge, it is extremely risky to rely on only a few days of monitoring temperatures before adding a tortoise. Advance planning will also give you time to make alternative arrangements, should your fridge prove unstable.

### **Boxing Up**

Once the correct temperature range has been achieved and the tortoise is ready for hibernation following the wind-down process, it's time to transfer to the fridge. **DO NOT** switch the fridge off during this process. Take out the hibernation box, add the tortoise and place back into the fridge. If adding a number of tortoises to any one fridge do so over two or three days, as this allows the fridge to stabilise more quickly. Allow time for the temperatures to stabilise. Do not adjust the thermostat. The temperature should not fall below the 3°C (37°F) at any time. Monitor the temperatures, permitting sufficient time for the temperatures to stabilise now that a new mass (the tortoise) has been added, and make regular checks to ensure that the tortoise has settled.

### **Multiple Tortoises**

Whilst one tortoise per box is preferable, many people do hibernate more than one tortoise in a box, but please note they may take a longer time to settle. In addition, if a tortoise urinates during hibernation it may be difficult to ascertain which tortoise has passed urine.



**Do Not** overcrowd: enough space should be allowed for the tortoises to be able to turn freely in their boxes.

### **Hibernating Russian Tortoises (*Testudo horsfieldii*)**

Russian or Horsfield tortoises originate from harsh climates and are notorious for not settling into hibernation as quickly as other hibernating species. It is recommended that a box made from wood/plywood or a plastic storage box be used, with air holes, to ensure the tortoise does not claw through the sides. Being more resilient to lower temperatures, Russian tortoises require hibernation temperatures at the lower end of the hibernation range of 3°C to 7°C (37°F to 45°F).

### **Hibernating Juvenile Tortoises**

The process for hibernating juvenile tortoises is exactly the same as for adults. However, it is worth remembering that due to their comparatively smaller mass they cannot sustain body temperatures as long as adults do, and they are more affected by temperature fluctuations.

Hibernation problems in smaller tortoises are far more frequent than with adults; so for that reason, in captivity, it is recommended that the juvenile tortoise should be subjected to a shorter hibernation than the adult tortoise, of no more than 8 to 12 weeks, and the hibernation process should be monitored more closely.

### **The Hibernation**

The riskiest time for a tortoise is at the beginning or at the end of a hibernation period, so the tortoise should be checked more frequently during this time. The tortoise may take a couple of days to settle down into the full hibernation state and may move around in the box and dig down into the substrate during this period, and this is perfectly normal.

An adult will benefit from a hibernation of 12 weeks or more. As time passes a tortoise's reserves deplete, and for that reason an adult should not be hibernated for a period of more than 18 weeks. Whilst a juvenile tortoise will hibernate for the same length of time as an adult in the wild, it is accepted that they are at a greater risk of not emerging safely from hibernation.

Once in a hibernation state, a tortoise's metabolism slows dramatically, and although a hibernating tortoise has a very low oxygen demand, the oxygen levels in the fridge must be replenished at regular intervals. It is recommended that the fridge door be opened at least twice a day, preferably when the room accommodating the fridge is at its coolest. Swaying the door back and forth a few times will ensure air is forced into the fridge. Smaller fridges with more than one tortoise may require the air supply to be replenished more frequently.

Hibernation is much more than just a deep sleep; it is a biological state when many complex changes occur within the tortoise. The ideal range of temperature for successful hibernation is between about 3°C and 7°C (37°F and 45°F). A tortoise must





**NEVER** be exposed to freezing temperatures. At temperatures of 2°C (36°F), the eye tissue may become damaged and could result in loss of sight; any lower than that, and there is the risk of brain damage or even death. At around 8°C (46°F) many tortoises will begin to stir, using vital reserves, and at temperatures over 10°C (50°F), the tortoise will no longer be in a hibernation state.

At 10°C (50°F), many of the changes that took place in the tortoise's metabolism are reversed – in addition, a chemical called glycogen is released into the blood stream. This provides the tortoise with an energy 'boost' and the tortoise must begin eating before this initial boost is used up. The tortoise only gets this boost once, and **must not** be put back into hibernation once it has woken.

Once the tortoise has settled into hibernation, check it weekly to ensure its well being. Removing a hibernating tortoise from its box, checking it over, and weighing it will only take a couple of minutes and will not interrupt hibernation. Ensure the tortoise does not spend more time outside of the fridge than necessary, and carry out the checks when the room accommodating the fridge is at its coolest.

The check should include the following:-

1. Check reflexes – the tortoise will move gently and move his limbs if touched.
2. Check the nose -- This should be dry and free from discharge.
3. Check body for any swelling or puffiness.
4. Check the box carefully for any signs of faeces or urination. Passing faeces especially in the first few weeks of hibernation is not a particular worry, however **if a tortoise urinates there is a significant danger that it could dehydrate and it should be woken up immediately.** The "Waking up from Hibernation" procedures should be followed as below.
5. Weigh the tortoise and record all weights taken. A tortoise will generally not lose much more than 1% of its body weight per month and should not lose more than 10% of its body weight in total. If there is substantial weight loss or consistent weight loss which causes concern, wake the tortoise from hibernation. Weigh the tortoise on the day it goes into hibernation, write this, and the date, on the lid of the box, and calculate what a 10% weight loss would be. Write this down as its 'critical get up' weight. (For example, if the tortoise weighs 420g, 10% = 42g, so the 'critical get up' weight would be 378g). Weight loss should be gradual. If there is substantial weight loss or consistent weight loss which causes concern, wake the tortoise from hibernation (please refer to the Waking from Hibernation document).

### **NEVER ATTEMPT TO RE-HIBERNATE A TORTOISE ONCE IT IS OUT OF HIBERNATION**

It is important when the tortoise is removed from the hibernation box at the end of hibernation that it is woken up using a recognised procedure to keep problems to a minimum.

Please refer to the TPG document on Waking up your Tortoise from Hibernation.