

## Beekeeping in Scotland - No 4 - Beekeeping through the Seasons

### Seasons in Beekeeping

Throughout the seasons of the year, different things are happening in the honeybee colony.

#### Winter

Did you know that a honeybee colony hibernates during the winter? Unlike many other related insects - such as wasps - the colony of bees does not die off during winter, but goes to sleep instead, and feeds very slowly off the reserve of pollen and honey which it has stored during the summer and autumn. Do the bees even survive when the hive is covered in snow?

Yes, of course the bees can survive, so long as they still have enough food. The bees form a tight ball or 'cluster', at the centre of which is the queen. The bees consume just enough food to maintain a temperature of approximately 30 degrees Celsius at the centre of the cluster. This is close to the normal temperature of the bees' nest in summer, and as the winter progresses the queen will start to lay eggs in the combs at the centre of the cluster, and the next generation of young workers for the coming season will be raised.



During the middle of winter, no eggs are laid by the queen, and the colony is almost completely dormant. When do you think the queen begins to lay eggs again?

Each of these hives (left) contains a dormant colony of bees, complete with queen and workers. By the end of January, the queen will be laying and young bee larvae will be present.

Many people are surprised to learn that bees both survive during the winter, and are able to produce heat. How do we know that this is happening?

The hive shown right contains a viable colony of bees. They have produced enough heat in the air coming out of the hive to melt the snow immediately in front of the entrance. In this way we can see that the bees are alive, and producing a small amount of heat.



The colony is not completely dormant during winter, as eggs are laid, and food is consumed. How much food do the bees need?

A colony of honeybees overwintering in Scotland will require usually between forty and fifty pounds of honey (that's between twenty and twenty-five Kilos) to survive through the winter, although this amount will vary depending on the harshness and length of the winter, the size of the colony, the location of the colony and so on. If a beekeeper suspects that a colony may be short of food, then a solid food in the form



of sugar candy may be fed to the bees (right).

In the photograph in the left, taken in the month of January, the roof of the hive has been removed exposing the insulation material which covers the frames - in this case, sacking. In the right



photograph the sacking has been rolled back to expose two blocks of sugar candy which have been placed directly on top of the frames of bees. The bees are in fact tunnelling inside the blocks of candy as they consume them - living right inside their supply of food in fact! The newspaper covering on the candy blocks is there because it has been used as a release agent when casting the blocks of candy from boiled sugar.

### Spring

In spring there is an abundance of flowers, rich in pollen and nectar, and the bee colony expands rapidly. The number of young bees increases quickly because of the abundance of food.

Worker bees have special parts of their body for transporting food. Nectar is carried in a part of their stomach. Pollen is carried on their hind legs.



The hive entrance is a bustle of activity of workers arriving with pollen and nectar.

The picture left shows a worker in close-up, with large dollops of pollen sticking to the hind legs. Only the left leg is visible, but both hind legs carry pollen.

As the weather becomes warmer and the flow of nectar into the hive increases, the beekeeper will want to encourage the bees to store some of this nectar as honey which can be harvested for sale. How is this done?

The beekeeper must secure a crop of honey by providing the bees with space in which to put it. Look at the hives in the picture right. They are of different heights, but each has had additional boxes of frames for combs, called a super, added on top of the main one. As more frames of comb are needed for honey, so they are added by the beekeeper.



It is important not to allow the queen into these upper boxes of comb to lay eggs, as this would result in larvae being mixed up in the honey. This is done by inserting a special screen, called a queen excluder, between the bottom box, containing the queen and bee larvae, and the upper boxes, which will contain the honey.



Left - part of a queen excluder. The holes are large enough to allow worker bees to crawl through, carrying their loads of nectar, into the upper boxes. They are too small to allow the queen through, so she remains confined to the bottom box.

## Summer

Summer is the time when the bee colony will often try to split into two. The only way that this can be done is by raising new queens. How are new queens raised?

Queen bees are raised in special cells (right).

These special cells, which hang vertically with the opening at the bottom, each contain one larva which is fed throughout its life on a special rich food, called royal jelly, which is secreted by the worker bees. On this rich diet the larvae grow rapidly and in a little over two weeks after the egg is laid, the young queen emerges from the wax cell.



How long does it take to raise a queen, compared to a worker and a drone?



Queens take 16 days to emerge after the egg is laid. Workers take 21 days, and drones 24. In the photograph left, there are two queen cells on the frame of comb. One of them is still open at the bottom end, and contains a larva. The other, which is sealed, is being removed by the beekeeper. By removing the old queen, and all except one queen cell, the beekeeper is

hoping to prevent the colony from swarming.

When the new queens (several are usually raised at once) emerge into the colony, the worker bees initiate a special type of behaviour called swarming. What happens in a swarm?

When bees swarm, (right) the old queen is chased from the hive along with a large proportion of the worker bees. The cloud of bees settles initially close to its original home, so that the bees have a chance to make sure that they still have a queen with them and that she has not been lost. If all is well, they will fly, often several miles, in search of a site for a new home such as in a hollow tree or dry hole in an earth bank, or even the chimney of a disused building.

The swarm (right) has settled in typical fashion in an apple tree about two metres off the ground, and about 25 metres from the hive from which it emerged. It contains a queen



and about four pounds - several thousand - worker bees. The worker bees are carrying a lot of honey with them, each one with a full stomach. This food will keep them alive until they establish a new home.

During the summer the beekeeper will also have a number of opportunities to harvest honey as well. Honey harvesting is described in the next section, Autumn.

## Autumn

Towards the end of the summer, the mood of the honeybee colony changes. Fewer young bees are produced, as the queen's egg laying becomes much reduced, and instead of being filled with bee larvae, most of the combs are filled instead with stored honey and pollen. It is this ability to stockpile a reserve of food which allows the honeybee colony to survive through the winter.

The beekeeper aims to harvest from the bees as much of this surplus of honey as possible. How is this honey harvested?



The boxes from the top of the hive, containing the frames with only honey in them, are cleared of bees and removed from the hive. It is usual to bring the boxes of frames into a warm room, as the honey is more easily removed if it is not too cold.

Left - a stack of supers full of honey, ready for extracting. A small greenhouse heating cable has been placed below the supers to keep the honey warm.

Although many people are happy to eat honeycomb whole, including the wax, honey is usually offered for sale separated from the wax. How is the honey separated?

The process of extraction - that is, separating the liquid honey from the combs - requires a lot of labour on the part of the beekeeper, as the photographs below illustrate.

First (right) the cappings must be cut carefully from the wax cells of the comb containing the honey. This is done with a sharp knife and a skilled pair of hands!



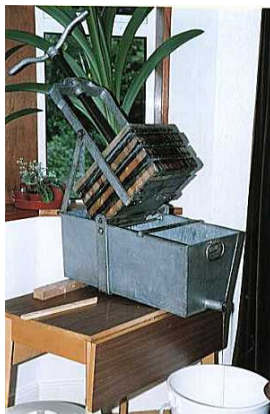
The frames of honey with the cappings removed are then placed in a machine like a spin dryer. The combs are seen in the photograph left, placed vertically in a wire mesh basket inside the drum of the machine. The basket then spins around rapidly on its vertical axis, either turned by hand or by an electric motor. As the combs spin round rapidly, the honey flies out of the open wax cells, strikes the wall of the drum and trickles slowly down to the reservoir at the bottom.



The liquid honey still contains small fragments of wax, which must be filtered out. The honey is therefore allowed to pass from the bottom of the extractor drum via a fine cloth into a second storage container (left). It can then be allowed to run into jars, ready for selling (right).



Can all types of honey be treated in this way?



All honeys are not the same, and the most notable in Scotland is the honey from the Ling Heather (*Calluna vulgaris*). This honey is peculiar in that it sets like jelly, and will not normally separate from the combs by spinning. Instead, it must be separated by squeezing the whole combs in a special press, through a filtration cloth.

Left - the combs of honey have been cut from the wooden frames, wrapped in linen bags, and placed between the slatted boards of the press. The screw of the press is then tightened, and as the pressure is applied to the combs the honey is squeezed out, leaving the sheets of flattened wax combs behind. The honey is allowed to run out into a storage container, from which it is put into jars for sale.

It is possible to render heather honey temporarily liquid by use of mechanical looseners which stir the honey in the cells. This allows it to be spun from the frames in the normal way. It is a process which is not so widely used as the looseners are quite expensive. The method is however widely used in small-scale heather honey production in Norway.

Since so much of the surplus honey, which the bees have gathered for their winter food supply, has been removed by the beekeeper, this must be replaced. What does the beekeeper feed to the bees?



Ordinary white refined cane or beet sugar, made up into a syrup with water, makes a very acceptable substitute for honey as far as the bees are concerned. It contains the essential carbohydrate or sugar which is essential to feed the bees and allow them to keep warm through the winter.

Depending on how much honey the bees have managed to store, the beekeeper will have to feed as much as ten or fifteen pounds of sugar, or more, to each colony (left).



The sugar is dissolved in hot water, and the resulting syrup, once cooled, is run off to be fed to the bees. (Left.)

It is obviously important that the bees receive their food in plenty of time, and in the correct way. How exactly is a colony of bees fed?

The syrup is fed to the bees from a special container, which is placed over a hole in the inner roof or crown-board, which covers the frames of comb and bees. The bees can crawl up into this container from below, and come directly into contact with the syrup without falling into it and drowning. They suck up the food into their stomach, then go below to the wax combs and regurgitate the syrup into the wax cells, just as they do with nectar. Once they have evaporated the excess water from the syrup, it is sealed up by the bees, again just like honey. In this way it will keep through the winter without fermenting.



Right, the disassembled feeder on top of the cover-board, in which the central feed hole is visible. Left, the feeder has been assembled, filled with syrup and placed over the feed hole. All that remains is to replace the roof on the hive.

