Hibernation
in human care

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IGEL WISSEN kompakt 4

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1 The biology of hibernation

Hedgehogs bridge the winter – the food-scarce period – by sleeping. In late summer and autumn, they put on a cushion of fat, which provides their bodies with the necessary energy for the months without any food supply.

1.1 The 500-g rule of thumb

Young hedgehogs in the wild should weigh around 500g at the beginning of November so that they have a good chance of surviving into the coming spring. This rule of thumb weight, however, only applies to just under 7 % of young hedgehogs found in autumn; most animals found - especially during the day - weigh considerably less.

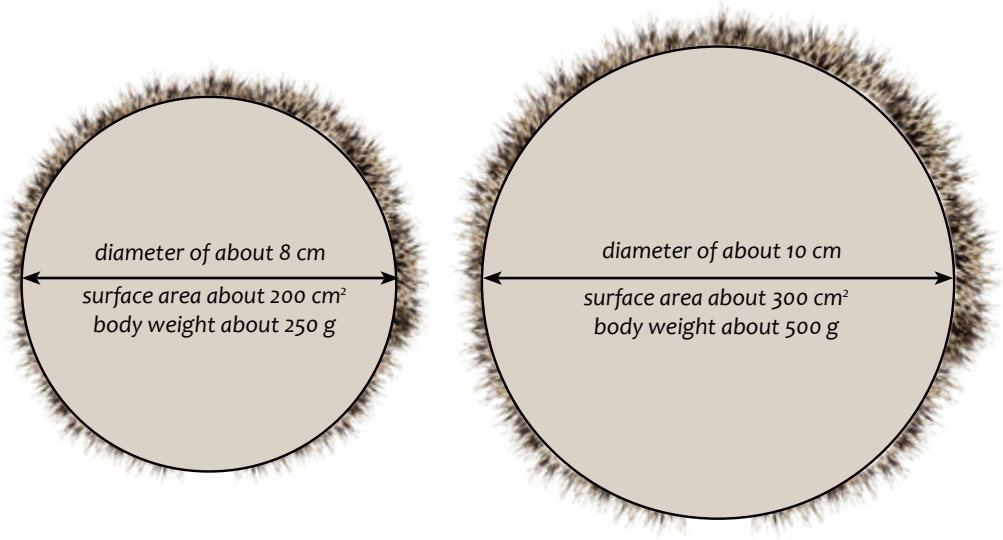
1.2 Hibernation weight

Every year, animal lovers who find a small hedgehog in late autumn, presumably in need of help, receive information from animal and nature conservation organisations that juveniles could survive hibernation in nature with a weight of 200 to 300 g. However most of these lightweights are unwell. And even healthy hedgehogs would not be able to get through a long hibernation with this weight:

- Hedgehogs are born without body fat. The percentage of body fat - the energy store during hibernation - increases with age and weight. A normally nourished (!) young hedgehog weighing 250g has only 14 % body fat, a 500g hedgehog has about 19 % and a 1000g hedgehog about 25 %.
- In addition, a smaller body, in relation to its volume, has a larger surface area than a larger body. The surface area of a 250-g hedgehog rolled up is about 200 cm^2, but that of a hedgehog twice as heavy is only 300 cm^2. So that means not double, but rather only a third more.

The smaller hedgehog therefore loses much more heat in relation to its weight

Body surface area and body weight of a 250 g and 500 g hedgehog



than the larger one. For young hedgehogs that have recovered while in human care, and are to go into hibernation, a weight of 600–700 g is recommended.

1.3 Energy storage through fat reserves

The fat reserves which hedgehogs put on through food intake when food is aplenty can be divided into two categories. Most of the fat is white fat and is used to maintain a minimum metabolism during hibernation. The smaller part is brown fat. This is mainly stored in the shoulder area, can be converted into energy very quickly and is needed for the waking process.

1.4 Hibernation triggers

A lack of food is not enough to trigger hibernation. Further factors are – amongst others – falling temperatures, decreasing daylight and hormonal changes in the body.

1.5 "Staggered" Hibernation

In nature, male hedgehogs go into hibernation about one month earlier than females. They can put on weight immediately after the mating season, whereas females can only put on weight after the pregnancy and rearing of their young.

Young hedgehogs – whose survival depends on their weight before hibernation being as high as possible – are still active when their parents have already been in hibernation for some time.

The opposite is true in spring: the adult males awaken first, then the adult females, and finally the young.

1.6 Bodily processes

Only a few mammals can hibernate the way hedgehogs do. All life-supporting processes are so drastically reduced that it is often difficult to distinguish a hibernating hedgehog from a dead one.

The entire metabolism works in an energy-saving fashion: the body temperature of about 35° C can drop down to 5° C, the heart beats only 2 to 12 times per minute instead of 200 to 280 times, and the respiratory rate is reduced from 50 down to 13 breaths per minute.

1.7 Hibernation with pauses

Hedgehogs spend only about 80 % of their hibernation time actually asleep. They wake up again and again for a few hours or days, but mostly stay in the nest. This energy-consuming behaviour is probably a "test run"; similar to starting a car after it hasn't been driven for a long period of time. If everything still works, the car remains "in mothballs", which means that the hedgehog continues its hibernation.

1.8 Weight loss and waking up

Depending on how long the hibernation period lasts; a hedgehog loses 20 to 40 % of its body weight during this time. This is about 1 to 2 g a day.

The wake-up process in spring lasts 5 to 12 hours and is accompanied by a quiver, which produces muscle warmth, thus supporting heat regulation.

2 Things to consider before hibernation starts

Hibernating when in human care signifies a long period of captivity for a hedgehog; and a corresponding responsibility for the carer, and thus requires careful consideration.

2.1 Release into the wild or hibernation in our care?

Whether it is a hand-reared baby hedgehog or a young hedgehog that was taken in the autumn, you must consider whether it can be released before winter. Hibernation in the wild is always preferable to a long period of captivity.

2.2 Hibernation calculation

If it is too late in the year to release a young cared for animal that has since recovered and reached a weight of 600–700 g, it must still be given the opportunity to hibernate, even if this is in captivity. Assuming that a 650 g hedgehog has an average body fat mass of approx. 21 %, and that during hibernation it loses an average of 0.25 % of its body weight per day, i.e. 1.63 g, its body fat reserves will theoretically last 84 days, i.e. almost three months. However, there are limits to the calculability of hibernation: Many factors that are not foreseeable influence weight loss and the possible hibernation period length. The body fat mass of a hedgehog cannot be determined exactly. It depends on the individual stature of the hedgehog. Nutritional condition and fat accumulation also vary from hedgehog to hedgehog.

Both the outside temperature and room temperature play an important role here. The warmer the temperature the more weight a hedgehog will lose when in hibernation. This happens because the lowest it can reduce its body temperature is to a few degrees above the ambient temperature. The higher the body temperature, the more energy the vital functions use up and the greater the weight loss.

Other factors are the location and quality of the nest. If it is well insulated and not exposed to sunlight, the temperature inside the nest will only change slightly and the change will happen slowly. In a sloppily built nest, temperature changes can be felt more quickly and cause reactions in the hedgehog organism, even up to the point where it wakes up.

3 Hibernation when in human care

If a healthy hedgehog of a good weight can no longer be released because of the onset of winter, it must be given the opportunity to hibernate in human care.

3.1 Reasons for hibernation

- Hibernation is in the biology of the European hedgehog.
- Hibernation shortens the perceived amount of time that the hedgehog is in captivity.
- Hedgehogs which are not allowed to hibernate often show behavioural problems, e.g. stereotypical running until their paws are so worn through that they bleed ("runners"), some refuse to eat, or when in a heated room fall into a half sleeping state, which causes them to lose a lot of weight.
- If hedgehogs eat during hibernation instead of sleeping, their weight will increase to the point of obesity.
- Hedgehogs that hibernate in the cold are better acclimatised in the spring.
- During hibernation hedgehogs "forget" their bond with their carer – which is especially important with hand-raised hoglets.
- Last but not least, the carer is saved work, time and money when the spiny hedgehog is asleep!

3.2 Requirements for hibernation

Only healthy hedgehogs of sufficient weight may be put into hibernation.

■ 3.2.1 Health condition

The hedgehog should have no external parasites; a slight infestation of internal parasites at most and no unhealed wounds or broken bones. Fleas can multiply in the nesting material. Injuries do not heal because in hibernation all the life processes come almost to a standstill. Hedgehogs going into hibernation must of course not be suffering from bacterial infections or skin diseases.

■ 3.2.2 Weight

Of course, the hedgehog must have a weight that enables it to go without food for several weeks or months. Young hedgehogs should weigh 600–700 g, adult hedgehogs 900–1200 g depending on age.

You can tell whether a hedgehog likely has a sufficient amount of fat by feeling it: when it is relaxed and rolled out, take hold of the hedgehog from above using both hands and feel the area around the sternum with your index and middle fingers: on a lean hedgehog you can feel the bones just under the skin. On a well-fed hedgehog, on the other hand, there is a layer of flesh between the surface of the skin and the sternum. This suggests that the hedgehog has fat reserves.

The weight required also depends on the expected length of hibernation: A hedgehog that can go into hibernation as early as the end of November needs a higher weight than one that – because it was not returned to full health until the end of January – only has a short hibernation period ahead of it.

■ 3.2.3 Keeping them separate

Even during hibernation hedgehogs must be kept separately, because:

- Hedgehogs are attracted to any source of heat; and other hedgehogs are also heat sources. As a result, when there

are several hedgehogs in an enclosure they will not spread out into individual sleeping houses, but rather gravitate together to just one or two houses. This has nothing to do with friendship or brotherly and sisterly love! This mutual warming prevents hibernation, they stay awake and continue to eat and gain weight.

- In non-hibernating male hedgehogs, testosterone production starts as early as the beginning of January. Females in the same enclosure, which are often only five months old by then, show themselves as being ready to mate. The consequences for competing males are not only bites from fighting with a high risk of injury, but also pregnancy in females that are far too young. Such young mothers rarely care for their offspring, and as a result the newly born hedgehogs have little chance of survival. In addition, the males kept in the same enclosure attack the babies and eat them. If hedgehogs are kept separately for hibernation, such horror scenarios can be avoided.

3.2.4 Fasting before hibernation?

Because hedgehogs ready for hibernation often no longer eat, some observers conclude that they fast before hibernation. It is assumed that this lowers the hedgehog's insulin level and that, with their metabolism reduced to a minimum, they are no longer able to digest their food during hibernation, which is why it rots in the gut. Numerous contradictory observations cast doubt on this claim.

4 Hibernation location

This should be easily and quickly accessible – e.g. do not use the attic of a four-storey house if you yourself live on the ground floor – otherwise there is no guarantee that the hedgehog will really be monitored daily.

4.1 Temperature at the hibernation location

Cellars or unheated rooms would seem to be a good place to accommodate a hibernator. However measuring the temperature often shows that such rooms are too warm. The temperature in the hibernation location should correspond to the outside temperature or come very close to it. For example, locations on balconies, in garden sheds, in agricultural outbuildings and empty stables would all be suitable. Of course, you can also set up a hibernation enclosure on the terrace or in the garden.

The enclosure with the sleeping house and its immediate surroundings should be shielded from direct sunlight. Balconies and terraces in particular often face south! In this case it is recommended to cover the enclosure, e.g. with planks.

4.2 Disturbing animals

A cover is also necessary if, for example, you have to fear that dogs, foxes, martens or rats might enter an outdoor enclosure located in the garden. Hibernating hedgehogs are helpless!

5 Hibernation housing

The nest is crucial in determining the quality and length of hibernation. Its most important characteristics are protection from moisture and good thermal insulation.

5.1 Hibernation nests in nature

Hibernation nests are compact structures with a diameter of 30–60 cm. The walls consist of closely packed leaves and are up to 20 cm thick. Inside there is only room for the curled-up hedgehog!

Once the hedgehog has decided on a location, it collects dry leaves and carries them to a location under bushes or into a hedge. When there are enough leaves, it digs into them and turns in circles. This rotational movement inside the nest, which is countered by the elastic pressure of the branches from outside, presses the leaves flat and close together. The densely packed leaves contain little oxygen – so that the normal decay process is delayed – and protects the hedgehog from cold and damp.

5.2 Hibernation house

Put a cardboard box (not a plastic box!) with an edge length of 25–30 cm and a hole on the side into a larger cardboard box (about 35 cm edge length) and stuff the space in between firmly with scrunched up newspaper.

Put thick layers of newspaper on top of and underneath the inner box. The insulating material must be breathable and able to absorb moisture (condensation). Of course, you cut a correspondingly large sized hole in the outer cardboard too.

If the hibernation house is exposed to the weather, build the outer house of wood or chipboard and provide it with a removable roof. The house is filled with torn and scrunched up newspaper. Nesting material is also placed in the enclosure so that, if it wishes, the hedgehog can further furnish its nest. If the hibernation area is outdoors, you can also fill the sleeping house with oat straw (it has no pointed awns) and dry leaves.

6 Hedgehogs in hibernation

After taking the hedgehog to its winter quarters, continue feeding it normally until it no longer touches the food and has retreated to sleep. For some hedgehogs, however, it may not be cold enough to trigger hibernation and they continue to empty their food plate, even if it is really freezing.

Such spiny animals must be deprived of their food completely – after all, they wouldn't find anything to eat

in nature at this time. Just three days of food deprivation are almost always enough – then the hedgehog is asleep! Fresh water must however always be available.

6.1 Monitoring hibernation

When the hedgehog has fallen asleep, fix a sheet of toilet paper with adhesive tape in front of the hole in the sleeping box. This way you can see during the daily check at a glance whether it is sleeping or has woken up and left its cottage at night. If you are worried about your hedgehog, then as an exception, you can reach into the sleeping house and touch the hedgehog: If it lifts the spines in slow motion, it is alive.

6.2 Interruptions to hibernation

The temporary awakening of a hibernating hedgehog is quite normal and occurs more frequently, the closer spring approaches and temperatures rise.

If you notice that the hedgehog has been awake for at least two days in a row, give it its normal, protein-rich food. However, under no circumstances should you take it back into a warm house.

7 After hibernation

From the end of March to the end of April – depending on the start of hibernation and current temperatures – the hedgehogs awaken from hibernation. As they have lost weight, they cannot be released immediately, especially as they would not yet find an optimal food supply in nature. Therefore, feed them until they reach the weight they had before hibernation before releasing them into the wild.

Imprint

© 2016 Verlag Pro Igel e.V., Münster/Westf.
1st edition, revised reprint 03|2022
1st English edition, reprint 03|2022
ISBN 978-3-940377-15-9 (complete set of leaflets)

Photo credits: R. Adam, Dortmund: 6; K. Effenberger, Lugau: 4 li; L. Ernie fotolia.com: 8; etfoto fotolia.com: 1; B. Hofmann, Donauwörth: 5; Chr. Koch, Singen: 4 re; P. Kröhl, Niestetal: 2; R. C. Näger pixelio.de: 3; K. Narten, Hannover: 7 left; G. Zinnecker, Wendelsheim: 7 right

Editor: Ulli Seewald, Münster/Westf.
Translation: Monika Neumeier; Michael J. Sansom
Layout und typesetting: schriftwerk p Pamela Kröhl, Niestetal; SeewaldDesignMST Ulli Seewald, Münster
Print and binding: Häuser KG, Köln
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