Swarming in Honey Bees

Part III
Conventional Swarm Control Measures

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Parts I and II of this four-part series reviewed honey bee swarming both from a biological perspective and from that of the bees themselves. We now turn to measures that have been used to arrest swarming and, by using our knowledge of honey bee biology, we can better understand why they work.

The case studies presented demonstrate sound swarm management practice focused on harnessing the full productive capacity of bees. In Part III we will outline standard swarm control measures and will follow this up in a final concluding Part IV that examines some more novel swarm control measures and, overall, what swarm control can achieve.

Super Reversal

In this simplest of practices, an early season deep super reversal (Figure 1) is employed to simulate a light honey flow. This ploy keeps bees more fully occupied than they would otherwise have been. After exchanging supers, or manually placing most brood frames in the lower chamber, any honey not required by emerging brood will be moved up by the bees from the now bottom super B. This makes extra room for the queen to lay.

Brood emerging from the now upper super A will similarly make space for nectar storage above the lower brood nest[1]. The honey stores, having a large thermal mass and narrow single bee space passages restricting air circulation[2], help insulate the brood below. This action stimulates brood rearing so must be conducted judiciously – there must be enough bees – to avoid chilling brood. Later in the season, as swarming conditions ensue, repeating this process or, more simply, moving frames of brood down will result in idle bees being put to work moving honey and expanding a now decongested brood nest.

Putting honey up and brood down is a reorganisation of colony resources that enhances colony expansion and delays swarming.

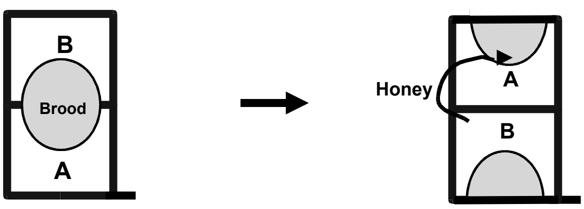

Figure 1 Super Reversal – simulated early honey flow

The alternative hive management practice of under supering rapidly expanding colonies replicates the condition of bees in a spacious tree hollow. Ample room is supplied for the colony to expand and the bees move honey into comb from which brood has emerged at the same time expanding the brood nest downwards. A similar stimulatory effect can be achieved by brood spreading. This interspaces brood with empty combs, but should only be practised in very populous colonies and then very conservatively. However movement of the brood down, achieved by colony reversal, will facilitate rapid colony expansion and would seem to do more to limit early swarming.

The Colony Split

The traditional colony split emphatically delays swarming simply because it mimics natural colony reproduction. In the definitive first step, the colony is divided into two separate parts (Figure 2a). The old queen unit (OQ) now resembles the swarmed colony while the daughter unit on the original stand is now queenless (No Q). It raises its own new queen (NQ) from emergency cells and, once laying is commenced, is very much akin to the reestablished parent colony from which bees have swarmed.. After supering, both units can then expand freely (Figure 2b), the parent colony having avoided most risk of swarming.

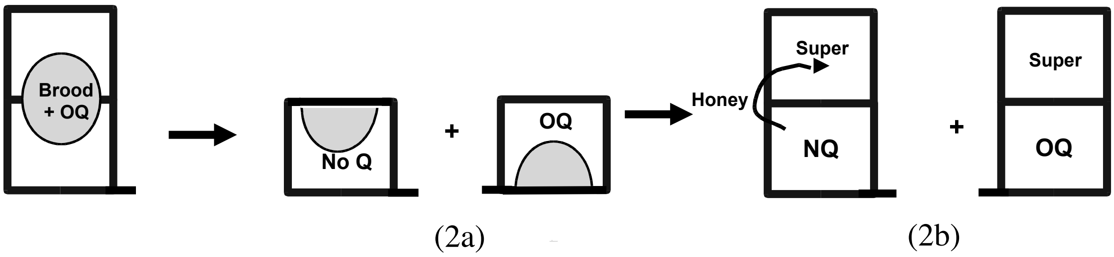

Figure 2 Colony Split – super added to queenright split

Alternatively a new queen or a queen cell can be introduced to the initially queenless unit so that brood raising is minimally interrupted. Not too remarkably any idle bees in each unit will immediately revert to working bees intent on reestablishing their colony. When practiced well before the main honey flow, both colonies will have a good chance of building to produce a good honey crop.

The Demaree Plan

Between 1884 and 1892 George Demaree[3] developed a truly ingenious system. The simple measure of separating the queen from all but a single frame of her brood, by using an excluder, simulates a near brood-free condition (Figure 3a). Nurse bees join the queen, but only as needed, while any excess honey located near the brood nest is moved up into the super to replicate the super reversal scenario described above. In his latter 1892 public oration, Demaree describes his plan very lucidly:

> 'In my practice, I begin with the strongest colonies and transfer the combs containing brood from the brood-chamber to an upper story above the queen-excluder. One comb containing some unsealed brood and eggs is left in the brood-chamber as a start for the queen. I fill out the brood-chamber with empty combs, as I have a full outfit for my apiary. But full frames of foundation, or even starters, may be used in the absence of drawn combs.
>
> When the manipulation is completed, the colony has all of its brood with the queen, only its condition is altered. The queen has a new brood-nest below the excluder, while the combs of brood are in the centre of the super, with the sides filled out with empty combs above the queen-excluder.
>
> In 21 days all the brood will be hatched out [sic emerged] above the excluder, and the bees will begin to hatch [emerge] in the queen's chamber below the excluder, so a continuous succession of young bees is well sustained.
>
> If my object is to take the honey with the extractor, I tier up with a surplus of extracting combs combs

as fast as the large colony needed the room to store surplus. Usually, the combs above the excluder will be filled with honey by the time all the bees have hatched out [emerged], and no system is as sure to give one set of combs full of honey for the extractor in the very poorest seasons; and if the season is propitious the yield will be enormous under proper management...

...The system above works perfectly if applied immediately after a swarm issues. The only difference in the manipulation, in this case is, that no brood or eggs is left in the brood-nest, where the swarm is hived back. - Read at the Ohio State University Convention. Christiansburgh, Ky.'

However, with a 'Demareed' colony, it is also essential to remove queen cells that may develop, supersedure style, in the brood nest largely deprived of queen substance. These cells must be destroyed after a week, or in any case no later than ten days afterwards, to prevent swarming. In a very strong colony, a super containing some drawn comb may be placed above the excluder to further distance the queen from her brood. Extra space will also allow the colony to expand freely. Either way idle bees are put to work.

A hybrid plan, employing a double screen rather than an excluder, further isolates bees from the queen. Here a frame of young brood can be left with the old queen to form the nucleus of a new brood nest. The now isolated queenless unit will develop emergency rather than supersedure queen cells, while the hive entrance in the unit with the old queen is oriented to receive field bees to help form a new brood nest. An entrance is provided for the unit above the excluder to allow drones to escape and to enable the queen to mate.

An attractive alternative Demaree procedure (Figure 3b) – the original Demaree plan – should be much more widely practiced. Here bees are shaken from all frames into the lower super or in front of the colony so that the queen does not need to be found.

With this setup, finding queen cells is relatively easy. Those queen cells will all be in the upper brood nest and frames can be examined without having to resort to removal of the top super. An additional super, placed above the old brood nest (Q), will further separate the the old queen from her brood, will keep bees busy if the colony is very crowded and will facilitate colony expansion (Figure 3c). An excellent account of the Demaree plan using this latter procedure is provided by Snelgrove[4].

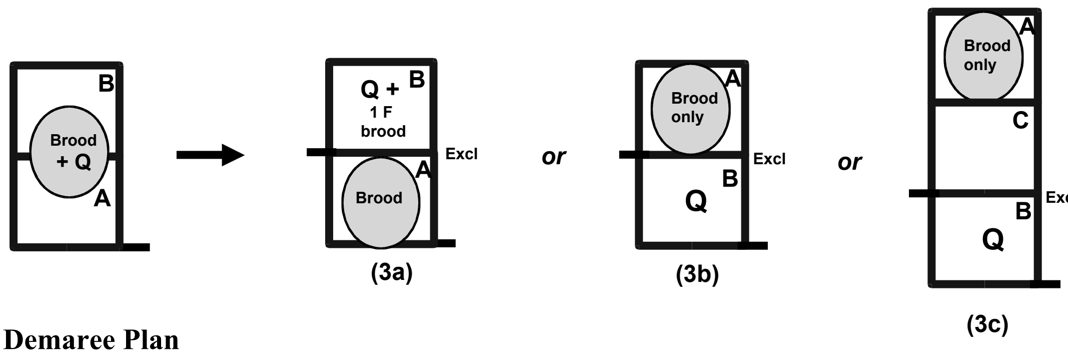

Figure 3 Demaree Plan

At this point we should stand back and ask ourselves: 'Why does the Demaree system appear to work so well'? The likely reason is that, while the colony is maintained as a single functional unit, most of the post swarming conditions are replicated, a vastly decongested brood nest and ample room for honey storage presented by emerging brood. In the Demaree plan the queen, largely, or completely, removed from young workers with its attendants now focussed on tending and thermoregulating brood, will be increasingly employed establishing a new brood nest. At all stages of readjustment idle bees will be kept very busy and attendant to the queen, at least for some weeks, with the clear advantage of there being no break in the brood cycle.

It is worth noting that both super reversal and the Demaree plan delay, rather than entirely avert, swarming. Indeed, and perversely, 'Demareeing' practiced well before the brood nest is expanding rapidly can invite swarming as queen cell development may then be started even if swarming would have otherwise been some long way off. Further attempting to use the Demaree Plan too early in the season before the weather warms up can be disastrous[5] something we have already noted for colony reversal.

Many beekeepers may not realise that a number of their swarm control measures achieve the same goal as the essential Demaree plan. For example, removing brood, young bees and some stores and placing them into one or more nucleus colonies will result in 'swarm caste' bees being reassigned normal hive and foraging duties in the respective parent and nucleus colonies. Since nuclei are usually unable to build good queens, any nucleus colony should be supplied with a young queen or a queen cell.

Whatever swarm delay plan is adopted, once the main honey flow is imminent and the main A
swarming season is over, divided colonies can be reunited by simply removing the excluder (where the units are stacked) or by papering on separately located colonies. Apiarists have found that the new queen present in the top super will usually supersede the old queen below. Anecdotal records suggest that his occurs in about 80% of instances.

However, while large scale beekeepers may not always have time to find queens, I place high value on new queens – provided they are likely to perform well – and always search combs to remove the old queen. It is also sound practice to thoroughly examine remaining brood nest frames for the presence of additional queens especially during the swarming season or if there is evidence of supersedure in progress. Such supernumerary queens are remarkably common and may explain why queen acceptance is sometimes poor, especially in colonies preparing to either swarm or supersede the colony queen.

Repeated supersedure preparations in queenright colony (from which supersedure cells were previously twice removed) at Jerrabomberra Wetlands January 2017
Photo Alan Wade

The net result of the full Demaree plan is the production of a hive much stronger than the original colony even had it never swarmed. A key advantage of the Demaree plan over colony splitting or colony weakening plans is that there is no interruption of brood rearing and that the colony is maintained as single functioning unit.

In concluding this series on swarming in honey bees, Part IV will examine some other methods of swarm control and round off with a summary of the important features of contemporary swarm control practice.

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[1] The majority of Australian beekeepers confine brood to a single bottom super. Provided excessive amounts of honey or pollen are regularly removed and placed above the excluder, there will be ample room for the queen to lay even in a single full-depth eight-frame box. However queen excluders are usually removed from overwintered double box hives to enable bees to move brood up to stores in the upper chamber in late winter and early spring. Like many American beekeepers, I maintain double super brood nests throughout spring and through the honey flow to minimise the risk of congestion-induced swarming. Some recent poor seasons have suggested to me that this strategy may not always be wise at least when conditions dictate that the bees are being given too much space to rear brood.

[2] Möbus, B. (1998). Brood rearing in the winter cluster, Part I. *American Bee Journal* **138(7):**511-514. Möbus, B. (1998). Rethinking our ideas about the winter cluster: Part II. *American Bee Journal* **138(8):**587-591. Parts I and II Rethinking ideas about the winter cluster can be found at http://poly-hive.co.uk/recourses/mobus-bernard-his-work-on-swarming-and-wintering/brood-rearing-in-the-winter-cluster/ *and* Möbus, B. (1988). Damp, condensation and ventilation, Part III: The sinwk, damp and condensation Part I repeated and Part III, Damp, condensation and ventilation, The sink. http://poly-hive.co.uk/recourses/mobus-bernard-his-work-on-swarming-and-wintering/damp-condensation-and-ventilation/ Möbus, B (1998) Rethinking our ideas about the winter cluster. The three parts were originally published in the *July, August and September* 1998 editions of the *American Bee Journal.*

[3] Demaree, G.W. (1884). Controlling increase, etc. *American Bee Journal* **20(39):** 619-620. http://bees.library.cornell.edu/cgi/t/text/pageviewer-idx?c=bees;cc=bees;rgn=full%20text;idno=6366245_6497_039;didno=6366245_6497_039;view=image;seq=9;node=6366245_6497_039%3A2.2;page=root;size=s;frm=frameset
Demaree, G.W. (1892). How to prevent swarming. *American Bee Journal* **27(17):** 545-546. http://bees.library.cornell.edu/cgi/t/text/pageviewer-idx?c=bees;cc=bees;rgn=full%20text;idno=6366245_6511_017;didno=6366245_6511_017;view=image;seq=17;node=6366245_6511_017%3A3.2;page=root;size=s;frm=frameset

[4] Snelgrove, L.E. (1935). *Swarming, its control and prevention.* Snelgrove and Smith. Pleasant View, Bleadon Hill, Weston-Super-Mare, Avon BS24 9JT.

[5] Wedmore, E.B. (1945). *A Manual of Beekeeping for English-speaking Bee-keepers*. 2nd Revised edition, p. 304. republished in 1979 by Bee Books New & Old, Steventon, Hampshire.