Keeping Bees on a Brood and a Half

(by Wally Shaw Anglesey BKA)

Introduction

In a previous article in Welsh Beekeeper (No. 170 Autumn 2010) I described the various options for accommodating the brood area (the part of the hive beneath the queen excluder) using the box sizes available for the Modified National hive. The pros and cons of using a single deep box, double deep boxes, a single extra deep box and a combination of one deep and one shallow box (or brood and a half) were discussed. In the last paragraph I admitted that we kept most of our hives on a brood and a half and promised to write a follow-up article to describe how they were managed round the year using this configuration.

In the first article the main advantages of using a brood and a half were summarised as follows:-

1) Most colonies have the potential to use more brood space than is provided by a single deep box with a relative comb area (RCA) of 1.0, as compared with 1.6 for brood and a half. Two deep boxes (RCA=2.0) provides too much space for most colonies and an extra deep box (12x14), with a RCA of 1.46, is about the right size but the single box limits management options.
2) The taller winter hive configuration provided by brood and a half (also two deep boxes or an extra deep box) is better for over-wintering, enabling the bees to work their way up through their stores. If height is available in the hive, bees will always arrange their stores vertically, leaving the lateral combs until last or even leaving them empty if there is no nectar flow or the beekeeper is less than generous over feeding. This is their natural behaviour and bees have evolved to do what is best for their survival, so when we force them to do something different it is often to their disadvantage (and ours).
3) Height also enables the bees to form a cluster that has a smaller cross-sectional area (for the same number of bees) in relation to convective air currents and this gives better heat conservation.

To reinforce what was said in the previous article about the height of natural nesting sites - and the example given was a local tree where the bees occupied a cavity that was 1.8m tall - Thomas Seeley's new book (Honeybee Democracy) provides further fascinating information on the size and shape of tree cavity nest sites. In Chapter 3 (Dream home for Honeybees) an investigation of 21 tree nest sites found they had an average cavity diameter of only about 20cm (less than ¼ of the cross-sectional area of a National hive) but that the cavities were tall, with an average height of 1.5m (equivalent to the height of 6½ Modified National deep boxes). The average volume of the nest sites was about 45L (a deep National is about 40L). Most tree cavities consist of long thin seams of rot which, until man came on the scene with his buildings, must have provided the majority of nest sites for honey-bees. So it is hardly surprising that this is the shape to which they are best adapted. This not to say that bees are unable to establish nests in cavities with quite different shapes (they may have no choice) but the question remains how successful are they in the long-term? I know of no studies that shed any light on this matter.

Amongst those who keep the Northern Dark bee (***Apis mellifera mellifera***) there are many advocates of the single deep box, not the least of them being Beowolf Cooper (founder of BIBBA). He claimed that a colony that could not be `compressed` into a single deep box was not the right sort of bee in the first place. Personally, I do not have the experience (I have not tried to compress colonies) to comment one way or the other on this view. All I know is that the type of locally adapted (near) dark bee that we keep is quite capable of producing a brood nest larger than that that can be accommodated in a single deep box and, as more bees means more honey, I tend to favour that argument. However, for people who do keep bees in a single deep box and find this satisfactory, there is nothing to stop them adding height to the hive for over-wintering (a shallow box with no queen excluder). This is just a suggestion that might have some advantage for the bees.

Management of Brood and a Half over the Year

August-September – When the honey crop has been taken, if the half-brood (shallow box) is at the bottom of the hive (and about 8 times out of 10 it is), it is moved to the top. It is then a question of what to do first; feeding or Varroa control? If the colony is short of food (ie. there is not sufficient for at least the next month, - allowing a safety margin for adverse weather) then feeding must be the priority, followed immediately by Varroa control. This initial feeding aims to provide the colony with at least 30lbs (14kg) which may need to be topped-up later to give at least 40lbs (18kg) for the winter.

If the shallow brood has been at the bottom during the summer it is usually more or less devoid of stores when it is moved to the top. For some reason the bees always seem to concentrate on storing honey in the deep box. This has the advantage that the deep box will contain most of the honey and the half brood will contain mostly syrup.

September to April (over winter) – The half brood remains on top (queen excluder should be removed) all winter and by January-February the bees will be clustered high in the hive adjacent to what remains of their stores. Some colonies will start to raise brood exclusively in the half brood, others will bridge the gap between the two boxes and some will start rearing the new season bees in the deep box. This behaviour is quite variable depending on such factors as the size of the colony, the disposition of the stores but also on the individual character of the colony. The use of an open-mesh floor with no tray in place encourages the bees to cluster higher in the hive and start to raise brood higher.

May-June – This is when the real management advantages of the brood and a half system can be realised. A queen excluder and the first super may already have been added in April but in some areas and some seasons this may not happen until May. As the first nectar starts to be stored (as opposed to being used for the immediate needs of the colony) now is the time for the beekeeper to assess the position of the brood nest. If the nest is located high in the hive so that there is brood up to the queen excluder over most of its area (say 60% plus) and little nectar is being stored in the half-brood, then all is well. The brood nest will extend downwards into the deep box and the queen will have plenty of space to lay in both boxes. If this condition prevails, no action is required - at

least for the moment. If it persists and the brood nest continues to occupy most of the half-brood – and in some hives it does – no action may be required all season.

At the other extreme the brood nest may be almost entirely in the deep box and the bees will have started to store substantial amounts of nectar in the half-brood. Once the nectar has been converted to honey and the cells have been capped this laying space will be effectively lost for the rest of the season and the half-brood will have become little more than a super. The bees regard this honey in the half-brood as the start of a close-to-hand, strategic food reserve and will not touch it unless they are starving. The `honey ceiling` in the half-brood will not be uncapped even to make the cells available to the queen. This situation needs some immediate action or the queen will find herself short of space in which to lay. At best this will limit colony size and at worst it will encourage swarming. There are two management options open to the beekeeper:-

1) The boxes can be swapped and the half-brood put to the bottom of the hive. This immediately re-locates the brood nest in the deep box next to the queen excluder - where the beekeeper wants it to be. The honey and nectar in the half-brood will now be stored under the main brood nest and the bees will not regard that as the proper place at all. The only time bees store nectar under the brood nest is during a heavy flow; it may be off-loaded there during the day but is usually moved higher up the hive (into the supers) at night. This is how the bees will regard the honey and nectar that you have placed in, what to them, is a temporary storage location and their reaction will be to remove it and re-store it in the supers. Capped honey will take longer than uncapped and, to speed the process, the cappings can be scratched with an uncapping fork. If there is a nectar flow at the time you swap the boxes, removal of honey from the half-brood may be delayed until the colony have some down-time. When the stores have been removed from the half-brood it will become available for the queen to lay.

2) Option 1) is not such a good idea if the half-brood contains a substantial quantity of capped and uncapped stores – say more than 15-20lbs – mainly because it is so much work for the bees. So option 2) is to place the existing half brood above the queen excluder and introduce a new (empty) half-brood at the bottom of the hive. Any brood in the half-brood will emerge and the box of combs will simply become a honey super. The only precautionary measure that needs to be taken is that as much drone brood as possible in the old half-brood should be culled to avoid getting masses of drones above the queen excluder – you will not completely prevent this from happening because some drones will be present as eggs or young larvae at the time of the manipulation. The hive will now have brood up to the queen excluder and the new half-brood will be available to the queen. **A warning**; - do not think that putting a new half brood on top of the deep brood will produce the same result because it will not. The bees will just regard it as a super and mostly use it to store honey and not brood.

Option 2) does have some small disadvantages that do not apply to option 1). Firstly it means that you have to have more equipment; two half-broods for each hive that is managed this way. Secondly it means that you will find yourself extracting honey from brood combs (the half-brood that was placed above the queen excluder) and this may be slightly detrimental to the quality of the extracted honey. Again this depends on how old are the combs in the half-brood. If they are old and black it may taint the honey slightly but if they are fairly new (as they ought to be for reasons of disease prevention) I do not think it is an issue. You should also be aware the half-brood may contain frames with sugar syrup left-over from the winter. If you want to avoid these being included in the honey crop they should be removed, stored securely and then replaced (as part of feeding) at the end of the season.

Assessing the colony for the size and position of its brood nest should continue throughout the season from May through to sometime in late June, when most queens have passed their peak laying and are starting to back-off. At any time during this period the deep and shallow brood boxes can with advantage be swapped to maximise brood space. Option 1) is to be preferred over option 2) for the reasons stated above but, particularly in favourable weather conditions, the within hive situation can change so quickly that it is easy to be caught napping and be forced into option 2).

As far as possible we keep our brood and honey frames segregated (brood for brood and honey for honey) as this is good practice for the production of high quality honey - but it also has advantages for disease control. Moving the half-brood above the queen excluder and the use of `dump` boxes (I will explain this in a later article) are the two exceptions that lead to the extraction of honey from frames that have contained brood.

How to Make These Manipulations Easy

How much work and how time consuming is this swapping of boxes twice a season I hear some people asking? Well it can be very easy on both the beekeeper and the bees or it can be hard work for the beekeeper and very disruptive for the bees. It all depends on the amount of brace comb and comb extensions there are on the bottom bars of the frames in the box next to the floor. You can not just reverse the position of boxes willy-nilly without first checking that they will fit together in their new relative positions without making an awful mess and crushing lots of bees. Unfortunately on solid floors and with many designs of open-mesh floor – all those that have 21-22mm height of floor surround – it will be necessary to examine each frame in the bottom box and, if necessary, shake the bees off and cut away the comb extensions before the boxes can be re-positioned. All our open-mesh floors have only a 9 mm surround, resulting in a reduced space between the bottom bars and the mesh (now about 15mm instead of 27-28mm) and the bees no longer build comb extensions – nor do they extend combs and join them to the mesh. With this provision it takes only a moment to reverse the boxes and, especially if two people are working the hive. The operation is over so quickly the bees are left wondering, `what happened there?` This is quickly followed by, `some idiots have been storing honey below the brood nest we'd better get it shifted.`

PS I do not claim this method of managing the brood nest to be original. There are similar ideas in several bee books and we got the idea from another senior (in experience but not necessarily age) beekeeper in our association – who shall be nameless.