

Managing Bees to Maximise Honey Production

All beekeepers like to see their bees healthy and producing lots of lovely honey. But some years we all seem to struggle with getting a good honey crop. The National Bee Unit achieve good success with honey production and they share their secrets with us in this article.

At the National Bee Unit (NBU) we keep 150 colonies in apiaries in and around the Food and Environment Research Agency (Fera) site at Sand Hutton, North Yorkshire. Although our bees are primarily kept for research and training projects they also produce a large honey crop. We harvest between four and five tonnes annually. Typically, each hive produces 40kg, but in 2009, which was a good year, our best performing colony made 120kg and the highest yielding apiary an average of 73kg. There are five golden rules that we stick to, which we believe help us achieve high yields:

- Thorough preparation and planning.
- Good bee stock.
- Careful monitoring.
- Swarm control.
- Correct apiary location.

Preparation

Our top motto is 'be prepared'. Whether you have one colony or one hundred, the better organised you are, the better your chances of achieving maximum yield. Skilled beekeeping and good bee stock are the foundations of successful productivity. Plan your beekeeping year in advance. Get the right equipment. Use the quieter periods such as the winter to get everything ready for the next season. If you are new to beekeeping, start by getting some training and as much advice as possible from experienced beekeepers.

Bee stock

A good honey crop begins with a good queen. We use UK-sourced bees from UK breeders, import some from Europe and also breed queens from our colonies that have been selected for desirable traits. When choosing queens for maximum honey production, it is equally important to consider traits like apparent disease resistance, temperament and swarming tendencies. Strong healthy colonies are more productive. Assessments of colony size and condition provide vital bases for husbandry decisions; choose bees that are docile and easy to handle. We find that younger queens are less prone to swarming and fewer young queens are lost over winter. We requeen our colonies every two years. Keeping thorough apiary and colony records is essential, so that whenever you visit a colony you either already know its history or can easily look up the details.

Monitoring

Bees are particularly vulnerable to starvation when coming out of winter and into the spring; many colonies survive winter but die during March. Colonies that have been stressed by starvation in the spring are smaller, more prone to diseases and infestations, and as a result are much less productive. Throughout the winter NBU colonies are checked for stores and topped up with feed (e.g. Ambrosia, sugar syrup) when necessary. Varroa infestation causes significant colony stress and can lead to collapse. If winter treatment is not carried out and mite populations are allowed to 'tick over' when the bees are clustering, the numbers of mites will increase extremely rapidly as soon as the brood area expands in the colony early in the year. This has a big impact on bees' immune systems and thus their productivity. Rigorous varroa management, not just before the season but throughout the year,



Hives with supers at the National Bee Unit apiary. Courtesy of The Food and Environment Research Agency (Fera), Crown Copyright; images supplied by the National Bee Unit at Fera.

underpins productive healthy colonies and therefore the potential for a good honey crop. In January we treat for varroa using oxalic acid, bought in pre-mixed sugar solution at 4.5%. We trickle 5ml of oxalic acid/sugar solution onto every full seam of bees between the combs, thus ensuring any mites attached to adult bees are knocked down when colonies are broodless.

The spring inspection is particularly important as it enables us to make vital husbandry decisions before any honey flows. Spring checks include clearing out any dead bees and debris from the floors and removing any old dark combs and replacing them with fresh foundation. Dead colonies are immediately sealed, checked for the reason that they succumbed and cleared out so that the remaining healthy colonies will not be allowed to rob out stores from the dead colonies, and pick up hidden pests and diseases and spread them throughout the apiary. At this time our colonies are also inspected for foul brood. Although these specific apiary visits checking for disease are scheduled at least twice each year, we always keep an eye out for any signs of foul brood. In this way, we ensure that colonies are as healthy and disease free as possible, minimising the possibility of stresses on the bees that will impact on their productivity during the coming season.

Swarm control

If bees are allowed to freely swarm, the colony will be unable to produce high yield. We visit each colony every eight to ten days, adding supers for space where needed. The trick is to make sure that the bees always have enough room well in advance of any congestion of the nest. Bear in mind that when you remove full supers from a colony, bees will quickly run out of space, triggering swarming behaviour. It is therefore really important to have enough boxes and frames with foundation ready to put onto the colonies. If you are thinking of just starting out as a beekeeper, or increasing the size of your apiary, the logistics of rapid turn around of your the boxes during a honey flow, and storage space for sufficient spare supers have to be considered.

Location

Finally, remember the estate agents' saying: 'location, location, location'. Our most productive apiaries are those which are set up where the bees have access to the right kinds of varied forage. To get the best honey yields, bees need season-long access to a succession of different flowers. It is a good idea to find out which crops and wild flowers are in your beekeeping area and to learn their flowering cycles. Early in the year, on the warmer days, we can see the NBU bees foraging for pollen on hazel and willow. Depending on the weather, this can be as early as February through to March (first pollen-gatherer this year was seen on 5 January 2011). By April the bees are foraging on dandelion. There is plenty of blackthorn, while May brings the hawthorn flowers into the hedgerows. The majority of our honey crop, however, comes from locally abundant oil seed rape (OSR), which first flowers as early as



Honey bee foraging on willow. Courtesy of The Food and Environment Research Agency (Fera), Crown Copyright; images supplied by the National Bee Unit at Fera.



Oil seed rape field — a good source of forage for bees. Courtesy of The Food and Environment Research Agency (Fera), Crown Copyright; images supplied by the National Bee Unit at Fera.

April/May, and continues throughout most if not all of June. Through the summer months a bean crop is occasionally grown on some nearby farms, providing forage for the bees even after OSR has finished. Our bees are also able to use many wild flowers from the surrounding villages and woodlands. A small proportion of our honey comes from clover and lime, flowering from July to August, while some of our apiaries benefit from the invasive introduced species Himalayan balsam (August/September). After we have removed and extracted the bulk of the season's honey, the bees can still be seen foraging on ivy flowering well into October.

Further information

For guidelines on varroa treatments, importing queens and general advice on bee health, please visit the BeeBase website at: www.nationalbeeunit.com where you can also register as a beekeeper.

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Pheromones — Part 6

This time I thought we could discuss a primer pheromone. Primer pheromones change the physiology of the bees rather than inducing an action; they are normally less volatile than other pheromones and might need to be absorbed into the body to work.

It is commonly known that in a honey bee colony there is a balance between the number of workers that forage and the number that look after the nest (known as house bees). But how is this balance maintained? If we do an artificial swarm using techniques where the flying bees are split from the house bees, such as Pagden and Snelgrove (see page 7), then we encourage the adult (foraging bees) to remain with the queen and the house bees to remain with the brood thus creating two unbalanced colonies. In these circumstances the colonies seem to balance themselves out pretty quickly and soon both have house bees and foragers in the right proportion.

Gene Robinson, in 1992, looked at this phenomenon and found that it seemed to relate to a hormone that differentiates a queen from a worker, known as juvenile hormone. He noted that older workers had high levels of juvenile hormone in their bodies whereas young workers had low levels. When he removed the older workers from the

colony he found the level of juvenile hormone in the young workers increased rapidly and they then started to exhibit traits associated with older, foraging workers. It is clear that there is a control on the aging of house bees by the foragers, but it is never as simple as just one control element. The process also is moderated by the presence of brood that requires feeding and the presence of the queen. Having looked at the literature I have been unable to identify the precise pheromone that exercises the control on the young house bees but it is clear that the older foragers are influencing development of the young ones.

This explains why, whatever the total size of a colony, it is able to adapt to the amount of forage available at any time of the year and ensure there are always sufficient foragers to collect nectar and pollen and sufficient house bees to use the income to care for and develop the brood. The only time this process does not seem to fit is in winter when there is no forage. In this case the balance is not required and, in extreme weather there will be neither forage nor brood to care for.

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