

SMALL SCALE QUEEN REARING

Many quite experienced beekeepers shy away from rearing their own queens. I am sure some of this lack of confidence stems from the complicated methods recommended by books and lecturers on the subject. Now, anyone who has kept bees for a couple of years or so should have noticed that bees are very good at producing queen cells, indeed most of their beekeeping efforts will have been spent trying to frustrate the bees in this activity. All one has to do to raise good queens is to harness this natural behaviour of the bees. Having over the years tried many of the complicated methods, I now use simple methods that any competent beekeeper could also use with success. The methods I describe here are suitable for producing queens in batches of 3 to 30 without unduly messing the bees about or interfering with honey production.

Method 1 - Using natural queen cells in a swarmed or swarming colony

A swarmed colony is used, or otherwise an artificial swarm is made from a hive that is preparing to swarm. In early evening the swarm is hived on its original stand. The combs from the original hive are split up and placed in nucleus boxes, each receiving a comb with a queen cell and at least two other combs of brood and food. The same arrangement takes place in making an artificial swarm. It might be necessary to put a framed wire queen excluder underneath the brood box for two or three days to prevent the swarm absconding, making sure there is an adequate ventilation space beneath the excluder. I am assuming the reader will know how to hive a swarm or make an artificial swarm. The disadvantage of this method is that it might select for swarmy bees. However some bees are less inclined to swarm than others, and it is from these (other things being equal) that one should endeavour to utilise as many queen cells as possible.

Method 2 – Giving grafted larvae to a swarmed or swarming colony

The method of raising queens that I now use is as follows:

1. A swarm or artificial swarm is hived on its original stand.
2. The box with combs of brood is placed on top of the hive over a division board (a clearer board with the openings blanked off). I then shake the bees from the combs to enable me to destroy all sealed queen cells. I leave the unsealed queen cells to reduce the number of panic cells the bees might otherwise start. I give an entrance hole to this cell raising box which faces to the rear for two or three days before being turned round to the front.
3. 8 days later I shake the bees off the combs again and destroy all queen cells, looking particularly for any small emergency queen cells that may have been built on the face of the brood. I leave a space for a frame with grafts in the middle of the box. This will fill with clustering nurse bees since the unit will by now be well stocked with recently emerged nurse bees. It is assumed that this box is well provided with food, otherwise feed sugar syrup.
4. 1 hour later I give 12 larvae grafted into plastic cell cups.
5. Next day I check for acceptance of the grafted larvae, usually between 6 and 10 which should produce queens of excellent quality. I work to my own rule of thumb

which is that the nurse bees on one well stocked and provided brood comb are capable of producing one good queen cell.

6. When the queen cells are sealed, nuclei are made up and each one given a queen cell. This should be done on the day the cells are sealed or otherwise one or two days before the queens are due to hatch. If, alternatively, the queen cells are put into an incubator the day they are sealed, or minus one or two days before they are due to hatch, the cell raising unit is re-united to the main unit over newspaper. Three or four days later this box is put back onto the floorboard restoring the colony back to normal. If this latter is to be done I give the swarm at the beginning of the exercise a shallow box of foundation, so that when re-unification takes place there is only one brood box in the hive.
7. If 3 comb nucs are made, move the nucs to their new stands. The flying bees will return to strengthen the swarm, so make sure there are enough bees in each nuc to keep the brood and the queen cell warm.

Method 3 – Using a queenright hive not preparing to swarm

This is also described in “Breeding Better Bees” (Dews and Milner, BIBBA). It works on the following principles:

1. Queenless bees will start making queen cells.
2. A queenright colony will continue to nurture started cells if they are kept separated from the queen.
3. The colony should not be making preparations to swarm.
4. A queen can be removed from her hive and returned 24 hours later without being harmed by the bees – no failure so far.

Day 1. The comb on which the queen is found, complete with queen and bees, is transferred into a nucleus box and placed between two dummy frames. This hive has a reduced entrance to help prevent robbing. The gap left in the cell raising colony is positioned between two combs of unsealed brood. One hour later this gap will be filled with clustering nurse bees, at which time it is given larvae from the desired breeder queen which have been grafted into plastic cell cups mounted on a wood bar which is then fixed with frame wire to the bottom edge of a shallow comb. This is placed in the gap.

Day 2. If using a single brood chamber, twenty four hours after the queen was removed, a cage made of queen excluder is fitted over the started queen cells. The queen and her comb of bees are then returned to the colony. Alternatively, the started queen cells can be placed over a queen excluder in the middle of a brood chamber fitted with a comb of unsealed brood on either side with a comb of pollen placed outside the brood combs. The rest of this box is filled with drawn comb or wide dummy frames.

*Day 6. The queen cells are sealed and put in an incubator or -

*Day 8. Make up sufficient 3 comb nuclei to take the sealed queen cells.

*Day 11. Introduce the sealed queen cells into the mating nuclei in aluminium foil protectors, which have a hole at the tip to allow the queen to emerge.

*Day 13. The queens hatch.

Day 34. Examine the nuclei for the presence of a mated queen.

*These timings may vary by 1 day, depending on the age of the larvae when grafted.

Grafting

This is the part of queen rearing most feared by the uninitiated. With the right equipment and good teaching (or so I'm told!) my bee breeding colleague learned the technique in 5 minutes. Further practise speeded up performance. There are three essentials – very good eyesight or a suitable magnifier, a good light source and a good grafting tool. It is sometimes said that if you can see a larva with the naked eye – then it is too big! An exaggeration, but it makes the point that the 6 to 18 hour old larvae are very small. As a spectacle wearer I find the X3 clip on magnifiers (from Radio Times pull out advert booklets or the internet) work for me. There are many sources of cool light these days. I use a small Maglite flashlamp. The light can be focussed down to a fine point – ideal for seeing into dark cells on old comb. New comb is preferable, but not always available from the chosen graft colony. I also have a cluster of small LED lights mounted on a headband, the ideal solution one might think, but the colour of the light makes it very difficult to see a larva floating on its bed of royal jelly. There are several fads and fancies promoted about grafting. Should the cell cups be acclimatised by the bees before using? Should the grafted larva be placed on a bed of royal jelly, be double grafted onto royal jelly, onto a small drop of water or dry grafted? Having tried the other methods, I now dry graft into new cells straight from the packet with equal success.

Equipment for grafting

Grafting tools - I have tried some of the grafting tools on sale in this country but find the tips too big to handle really small larvae. The tip needs to be very fine and properly shaped with a 30 degree bend about 20mm from the tip. There is one with a lens attached which looks a good idea, but it doesn't work for me. The Swiss grafting tool, whilst expensive at 34.40 Euro plus postage, is generally reckoned to be the best and can be bought in two versions for left or right handed use. However, some people manage with a match stick sharpened to a fine point, a very fine artists paint brush or a bit of goose quill

Cell cups

Unless you like playing with molten wax and are prepared to risk an outbreak of domestic strife, don't waste time and effort making wax cell cups. The plastic cups I describe here are scientifically designed to be the optimum shape and size, they are inexpensive and effective.

JZsBZs - these have stems that fit into 4 mm holes drilled into a wooden bar. I use these when producing ripe queen cells to go straight into a nucleus hive.

Cupkit System – this is a complete system comprising attachment to a wooden bar, cup holder, cup and queen cage. I use these when producing queen cells to be hatched prior to the introduction of the virgins into mininucs. There is also a unit where the queen can be caged to lay eggs directly in the queen cups. I have tried to use one of these on two occasions, but the queen failed to lay both times. The fault is probably mine.

Jenter system – The queen is placed in a unit with plastic cells. Every third cell on every third row has a plug fitted into the base of the cell producing potentially 90 ready grafted larvae of precisely the right age. I have used this with success on many occasions, but now find it is less trouble to graft for the small batches I normally need. Queen caging is not as convenient as the Cupkit system.

Incubators

These are by no means essential. I, however find one advantageous. The problem I had with storing sealed queen cells in hives was that if the weather turned cold the cells were neglected by the bees and got chilled or torn down. In a good nectar flow the cells became encased in wild honey comb. This did not harm the young queens, but created an awfully sticky mess when the wild comb was cut away. I therefore many years ago made an incubator from a well insulated (home made) honey tin warmer, a small tubular heater, thermostat and continuous running fan. Last year my colleague bought the previous model of the Brinsea Octagon 20

ECO. This is currently listed at £129 on the website. There are two wells in the base for water. The humidity can be increased by draping a small piece of towel or greenhouse capillary matting between the two wells. If the humidity is too high the candy in the queen cages softens too much and covers the queens in a sticky mess, if it is too low the pupae become desiccated and die. An early problem we had with mature queens dead in cell in the Octagon 20 has been partially resolved by reducing the temperature slightly. In "Pedigree Bee Breeding in Western Europe" Frau Englert recommends a temperature of 32 - 35C for queen cells and a relative humidity of 65 – 85%. Ruttner recommends a reduction to 32C when the queens emerge.

Mininucs

If a dozen or more queens are to be raised it is worth considering using mininucs. These only require a good cupful (300ml) of young nurse bees thereby not reducing unduly the strength of provider colonies. Over the past 30 years I have designed, made and used successfully, about half a dozen different kinds. I now find it less trouble to use one of the commercially available types, the Apidea or the Warnholz. Of these I prefer the Warnholz. They cost less, and are roomier making it easier to catch queens. They can be extended by using "supers" (obtainable from the manufacturers in Germany). I have brought queens safely through winter in these double units, but I cannot claim 100% success.

Nucleus hive entrances

These are invariably placed at the bottom of the hive, leaving it very exposed to robbing if the weather turns cool when the bees will cluster on the brood higher up the hive. I find that a 15mm entrance hole bored as high up the hive front as possible, but still visible beneath the level of the roof, is always protected by a small number of bees. The bottom entrance is closed.

Making up a drone free nucleus hive to be taken to another apiary

Combs for making up nuclei are selected from a hive (BC1). All the bees are shaken into BC1. All drone cells on the combs are destroyed and the combs put into another brood chamber (BC2). The process is repeated until sufficient combs have been treated in this way. We now have BC1 with the queen and all the bees, and BC2 which has the combs for the nuclei but no bees or drone brood. The space in BC1 is filled with drawn combs or foundation. Dummy frames are used to fill any space remaining in BC2. A queen excluder is put on BC1 and BC2 placed above this. The next day the combs in BC2 should be covered with nurse bees. These combs and bees can now be put into the nucleus hives together with a ripe queen cell and taken to the queen mating apiary.

Further reading

There is only one book I can recommend for further reading. This is "Queen Rearing" published by Apimondia and edited by Professor Friedrich Ruttner, who also contributes some of the chapters. The other chapters are all written by scientists of international repute. This fully comprehensive book is based on scientific studies and dispels some of the myths, fads and fancies that have grown around the subject. Sadly, the book is out of print and so far as I can ascertain, likely to remain so for the foreseeable future. It can sometimes be found at second hand bookshops. I managed to track down two copies for friends last year. There ought to be a copy in a library somewhere.

Equipment

Jenter set. JZs BZs cell cups - D. Fretwell 01335 370567

Jenter Kit - www.thorne.co.uk

Cupkit System – www.thorne.co.uk

Swiss Grafting Tool – professional No. 112102 - www.swienty.com/shop/search.asp

Grafting Tool – professional left hand No. 112103 - www.swienty.com/shop/search.asp

Incubator - www.brinsea.co.uk/products/octagon-20-eco/361/

Warnholz mininucs - www.thorne.co.uk or

www.bienen-voigt.de/index.php?page=product&info=430

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