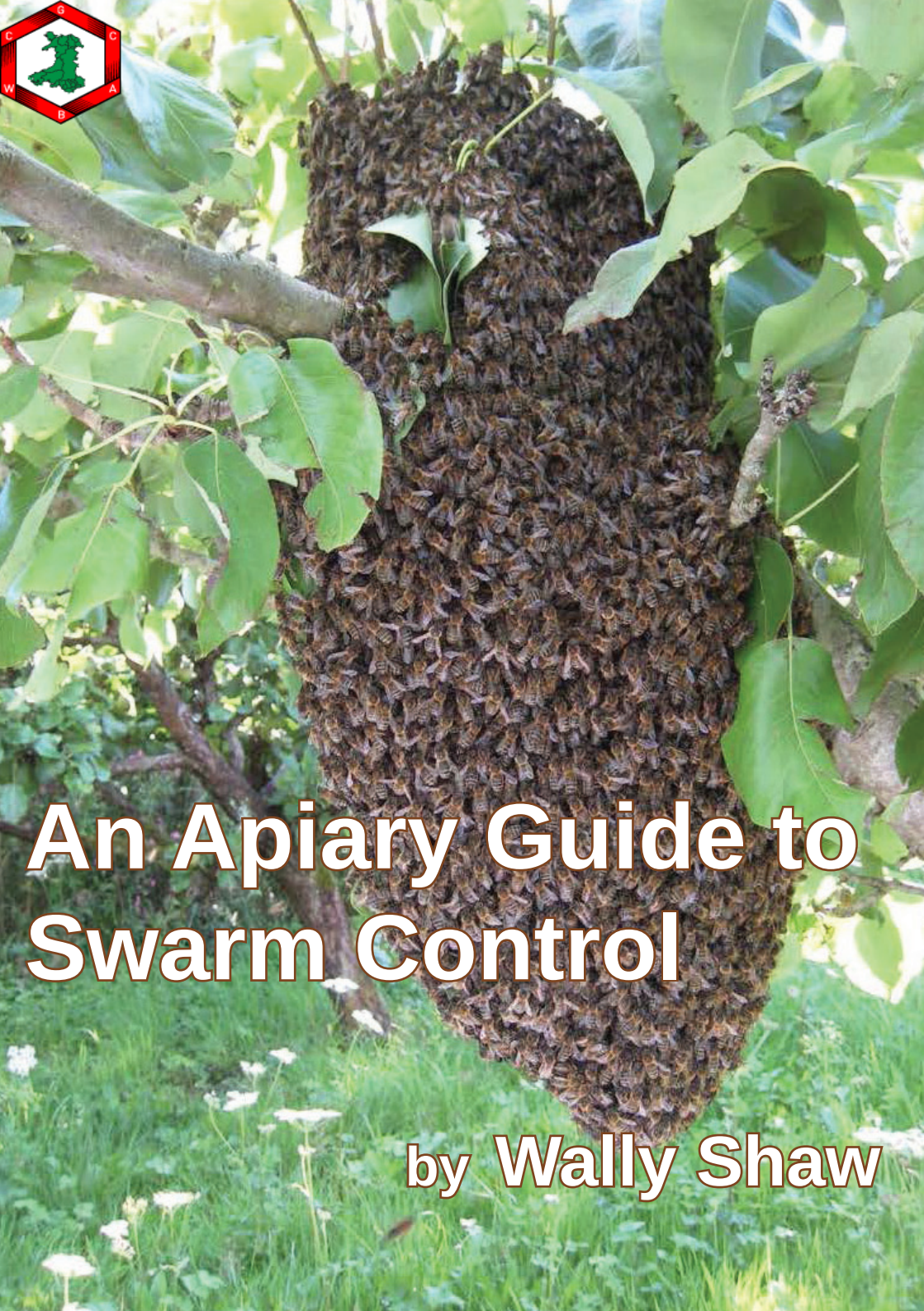

An Apiary Guide to Swarm Control

by Wally Shaw

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Introduction

The beekeeper should remember that swarming is simply reproduction. All the complex, integrated behaviour that occurs within a honey bee colony has evolved simply to improve its chance of successful reproduction. Most beekeeper's primary interest is just one aspect of this behaviour, namely the collection of nectar and the storage of honey. In order to produce the maximum amount of harvestable honey, the beekeeper seeks to create large colonies but also to prevent them from achieving their natural destiny through swarming.

In their book entitled **`*Bait Hives for Honey Bees*`**, Seeley and Morse state that, **`Mature colonies have a natural urge to swarm each year unless weakened by disease or mismanagement`.** So perhaps we should not be surprised or regard it as dysfunctional when colonies swarm. Most beekeeping books understate swarming but its control is vital if good honey crops are to be consistently obtained. There is no doubt that swarm control is simultaneously the most important and most difficult aspect of colony management

The Booklet (or Field Guide)

As the name suggests, this booklet is primarily about practical swarm control; what to do when you are out there at the hive-side faced with making a decision about management to try and control the swarming impulse. It contains a series of diagrams that can be used as a guide to management and can even be taken out into the apiary for reference if required. Because no two hives are ever the same, the diagrams need to be applied flexibly as they show generalised examples but it is the underlying principle that matters – how the management interacts with the natural behaviour of the colony. The accompanying text has been kept to a minimum with (hopefully) just enough to explain their use.

For the sake of simplicity, all the diagrams assume the use of a Modified National hive with 12 self-spacing (Hoffman) frames. However, the same management techniques can be applied to all types of movable frame hives whatever their size, shape, number and spacing of frames. The frames shown in the diagrams are colour coded according to their contents; frames containing brood are coloured **red**, honey and pollen **yellow**, drawn frames with no contents **black** and un-drawn frames (containing a sheet of foundation) are shown as a **thin black** line. In the real world the frames within a hive usually have a mixture of contents so the colour coding refers to the **primary contents** (the dominant characteristic) of the frame.

Types of Swarm Control

From the point of view of practical management, swarm control can be divided into two distinct parts with a clear (biological) threshold between them - which is **when the colony starts queen cells**.

1) **Pre-emptive swarm control** – the type of management that can be used before queen cells are present in the hive (to prevent their initiation).
2) **Re-active swarm control** – the type of management that can be used when queen cells are produced (to prevent the issue of swarms).

PART 1

Pre-emptive Swarm Control

The management activities involved in pre-emptive swarm control are **multi-purpose** and not just about preventing queen cells being started. They double-up as good beekeeping practice which aims at:-

- Promoting a large colony capable of collecting a large crop of honey.
- Systematic renewal of brood combs (particularly important for disease prevention).
- Queen replacement and making increase (when required).

Unfortunately, producing a large colony and maintaining it over the period during which nectar flow may occur (3 months or more) can create the very problem the beekeeper is trying to avoid. This is because the larger the colony and the longer it is in that condition the more likely it is to swarm. Good management always delays swarming but may not prevent it happening eventually. Late season swarming is particularly frustrating because it can compromise the potential for honey production during the main flow in July (or later) and ways of dealing with this situation can be found at the end of the booklet.

Triggers for Swarming

The triggers for swarming – biologically the means by which the colony recognises when it is a good time to swarm – are multi-factorial and a mixture of internal and external conditions.

Internal (within the hive)

- Size of the colony, space for the queen to lay, brood nest congestion,

brood nest maturity and (possibly) the age of the queen.
- Space for nectar processing and honey storage.
- Production and/or distribution of queen substance (thought to be the main mechanism).

External

- Time in season - the swarming urge is at peak in a May and June and declines thereafter.
- Weather – an underrated factor and interludes of poor weather (with little flying time) often precipitate swarming

The beekeeper can to some extent control internal conditions through management of the hive but can do nothing about the external factors. It follows that pre-emptive swarm control is mostly about management of the brood area.

The main management techniques by which the beekeeper can control hive internal conditions are:-

1. Comb management
2. Box management
3. Brood relocation
4. Splitting colonies

1.1 Comb Management

The aim here is to ensure that as many as possible of the frames below the queen excluder (the brood frames) are actually used for the production of brood. During the main season stores of honey and pollen in the brood area should be kept to a minimum. Quite early on in the season, when the colony has not yet attained its full potential size, it is the bees' instinct to create a ceiling of capped honey. These (close-to-hand) stores are a form of insurance against adverse conditions which the bees are reluctant to uncap and prepare cells for the queen to lay. When this ceiling is in place the only way the brood nest can be extended is in a downward direction, so the aim is to have brood in contact with queen excluder over as much of its area as possible. The bees will still create a honey ceiling but it will be in the first super – which is where the beekeeper wants it.

Comb management may involve moving existing frames within the brood area in order to provide space for the queen to lay but the main activity is removing old or defective frames and getting new frames of foundation drawn. It is good beekeeping practice to replace brood frames on roughly a 3 year cycle, so that means an average of 3-4 frames/year. The use of foundation is thought to be

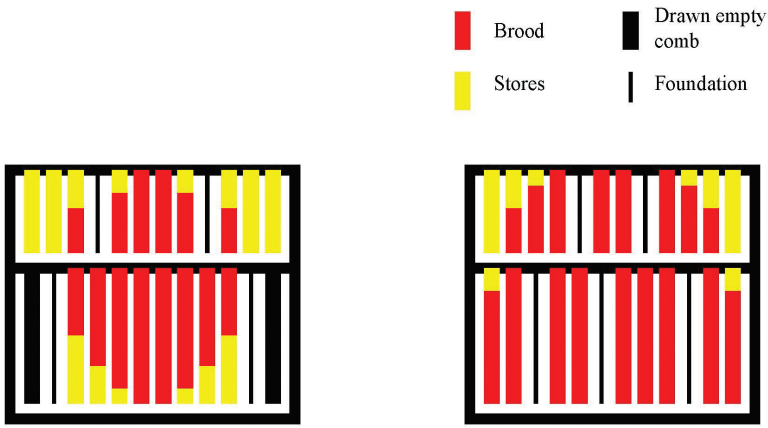
an additional disincentive to swarming by simulating brood nest immaturity and diverting bees to the task of wax making.

However, in order to be successful (get frames drawn quickly) and not damage existing brood by chilling, the introduction of foundation must be done at the right time and in the right position in the hive. Early in the season, in order to maintain brood nest integrity, foundation **must** be introduced on the edge of brood nest - so that it becomes the next frame to be drawn if the brood nest is to expand. Later, when the colony is crammed with bees, foundation can be interleaved with brood frames. **Never** put foundation next to the hive wall because in this position it will only be drawn as a last resort – and then usually badly.

Figure 1 illustrates where foundation should be placed early in the season (left) and later in the season (right) in both deep and shallow brood boxes. Using a two-box system (ie. brood and half or double brood) the placement of foundation in the upper box is much less critical because of the warmth coming up from below. Single box users (standard deep or extra deep 12x14) should follow the procedure for the lower box.

When introducing foundation to a hive the beekeeper should understand that the colony **MUST** have an **immediate need** for comb either to extend the brood

Figure 1 – positioning of foundation in a hive on brood and a half



Early season – before first super added

Later season – when super(s) added and hive full of bees

nest or for storage because bees don't do 'speculative' comb building'. There **MUST** also be a nectar flow (or the beekeeper must provide one by feeding) because bees do not use stored honey for wax-making. For further information see also WBKA/WAG booklet on ***'Comb Management'***.

1.2 Box Management

This is only applicable to beekeepers who use a two-box system; either brood and a half or double brood. As with comb management, the aim is to have as much as possible of the brood nest in contact with the queen excluder thus avoiding a honey ceiling.

Hive on Brood and a Half

The need for box management depends crucially on the position in the hive that the brood nest develops at the beginning of the season. If the nest is high then nothing needs to be done because the queen is free to lay down and use as much of the available space as she needs **(Figure 2a)**. A nest developing in the middle of the hive will, as the season progresses, result in a honey ceiling in the upper box and this may restrict the ultimate size of the brood nest. In this situation the boxes can be swapped – placing the shallow brood box

Figure 2a – brood nest in high position mostly in shallow brood box – no management required

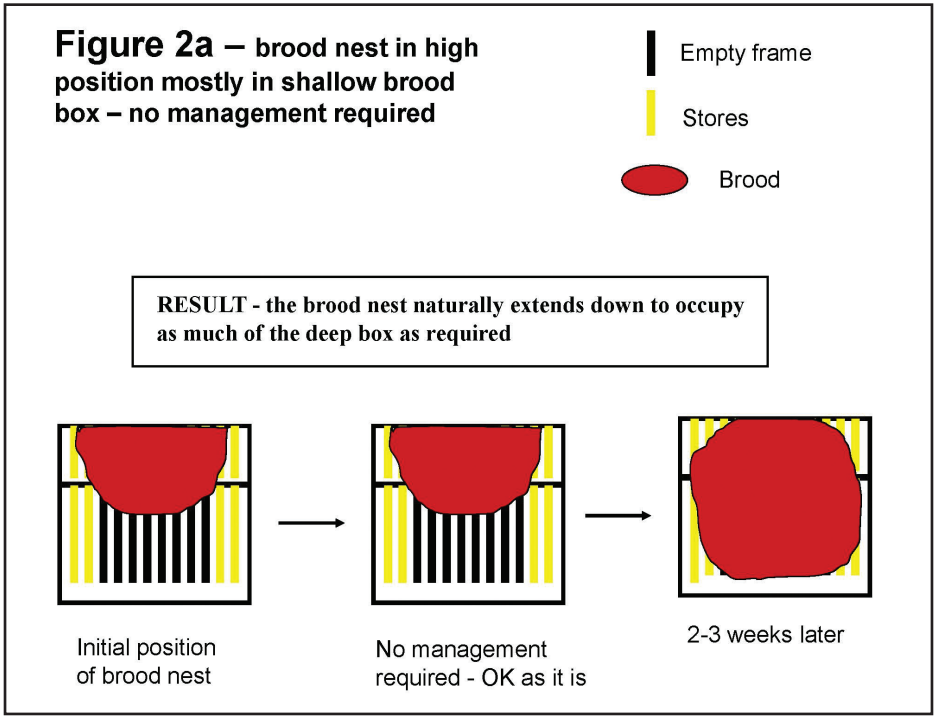
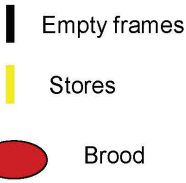


Figure 2b – brood nest in mid-position between deep and shallow brood boxes – re-position shallow box under the deep



RESULT – any honey in the shallow box is removed, comb becomes available for the queen to lay and the integrity of the brood nest is quickly re-established

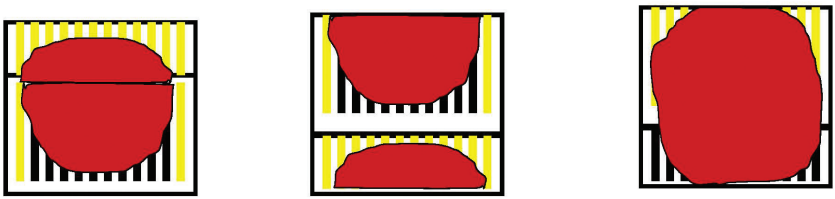
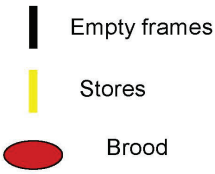
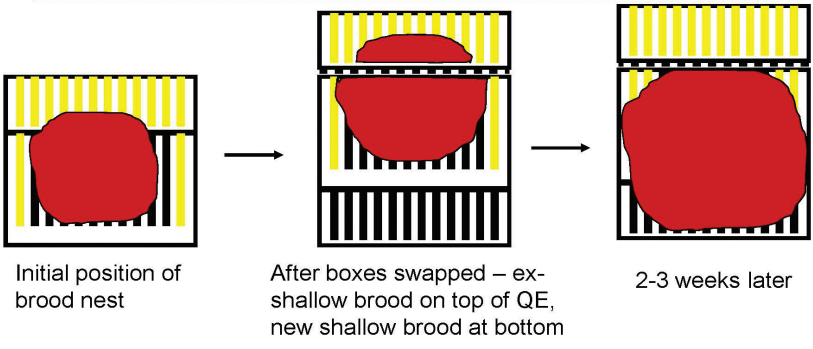


Figure 2c – brood nest in low position mostly in deep brood box – shallow brood put above queen excluder and new empty shallow introduced at the bottom



RESULT – brood in the shallow box emerges and it becomes the first honey super and the brood nest extends down into the new shallow box below



beneath the deep **(Figure 2b)**. When the brood nest starts low then the upper box will quickly become a honey store (a super) and the brood nest size will be restricted. In this case the best option is to place the existing shallow brood above the queen excluder (make sure the queen is not in it) and introduce a new shallow brood box containing drawn frames beneath the deep brood **(Figure 2c)**.

Caution – If the hive has a floor with a traditional depth of 21-22mm (solid or open-mesh) it will usually be necessary to remove brace-comb from the bottom bars of the box immediately above the floor - otherwise it will not fit in its new position and numerous bees will be squashed. Frames **must** be shaken free of bees before attempting this process. Using floors with the correct depth for open-mesh (9mm for bottom bee-space hives and 15mm for top bee-space hives) the frames should have little or no brace-comb and will not need any trimming.

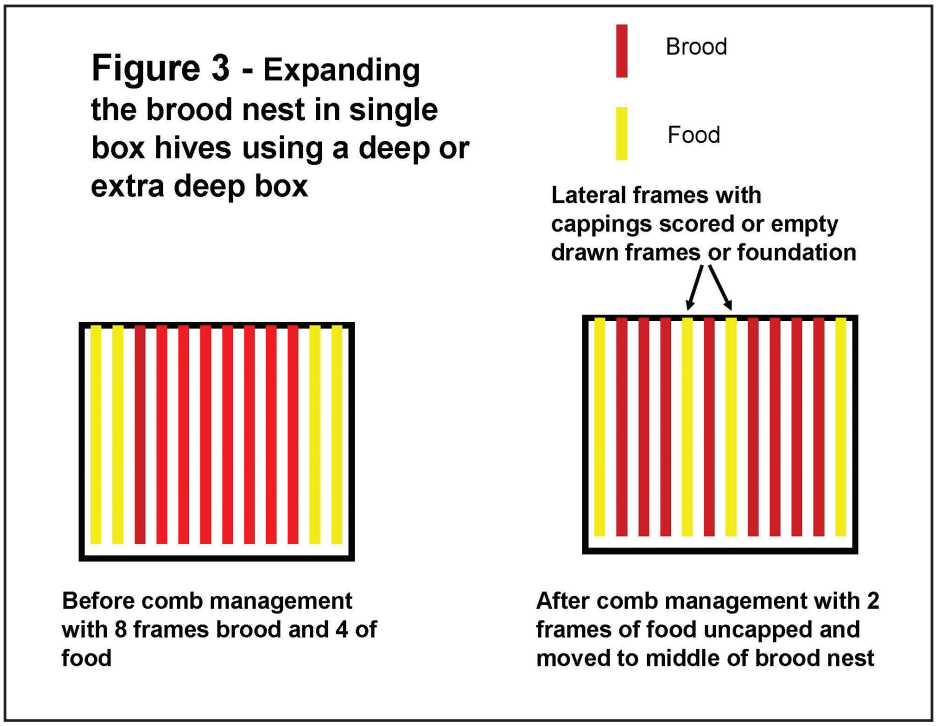
Other Hive Configurations

In the case of a hive on double deep configuration, controlling the brood nest position is simply a matter of moving as many frames of brood into the top box as possible (taking care to create a sensible nest shape that the nurse bees can cover efficiently) and moving frames of stores down. Stores beneath the brood nest will quickly be removed and space will become available for the queen to lay. Because double brood provides more than enough space for most colonies the situation is less critical. However, the colony is likely to end the season with a substantial amount of honey beneath the queen excluder – which is good or bad depending on your point of view (i.e. how much you want to feed).

Using a single deep brood box hive configuration (which gives less space than the potential of most queens), the position of the brood nest is less likely to present problems. Here it is just a matter of ensuring that, as far as possible, all the frames pull their weight (are available for the queen to lay on). To achieve this aim the frames should contain a minimum amount of honey and pollen stores. Well managed single deep box hives tend to have more pollen stored in the first super simply because there is nowhere else to put it and the first super, in effect, becomes a brood-less extension of the brood nest.

Extra deep box hives can have a problem with brood nest position and this is not quite so easy to remedy. **Figure 3** shows how this can be done by introducing frames to the middle of the box – but there must a good head of bees when this is attempted. Depending on what is available, these can either be frames of foundation, drawn empty frames or existing lateral frames (from the outside of the box) with any honey stores scored using an uncapping fork. The colony

will want to restore brood nest integrity and these frames will quickly become part of a larger, spherical brood nest.



Supering

Also part of box management, adequate supering of a colony to provide plenty of space for the processing of nectar and the storage of honey is an essential part of pre-emptive swarm control. It should be remembered that fresh nectar has 2-4 times the volume of honey and extra space should be provided for the drying process. However, no amount of supering will act as a substitute for poor brood nest management. Just to further complicate matters, during prolonged adverse weather the bees will move down from the supers and crowd the brood area and this will often trigger swarming. There is nothing the beekeeper can do about this.

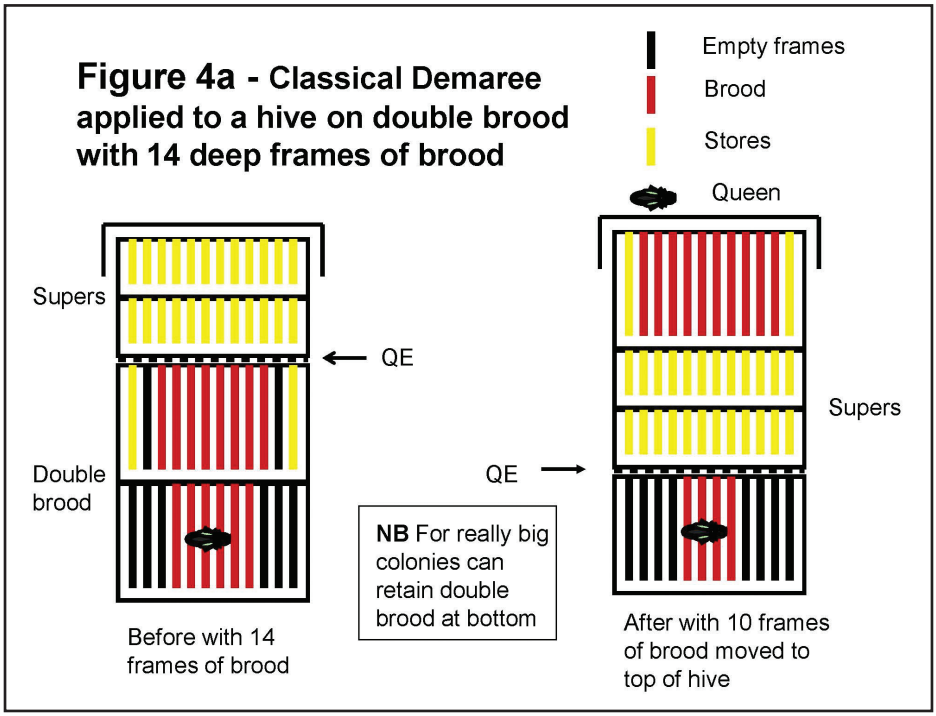
1.3 Brood Relocation

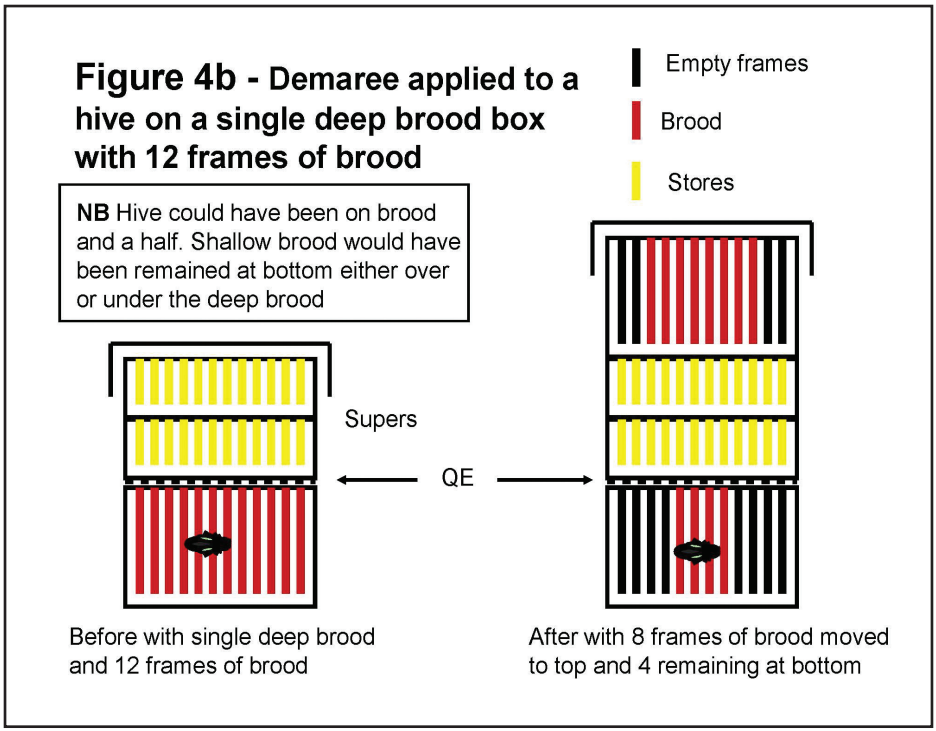
This is one of the oldest tricks in the book and usually goes under the name of the Demaree Method, dating back to 1892 – a method that is probably under-used in modern beekeeping. There are many variations of the method but the basic principle is removal of frames of brood from the bottom of the hive

and relocating them in a new box at the top of the hive – above the supers. The removed frames are replaced by empty drawn frames (if not available foundation can be used) thus giving extra space for the queen to lay. Brood at the top of the hive attracts nurse bees to move up to cover it and this serves to reduce congestion at the bottom of the hive. The combination of new laying space for the queen and a reduction in congestion in the brood area inhibits the impulse to swarm.

The method was originally designed for hives on double (or triple) deep brood and when brood has emerged from the frames put to the top the plan is to return them to the bottom of the hive in exchange for ones containing more recent brood (a frame circulation system).

Figure 4a shows a classical Demaree with two deep brood boxes. **Figure 4b** shows how the method can be applied to a hive on a single deep brood box. The manipulations shown in **4b** can easily be adapted to brood and a half configuration – the shallow brood stays at the bottom of the hive, either above or below the deep brood box depending on the position of the brood nest (see Section 1.2 above).





The Demaree method is quite an effective method of pre-emptive swarm control but it does have some downsides:-

- The first is that the bees covering the brood at the top of the hive may be far enough removed from the queen that they regard themselves as queen-less and start emergency queen cells. The greater the spatial separation (the number of supers) the more likely this is to happen. After 5-7 days it is necessary to carefully examine the top box for queen cells and destroy them.
- The second is that frame re-cycling is more difficult than appears at first sight because as soon as the brood has emerged the vacated cells are quickly filled with nectar and later with capped honey. This means that the top box often has to be left in place for the rest of the season and removed as part of the honey harvest. However, providing the frames are fairly new this should not adversely affect honey quality.

1.4 Splitting Colonies

The previous methods of pre-emptive swarm control have kept the colony in one piece. Splitting is different and (potentially) creates a second colony. However, splitting is the most powerful and reliable method of pre-emptive control and has a long history of use in beekeeping. Splitting colonies is also a method of making increase which is covered in more detail in the WBKA booklet, ***'Simple Methods of Making Increase'***.

It is often said that splitting a colony is the enemy of a good honey crop. However, splitting is always better than losing a swarm - unless you can guarantee catching it! The effect on the honey crop depends crucially on the timing of the split. If the split is done at the right time, eg. directly after the spring flow, it can result in an enhanced yield. Under the right circumstances the two resultant colonies can produce more than the original (one) colony - even if it did not eventually swarm. A controlled split is always better than an artificial swarm because it enables the beekeeper to create a better age-class distribution of worker bees in both parts of the split.

When splitting a colony to provide pre-emptive swarm control the following considerations should be taken into account:-

- The split should be sufficiently radical to provide swarm control for the rest of the season.
- Both sides of the split should be viable, ie. adequate bees, brood and stores.
- The timing should be right for the colony, ie. its state of development.
- The timing should be right for potential nectar flows, ie. allowing time for the colony to re-build.

No firm guidance (prescription) is possible and the details of splitting depend on the judgement of the beekeeper. **Figures 5a** (using a new hive stand) and **Figure 5b** (using a split board) are examples which illustrate the principle. In both Figures the blue box and the frames within are new.

Figure 5a – splitting a hive on brood and a half with 10 deep frames of brood, 7 of which placed new box on new hive stand

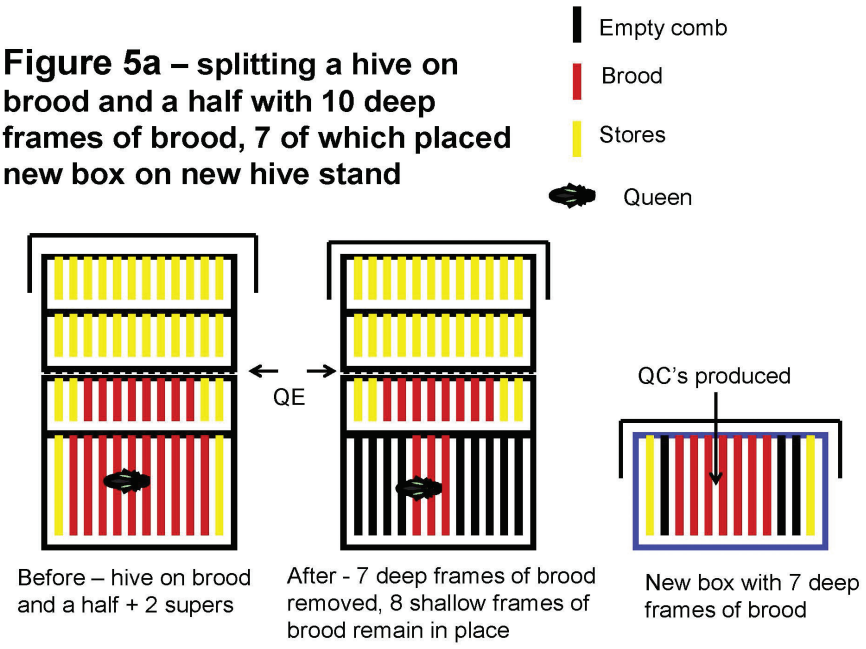
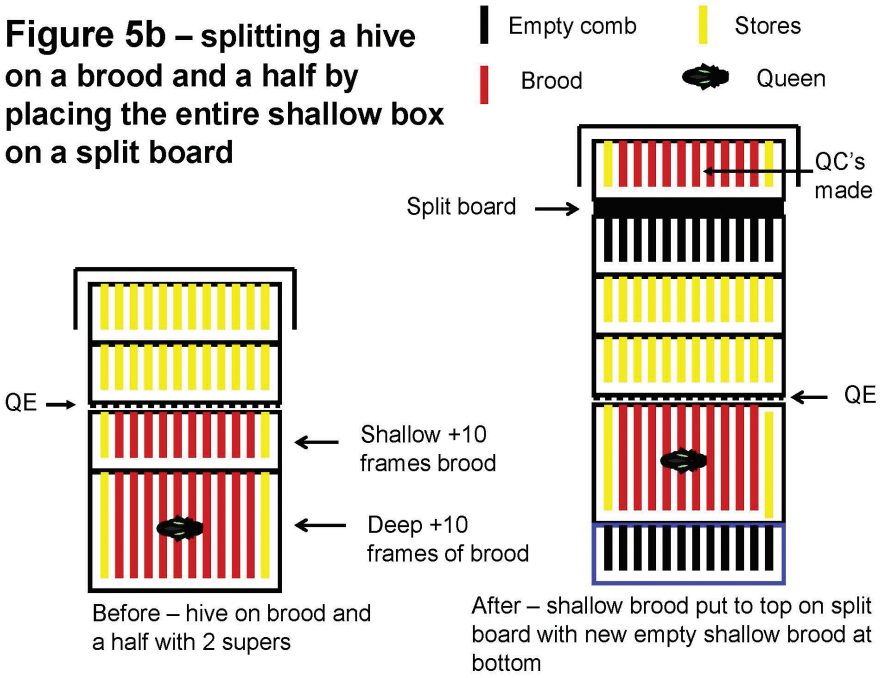


Figure 5b – splitting a hive on a brood and a half by placing the entire shallow box on a split board



Recombining Splits

If a split has been made properly (see guidelines above) there is about a 90% probability that the queen-less part of the split will raise a new laying queen. The beekeeper now has two colonies instead of one and this may not be the desired outcome. Simple logic dictates that you can not go on indefinitely doubling the number of your colonies so the solution is recombination (uniting colonies) but how and when? Early in the season recombination is not usually a sensible option as it will only create a large colony that is likely to undo all your good work and swarm. Later in the season, when the swarming impulse is on the decline, it is possible to recombine to produce a 'super-colony' for the main honey flow.

There are three main options for the new colony (with a new queen) which will currently be living either on a new stand or a split board.

- Giving it permanent independence, ie creating new long-term colony.
- Recombining later in the season to produce a 'super-colony' (with a choice of queens to be made).
- Giving it temporary independence, ie. supering it, keeping until the end of the season and then recombining (also with a choice of queens).

The word 'recombination' implies that the new colony has to be united with the original colony. However, much greater flexibility is possible and it is often the preferred option to unite it with a colony that has an old or unsatisfactory queen as a simple method of re-queening. Artificial swarming also creates two colonies from one and there is further discussion about how to deal with this situation in Part 2 (Aftermath of Artificial Swarming).

PART 2 – Re-active Swarm Control

Re-active swarm control starts where pre-emptive swarm control fails - when queen cells with contents are found in the hive. When this happens there is no known (reliable) method by which the swarming process can be turned off and the beekeeper needs to accept the inevitable because, unless something is done to prevent it, that colony will inevitably swarm. Destroying queen cells only delays swarming and may only make the situation worse, ie. the colony swarms with barely-started second generation queen cells and takes a higher proportion of the bees with it. Worse still is failing to realise that the colony has

already swarmed because, unless it has only just happened, there will be no eggs and young larvae present from which emergency queen cells can be made and the colony will be rendered queen-less.

Determining the Stage in the Swarming Process

On finding queen cells in a colony the first thing to do is to determine what stage in the swarming process the colony has reached. There are four main possibilities for a colony, each with a different solution:-

1. Colony has queen cells but has not yet swarmed.
2. Colony has issued the prime swarm but has not yet cast swarm.
3. Colony has emerged queen cells and may (or may not) have cast swarmed.
4. Colony appears to be queen-less and beekeeper has no idea what happened and when.

How to Investigate

Full details of how to do this are given in the WBKA/WAG booklet, ***'There are queen cells in my hive – what should I do?'*** The booklet contains a diagnostic tree with 12 steps each consisting of the method of **Investigation** and the recommended **Remedial Action**.

The beekeeper should do **NOTHING** until a careful investigation has been completed. Fortunately the information persists in the hive (on the frames) until at least 3 weeks after the prime swarm has departed – the last time the queen can have laid some eggs.

2.1 Colony has not yet swarmed

How do you know? – evidence in order of reliability:-

- Queen seen.
- Recently laid eggs (standing on end).
- No missing bees (colony the size you expect).
- Maturity of queen cells and recent weather – has it been conducive to swarming?

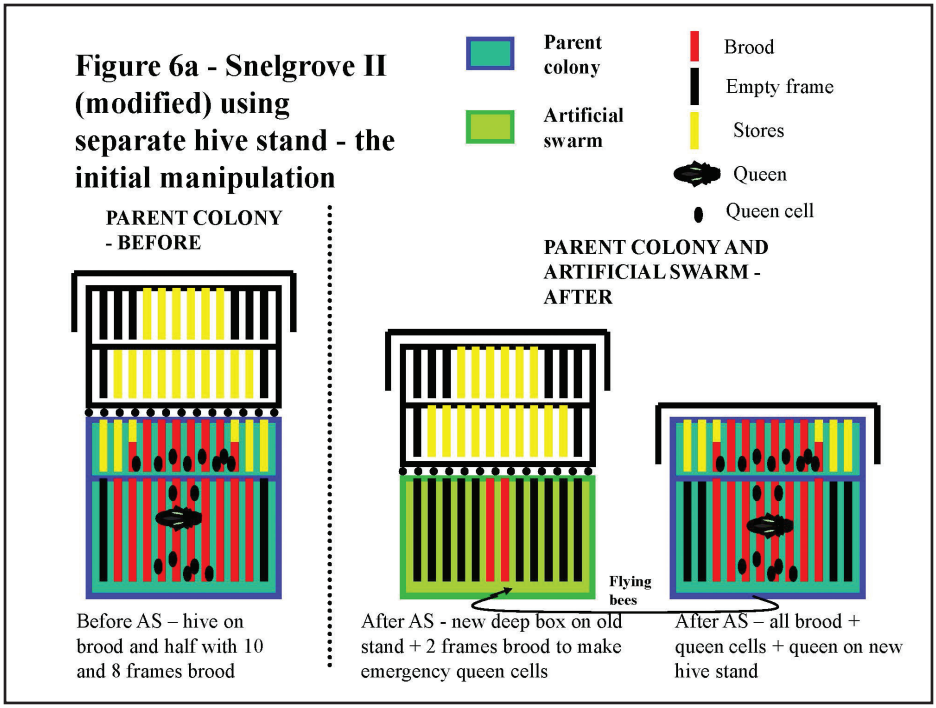
The beekeeper really needs to see the queen or recently laid eggs to be absolutely sure. The remedy for this situation is to make an **artificial swarm**.

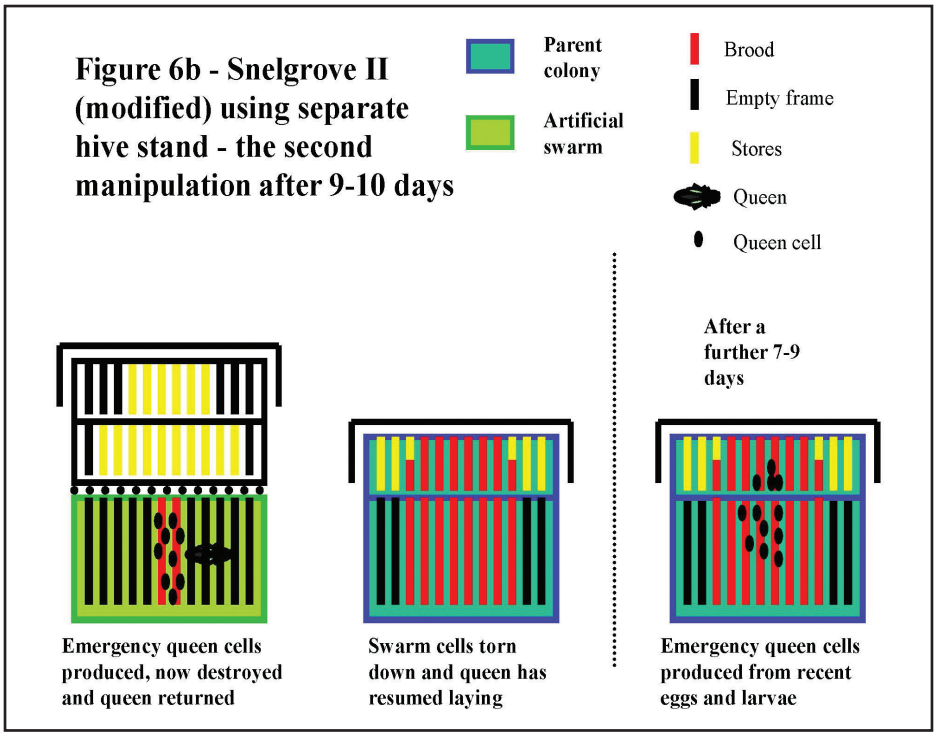
Artificial Swarming

If it is established that the colony has not yet swarmed the (only) solution is artificial swarming. Most beekeeping books describe what is called the Pagdon Method (it should really be called the Heddon Method) but experience shows this has an unacceptably high failure rate – probably in excess of 50%. By 'failure' what is meant is that the artificial swarm does not lose the impulse to swarm and will do so at more or less any time during the next 3 weeks.

The alternative method described in this booklet has a virtually 100% success rate and is called (for want of a better name), Snelgrove II (modified). As the name suggests the method originates with L. E Snelgrove but the modified version is even more successful than that originally described. Despite the name it does not require the use of a Snelgrove board (or a split board) but use of one does have some practical advantages.

This method of artificial swarming is a two-stage process which is shown in **Figures 6a and b.** using a new hive stand (not a split board in sight!). For clarity the brood area of the parent colony is in blue boxes (with a blue background) and the artificial swarm in a green box (with a green background).





In the initial manipulation (**Figure 6a**) all the brood including queen and queen cells is moved onto a new hive stand within the apiary (**the parent colony)**; reasonably close is more convenient but more than 3 feet away is essential. A new box with 10 frames of (preferably) drawn comb is placed on a new floor on the old hive stand – but a mixture of drawn and foundation will suffice. Two bee-free frames of brood are transferred to the middle of this new box (**the artificial swarm**). These two frames **must** contain eggs and young larvae from which emergency queen cell can be made but **must not** have any queen cells (or the queen) on them. The number of frames in the parent colony should be made up with drawn comb or foundation. The parent colony on the adjacent stand will lose its flying bees back to the artificial swarm and amongst these will be the bees that are running the swarming process. For this reason, the parent colony loses the impulse to swarm, the queen cells will be torn down and the queen will resume laying. In the queen-less artificial swarm the bees will start emergency queen cells – and this appears to be an important part of the process leading to a loss of the swarming impulse.

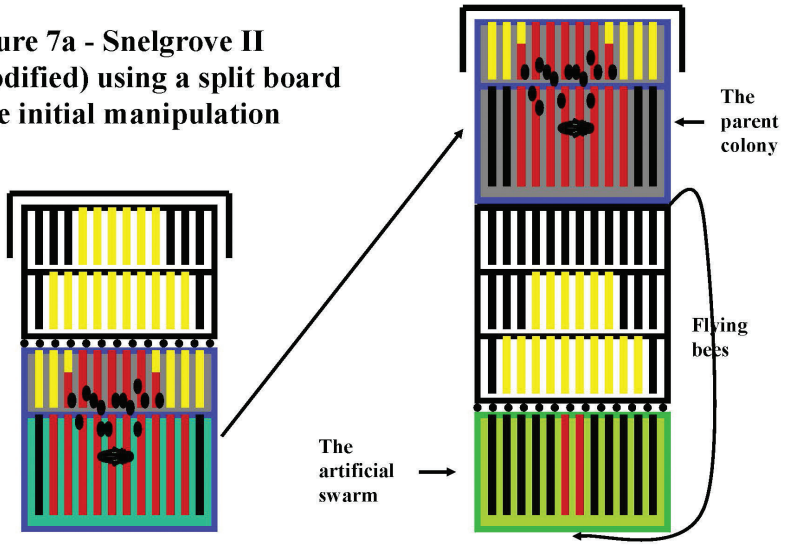
The second manipulation **(Figure 6b)** should take place 9-10 days later (12 days is the absolute safe limit). This timing is important because all the queen

cells in parent colony must be torn down (this usually happens quite quickly) but, more importantly it must be done before any of the emergency queen cells in the artificial swarm can emerge. The second manipulation starts with destruction of all the emergency queen cells in the artificial swarm. When this has been done the queen in the parent colony should be found and transferred to the box on the old hive stand containing the artificial swarm. As soon as the queen is removed from the parent colony the bees will start emergency queen cells using brood that the queen has recently laid. Following the repatriation of the queen, the artificial swarm will settle down to re-build and, providing there are plenty of nurse bees, this will happen quickly. It is thought that the temporary loss of the queen, but with the means of making emergency queen cells to replace her, is what turns off the swarming impulse in the artificial swarm. No precautions are required when returning the queen to the artificial swarm. They should be expecting a virgin queen any day now and the fact that they suddenly have the gift of a mature laying queen does not seem to bother them. Their willingness to accept the queen is thought to be because all the bees in the artificial swarm are her offspring and it is just the return of their mother after an absence of 9-10 days. When the method is done using a split board (with a mesh panel) the hive smell has also remained in common.

Meanwhile, the parent colony will also settle down and raise a new queen and make no attempt to swarm – **NB** no thinning of queen cells is required.

The question arises, why is it necessary to destroy the emergency queen cells in the artificial swarm? Why can they not simply be moved to the now queenless parent colony to save time (9-10 days) on them having a new queen? The answer is that you **can** do this but destruction is the safe option. The emergency queen cells produced in the artificial swarm have been raised in the absence of a large number of dedicated nurse bees – the ones that specialise in feeding queen larvae – and the queens produced under these conditions **may** be inferior. However, if the colony is large and there were a lot of bees in the supers that could quickly adapt to produce the right type of royal jelly, then this may be an unnecessary precaution. The parent colony has all the nurse bees it needs to make good queen cells and the delay in re-queening is probably worthwhile in the long-run.
Starting with an identical hive that has set up to swarm, **Figures 7a and b** show the equivalent process using a spilt board. (colour coding of boxes the same as Figures 6a and b).

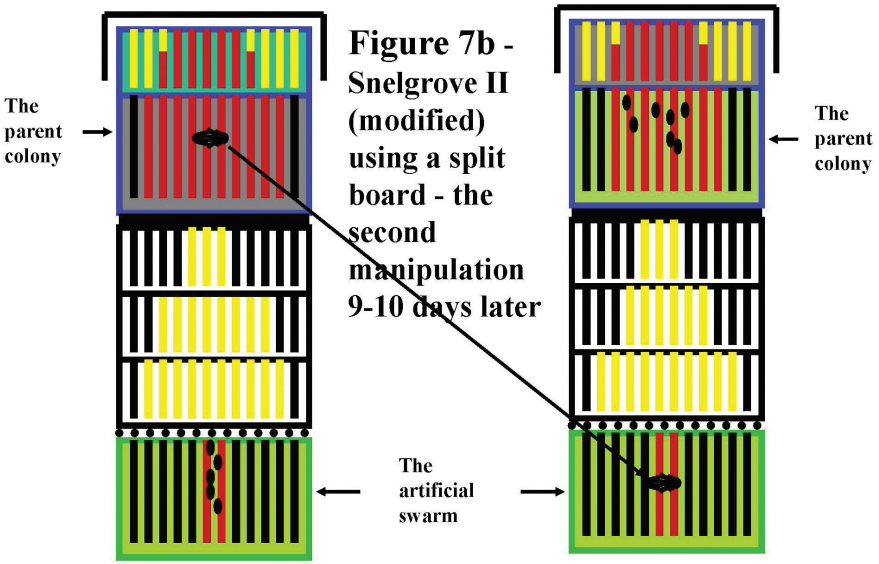
Figure 7a - Snelgrove II (modified) using a split board - the initial manipulation



Original colony on brood and a half + 2 supers and set up to swarm

Complete brood nest along with QC's and queen moved to top of hive on split board BUT 2 frames of brood transferred to artificial swarm

Figure 7b - Snelgrove II (modified) using a split board - the second manipulation 9-10 days later



Queen cells at top of the hive have been torn down and the queen resumed laying. There are emergency QC's in the artificial swarm

Queen returned to artificial swarm, emergency QC's destroyed, new emergency QC's will be started in top colony

One of the advantages of this method of artificial swarming is that for the first manipulation, when the colony is crammed with bees and the queen is being harried to slim her down, the queen does not have to be found. When doing the second manipulation, and she **does** have to be found, there will be many fewer bees, she will have settled back to her day job and she should be more easily found.

Got the timing wrong?

If, for some reason, the beekeeper gets the time of the second stage wrong, and the emergency queen cells have released virgins into the artificial swarm it is not the end of the world. It is unlikely that all the virgin queens can be found and the old queen re-introduced so it is better to allow the artificial swarm to re-queen naturally and leave the old queen where she is and run the parent colony as the main-honey producing unit.

Aftermath of Artificial Swarming

If successful, when the process of artificial swarming is complete there will be two colonies instead of one and this may or may not be what the beekeeper wants.

- If an increase in the number of colonies is not required then re-uniting is the answer. This is easier when using a split board than it is with the new colony on a separate hive stand. Re-uniting should not (normally) be attempted until the parent colony has developed a new laying queen and she has proven herself to be a good'un. Using a split board, a two-tier colony (one on top of the other each with its own supers) can be retained until the end of the season when a decision as to its future can be made. When uniting two colonies it is preferable for the beekeeper to choose the queen because letting the colonies do it for themselves **can** result in conflict. Also I find it difficult to believe the old adage that 'the bees will always choose the best one'. From the beekeeper's point of view the new queen is usually preferable.
- If extra colonies are required then, with a new colony on a separate stand, this has already been accomplished. If a split board has been used then moving the new colony to a different apiary to give it independence is preferable as there will be no loss of flying bees. If a new colony on a split board is to be kept in the same apiary care must be taken to avoid excessive loss of flying bees. It is recommended that independence day should be delayed for a minimum of 5-6 weeks after the new queen has started to lay – which may be pretty much the end of the season.

2.2 Colony has already issued the prime swarm but has not cast swarmed

It is assumed that the beekeeper has already determined that the prime swarm has departed with the old queen. It is then just a matter of carefully checking that no queen cells have emerged. The age of the youngest brood gives some clues, eg. if there are no eggs but some newly hatched larvae then the swarm occurred 3-4 days ago and, under normal circumstances, the queen cells are about 4 days from emergence.

In this situation, unless something is done to prevent it, the colony is likely to issue at least one cast swam. The timing of this swarm will be 2-4 days after the first queen cell has emerged. There are two methods of preventing this:-

1) Thinning the queen cells to just one, selecting a cell of good size in a well protected position. If there are still eggs or young larvae present it is best to delay this operation until they are past the stage when they could be used to make emergency queen cells. Alternatively the existing queen cells can be thinned now and the hive checked for new recruits in a few days time.
2) The queen cells can be left intact until the estimated date for their emergence – a few queen cells can be investigated to check on their state of development and likely due-date. What to do next is described in the next section (2.3).

2.3 Colony has emerged queen cells and may (or may not) have cast swarmed

There is no easy way of knowing whether the colony has already cast swarmed and no way of knowing if the colony contains an emerged virgin queen (or queens). Most of the remaining queen cells will contain queens that are waiting to emerge but are being prevented from doing so by warder bees. Using the tip of a knife the beekeeper should carefully open several cells and let the virgin queen walk out into the colony. When you think you have done enough of this (ie. given the bees plenty to choose from), **ALL** remaining queen cells must be destroyed. It does not seem to matter how many virgin queens you release in this way the colony will proceed to select one (by whatever means) and make no attempt to swarm. This is mission accomplished - the bees have selected the new queen not you.

2.4 Colony appears to be queen-less and beekeeper has no idea what happened and when

There may be a queen in the colony who is just about to start laying but, without actually finding her, you can not tell. The behaviour of the colony (the bees seem calm) and the presence of laying arcs (cells prepared for a queen to lay) imply that all is well with the colony but neither of these signs is completely reliable. The best thing to do in this situation is to insert a test frame (taken from another hive) containing eggs and young larvae. If the colony is queen-less emergency queen cells will be made on this frame but if they think they have a queen the donor brood will be raised in the normal way. Even this is not 100% reliable because in rare cases the colony may contain a non-laying queen and no further progress can be made (ie. the colony can not be re-queened) until she has been found and removed. Further information can be found in the WBKA/WAG booklet, ***'There are queen cells in my hive – what should I do?'***

Late Season Swarming

This can be one of the unfortunate by-products of pre-emptive swarm control. Typically a large colony that has been kept together with no attempt at swarming until late-June or early-July will suddenly develop queen cells. This can still be controlled by means of artificial swarming but this means splitting the colony just when the main nectar flow is about to start – definitely the last thing the beekeeper wants. One method of dealing with this situation is by simply removing the queen. You do not need to do anything drastic like kill her (you may want her later), you merely put her aside to tick-over with a few workers in support. We call this practice putting the queen in 'purdah'; it is not perfect but it works quite well.

As soon as queen cells are found the queen should be removed along with a small amount of brood and some worker bees and either installed in a nuc box or a shallow brood box which is placed on a split board on top of the hive. There must be sufficient bees to support her and cover any brood. It is also a time of year when robbing may occur so there needs to be enough bees and a small entrance to prevent this happening.

If the queen cells have only just been started when the queen is suddenly removed the colony will probably go into emergency re-queening mode and make no attempt to swarm. However, if the queen cells are more mature the issue of a swarm containing a virgin queen is possible. A belt-and-braces strategy means that you should either thin the queen cells to one or wait until the virgin queens are about to emerge and then carry out the same procedure

as that to prevent cast swarms (Part 2 c) above.
During this enforced queen-less period the colony will continue to forage well (but probably not quite as well as it would with an incumbent laying queen) and there will be little loss of honey crop. When time for the honey harvest arrives the beekeeper has the choice of retaining the new queen (if re-queening has been successful) or returning the old queen. In recent years queens mated later in the season have proved less reliable than those mated earlier, so return of the old queen is probably the preferred option.

Conclusions

The above methods of pre-emptive and re-active swarm control should provide the beekeeper with a comprehensive package of management techniques by which the swarming impulse of honey bee colonies can be kept under some measure of control. The qualification 'some measure' is used because the beekeeper who claims to have achieved complete control is probably not of this world or is being economical with the truth. Colonies are individuals and the most common type to evade swarm control is one that starts queen cells and swarms long before the first one is sealed (the ***Houdini*** colony). Even with a 6-7 day inspection interval during the swarming season it is impossible to prevent this sort of thing from occasionally happening – except by clipping the queen's wings. Queen clipping is not really a method of swarm control, it just extends the safe inspection period to about 14 days. As a management practice it has pros and cons and often elicits strong opinions. A full discussion of queen clipping is beyond the scope of this booklet.

To bring this booklet through the full circle, I return to what was said at the end of the second paragraph of the Introduction; '***there is no doubt that swarm control is simultaneously the most important and most difficult aspect of colony management'.*** We can but try!