National Bee Unit

FAQ 14

The Food and Environment Research Agency

Using Drone Brood as a Varroa Control

Current scientific data indicates that the removal of drone brood, when performed correctly can slow mite population growth, in a bee colony, by about 50%. Though its use alone will not prevent a bee colony being overwhelmed, it is an important tool within an integrated approach to varroa control. With the advent of varroa resistant to pyrethroid treatments, such as Bayvarol® and Apistan®, the removal of sacrificial drone brood can enable other less effective controls to reduce infestation to a safe level.

How does it work?

Varroa mites reproduce within sealed bee brood. A hormone in bee larval food, which is more prevalent in drone brood, triggers this. As a result mites have a preference to enter drone brood in order to reproduce. One mature mite entering a drone cell of *Apis mellifera* will emerge together with the imago drone and five daughters having an average survival rate of 83%. Mites entering worker brood cells will emerge with three daughters having a survival rate of 46%. Female mites have the ability to reproduce up to three times so the potential for large-scale increase of mites breeding in drone cells is clear.

When infesting its natural host, *Apis cerana,* reproduction is only possible in drone brood, which coupled with other factors enables a symbiotic relationship with that host.

Varroa mites have a preference to be near the centre of the brood nest. If an area can be given to drone brood it can be a bait trap for varroa. As bee larvae mature mites enter the cells to reproduce just prior to the cells being capped. When the comb is sealed it can be cut out or removed taking with it any mites that are present. However if these combs are left to hatch then an increase in varroa populations levels will result.

It can only be used in colonies rearing drones. Small colonies will not be suitable, as they have no interest in developing drones. In the United Kingdom it can effectively be used between April and July. If mite populations are at a level where control will not be required, see the NBU/Defra leaflet *'Managing Varroa'*, then drone brood removal should be delayed.

How effective is it?

Research indicates that when performed correctly, i.e. combs have not been left to hatch, it can reduce mite population growth by 50%. Swiss beekeepers report finding it very effective when colony mite populations are below 700. With higher mite levels it will have little or no impact on the mite population.

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Why should it be considered for use in conjunction with other controls?

To be effective as a 'once a year' control an efficacy in excess of about 96% is required. Many controls such as formic or lactic acid will give a maximum efficacy of about 80%. This means that at some point in the current, or a future season, another control will have to be used. To illustrate the point, consider an average colony having a mite population of 800 in early August. At this level the colony is not at immediate risk but some control is required. If we remove 80% of the mites this leaves 160 mites which may increase to a level to put the colony into an 'at risk' situation early in the following season. If drone brood removal had been carried out in the colony then the population would have been halved to about 400. If we remove 80% this leaves a mite population of 80 which, unless there is invasion from another source, will leave the colony safe for the following season.

If it is intended to use 'Apiguard®', after removal of the honey crop, drone brood removal can enable this product to be a very effective control measure. Please see '*Fact Sheet 13 – Apiguard®'*.

How is it performed?

There are three simple ways of performing this procedure.

a) Full Brood Comb.
   A brood comb is fitted with drone brood foundation and placed adjacent to the brood nest. The bees will draw out the foundation, the queen will lay eggs into the comb and when it has been capped over the frame can be removed. The comb can then be cut out and destroyed. If a narrow strip of the comb midrib is left at the top of the frame, similar to a foundation starter strip, the frame can be returned to the colony for re-use.
b) Shallow Comb.
   If a shallow 'super' frame of worker comb is placed between two fully drawn brood comb frames, the bees will draw out comb below the bottom bars. During the drone season this will invariably be drone comb. When sealed over it is simple to cut off using the hive tool or a knife. The frame can then be re inserted for another cycle.
c) Cartridge.
   This is a refinement of b). A small frame is made up which clips or is held by two pins to the base of the shallow frame. When the time comes for removal it is removed and a replacement cartridge fitted.

Systems b) & c) are probably more effective as these combs can be placed near the centre of the brood nest where most mites will congregate. If a full frame is placed in the centre it will create an undesirable break in the brood nest.

The equivalent of three to four full brood frames of sealed drone brood needs to be removed for maximum effect.

What else do I need to be aware of?

Do not leave bait drone combs in the hive longer than 23 days. Drones may start hatching on day 24, which could lead to an increased mite population. If you carry out swarm management on a nine-day rota then removal on day 18 fits in well with five 'safety' days to spare. With system b) & c) it can be effective if two frames are used on an alternate removal period of 9 days.

At the end of the season, sometimes earlier, bees will build worker comb rather than drone in the traps. You will not wish to destroy this brood so move the frame to one side of the brood nest. When hatched and as the brood nest reduces in size the frame can be moved to the end of the chamber for subsequent replacement.

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