A Year in the Life of the National Bee Unit's Apiaries: Part 1

Damian Cierniak, Jack Wilford, Ben Jones, Selwyn Wilkins, Gay Marris and Mike Brown

We are given an insight into the apiary work at the NBU

THE NATIONAL Bee Unit (NBU), located in Sand Hutton, North Yorkshire, delivers the Bee Health Programmes on behalf of the Department for Environment Food and Rural Affairs (Defra) and the Welsh Assembly Government (WAG) in England and Wales. In brief, our objectives are the control of serious endemic pests and diseases, the provision of advice to beekeepers on the recognition and control of pests and diseases and the minimisation of the risk of importation of exotic pests and diseases.

The NBU runs about 150 colonies of honey bees in nine different apiaries in and around Ryedale, within a few miles of Sand Hutton. These are used for a wide variety of purposes, including research, commercial work (development of Veterinary Medicines and Ecotoxicology work) and training for Bee Inspectors and beekeepers. More details of these projects can be found on our website (www.nationalbeeunit.com) and you may also have read about some of our work in the December 2009 issue of *Bee Craft*, page 4.

This and the next article describe the beekeeping year of 2009, a typical 12 months in the life of the NBU's apiaries.

Although our colonies are very productive, this is not their primary function; first and foremost they are a vital educational and research resource and without them we would not be able to fulfil many of our annual objectives. The apiaries are closely integrated with our research, diagnostic and training programmes.

All aspects of apiary management are overseen by the Commercial and Diagnostics Manager, Selwyn Wilkins, who has over 20 years of beekeeping experience. However, many of our technical staff at York are also very experienced beekeepers. Apiary manager, Damian Cierniak, who has kept bees in his homeland of Poland for 20 years, is responsible for the day-to-day management with help from Jack Wilford. Diagnostics Laboratory Manager, Ben Jones, liaises with the Research Co-ordinator to ensure that samples required for research and development or commercial work are processed appropriately. Mike Brown, who is the head of the NBU, has nearly 30 years of beekeeping experience including professional beekeeping in France, the USA and North Africa.

Our Hives

We keep our bees in double-brood Smith hives, chosen because these support the large colonies that we need to manage the work. They are easy to split into two, for example, to supply sufficient bees for the NBU's demanding research and development programme. We keep comprehensive records at all times, since they are essential for apiary management. Each apiary visit is carefully recorded so that we have a complete history of every colony's condition, including checking the varroa status at every visit, queen origin and performance throughout the year. Although apiaries require less attention in the winter, in fact beekeeping is a whole-year-round livestock management activity. The beekeeping year traditionally begins in the autumn, when you need to get your colonies ready for the winter. Every beekeeper knows the importance of ensuring their colonies have adequate stores (we leave 20–25 kg on each hive), young queens, a large, young, fit worker population and so forth. For the purposes of this article we've started in March. Bear in mind, however, that our bees have already been regularly inspected before March.

National Bee Unit

Colony health assessments in 2009

THE EARLY PART OF THE YEAR March/April 2009

Full Spring Checks

As spring approaches, one of our first jobs is to carry out comprehensive spring checks and inspect all of our colonies. We complete a systematic examination of each hive, removing any dead bees and debris from hive floors and colony entrances. To reduce potential pathogen load on the combs, we have a policy of replacing any old 'dark' combs (that were moved to the outside of the brood nest during the previous season) with combs of fresh foundation.

We also carry out the year's first thorough 'colony assessments'. From this point on, full assessments are done once a month throughout the season to monitor trends in colony health and productivity and to help us detect shifts in the condition of the colonies as soon as they arise. Assessments involve recording a variety of information about colony condition, including the number of full seams of bees, frames of brood and frames of honey

Tubes of bees collected for molecular analyses

and pollen stores, as well as assessing the general health of the colony. We always monitor for varroa and will note down any signs of varroa damage; we check the brood pattern, whether the colony is queenright, that there is available space in the hive and if there are any abnormalities that are likely to impact on the vitality of the colony in the coming months.

In addition to the general colony assessments, at the start (and end) of every season, we perform dedicated foul brood inspections of our colonies, together with independent mid-season checks by one of the local NBU inspectors. But, of course, at each visit we still check the brood for any signs of abnormality. The trick is to know what is normal, which means that you can then detect anything untoward immediately, eg, the one cell that looks out of place.

At this time of year, our colonies are also checked for food stores and during the spring they may be fed to encourage brood rearing. If upon inspection we find that there is less than 5 kg of food stored inside the colony, we either provide fondant, supers of honey from the previous summer, Ambrosia or sugar syrup 1:1 (sugar:water), fed using Ashforth tray feeders. We make sure the bees have at least two full deep frames of honey stores at all times.

In 2009, the feeding regime was Ambrosia, delivered in a volume of 10 litres per colony. As the colonies began to build up, we then swapped the top brood box with an empty bottom brood box containing foundation, to provide more space in which the queen could lay and for the bees to draw out a full set of new combs.

So, at the start of the active beekeeping season in 2009, having completed the spring checks, we had lost just five colonies over the winter, in all cases due to failing queens that were poorly mated from 2008. We were pleased to find that all our remaining colonies were in good condition and free of any problems. This is the sort of level of over-wintering loss we always aim for; we do not like to see anything higher than this.

Dealing with Dead Outs

No dead colonies are ever left in an apiary. Dead colonies are not just dealt with in the spring but whenever they are found throughout the year. They are immediately sealed and brought back to the apiary maintenance facility and dealt with straight away, to minimise any risk of spread of pests and diseases. With any dead colonies found, our standard procedure is to check whether all the combs are worth keeping or not. With a low risk of disease spread, freezing does the trick before they go back into the system. With others we chop out the wax and dispose of the comb, boil the frames and scorch all the boxes with a blow torch before re-using any equipment.

All equipment that is going to be retained from the field is stored in a freezer at –20 °C for at least 48 hours before going back into the apiary store. This helps us to control wax moth by killing any eggs and larvae in the boxes and frames. Even though our bee-proof comb storage area is cold, it is sometimes not enough to stop wax moth unless we take this step.

Supporting the Research Programme

The NBU has various ongoing Research and Development (R&D) projects that require bees. For example, there is one looking at the long-term impacts of the microsporidian pathogens, *Nosema* spp. To support this, we maintain an apiary that is never treated for Nosemosis. One of the jobs for the team in March 2009 was to collect samples of adult bees from these colonies for screening for the presence of *Nosema apis* and *Nosema ceranae*. We did this by shaking combs of bees into the hive roof and then collecting them up, in groups of around 60 workers at a time, into sample tubes, ready for analysis in Fera's Molecular Technology Unit. This Fera team provides key support to our R&D programme.

Supporting the Training Programme

In April, the NBU at York hosted a Contingency Planning Exercise for the North East and Eastern Regions of our Appointed Inspectorate. Fifteen Inspectors took part and used the NBU home apiary for practical and training aspects on the day and meeting rooms on site to set up the local 'Coordination Centre'. These exercises are run regularly across all the regions and also involve local beekeepers. It is very important to be able to practise and demonstrate the inspection techniques that must be put in place to search colonies for exotic threats such as the small hive beetle and Tropilaelaps mites.

Collecting honey samples for residues analysis

Grafting larvae from a brood comb into plastic queen cell cups

(far right) Finished queen cells

THE MAIN BEEKEEPING SEASON May/June/July 2009

Re-queening

It is our long experience that younger queens perform better and are comparatively less prone to swarming. We re-queen our colonies frequently, at least once every two years, and have a programme of both buying-in replacement queens and rearing them ourselves. Each queen is marked and numbered. May is a good time to start queen-rearing as it is at this time of year that the bees will start to produce large numbers of drones, plus the colonies will be populous in worker bees that are required to feed and raise the new queens. We use a queen rearing method brought to the NBU by Mike Brown from his experiences in France and the USA.

Last year, we reared 120 queens from what we call our 'breeder colonies'. These are colonies that, according to our own records, have the desirable characteristics of (first and foremost) docile bees, apparent disease and pest tolerance, and productivity. We have used a wide variety of bees but they are mostly Buckfast or Carniolan type as these suit our needs.

We graft one-day-old larvae into plastic cell cups (JZBZ queen cups), which are then transferred to a strong, well-fed cell-raiser colony that has adequate stores of pollen and young bees. Ten days after grafting, the ripe queen cells are usually transferred into Apidea mating nuclei, but we also use five-frame nuclei. Apideas are small, purpose-built, three-framed mini hives in which new queens hatch out and from which they fly on their mating flights. They are easy to manage and a nice size, making it easy to find the queen when you need to use her.

We check the Apideas 10–14 days later, looking for successfully mated queens, ie, those laying eggs and showing a good brood pattern. We can use them for re-queening or increasing the numbers of colonies we run. We were really pleased to find that during the 2009 season we had a 78% graft acceptance rate and that 81% of the resulting queens were mated. Again, these are the kinds of figures that we always aim for and regularly achieve.

In addition to the Apidea-mated queens, we reared 30 artificially inseminated (AI) queens. AI is a technique we can use in our R&D programme as well, for example when we want to study particular lines of bees. In 2009, our queen-rearing programme carried on throughout the season, so we were able to continue to introduce new queens right up until September. We hope to be just as successful in 2010.

Increasing Colony Numbers

In Yorkshire, May is often the beginning of the swarming season although, of course, it can happen earlier if the conditions are right. In this month, we take the opportunity to increase our colony numbers. This serves several purposes:

- we can produce the colonies we need for studies or for replacements quickly
- it helps with swarm control
- it uses the queens we have bought in or purposefully reared (as described above).

To make up five-frame nuclei, we take brood and frames of honey stores from selected healthy colonies. The composition of the nucleus is usually two frames of sealed brood, one frame of pollen, two frames of stores and plenty of bees. In 2009, the combs removed from the full-size donor colonies were replaced with frames of fresh foundation and empty supers were added to give the bees plenty of space in the colony, as required. The queen is introduced to the colony in a queen cage, placed between the brood frames.

Alternatively, the old queen is taken from the original colony and transferred to the nucleus and moved to a different apiary site, while we introduce a new queen into the original colony. We will also put queen cells directly into five-frame nucleus colonies instead of queens. ◈

[To be continued.]

Making up nucleus colonies in 2009