

# A Different Twist on Swarm Prevention — Part I of Two Parts

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## THE URGE

The bees' desire to swarm is the basic urge of reproduction. Since they have evolved the complex swarming mechanism to perpetuate the species, it has the compelling force of the mammalian sex drive. Experiments performed with other animals have demonstrated that the sex urge rates favorably with other primary urges such as self preservation.

The general colony management plan is oriented toward the reproductive urge of swarming. It starts with selection of a nest site. Experiments have shown that the scouts select a cavity just under a bushel in size, when larger and smaller cavities are available. Its sufficient volume to store ample winter supplies, when plugged, and small enough to create congestion early in the build up. The early swarm generated by this congestion has the best chance of survival. That is real forward thinking on the part of the scouts making the nest-site selection.

## SWARM GAME PLAN

The "Swarm Game Plan" is comprised of some delicate scheduling and the raising of all three types of bees. The drones and queens raised are intended to support the perpetuity of the parent colony. Workers are needed to populate the swarm and maintain the parent colony after swarm exodus. The more workers available to include in the swarm, without jeopardizing the parent colony, the better assurance of success for both.

You experienced beekeepers, bear with us a minute or two while we plow through this stuff that is quite familiar to you. We'll start with worker rearing since that is already in progress prior to swarm preparation.

The bees have fine-tuned their approach to raising workers into an efficient process. The experts tell us that the newly emerged young bee progresses through a series of job assignments starting with cell cleaning, and larvae feeding. It's not an

accident that those duties are exactly what is needed to raise another cycle of bees in the cells just vacated. Their physiological development is in the proper stage to support those duties. After the next cycle is capped, the new bees can graduate to other duties. The brood cell turnover is not on a one-for-one basis. The number of available brood cells is increasing as a result of stores consumption. Each hatch-out must be able to cover the additional work load of the cells where stores have been depleted.

Raising of drones starts on the second or third brood cycle. Since drones require some maturity to be effective, some lead time is required. Drones are raised for either supersedure or swarming needs. The buildup period is the first time in several months that the existing queen has been called on to produce eggs at a demanding rate. If the bees even suspect that she is not up to the task, they do not hesitate to supersede her early. The drones raised for this contingency are available to support swarming requirements, but the bees continue to raise additional drones through the buildup whether they decide to swarm or not.

When mature drones are present or imminent and congestion has been achieved, two of the three prerequisites for swarm commit are in place. Stores are the final element. Nectar and pollen must be available. At swarm commit, the consensus is that we will swarm. At that point construction of queen cells gets underway. The queen cells are timed such that the first emerging queen can be lost on a mating flight and back up queens are available.

The swarm will normally get airborne prior to emergence of the first queen. The timing of the queen's trim down for flight is a little touchy. She must lay eggs for the later queen cells, but she must be in a non-laying mode on swarm day. With queen development requiring only 16 days, some tight scheduling is in order.

During the time that the queen is not laying in an effort to trim down for flight,

scouts are scouring the area for potential nest sites. Nest-site selection is a democratic activity. When the scouts reach a consensus on the best location, they maintain a small force there to stake out that site until swarm day.

The "Swarm Game Plan" can be summarized in two words; make bees. The objective is to duplicate the parent colony. This is done with worker bees and the existing queen.

## OTHER CONSIDERATIONS

Most of the above is common knowledge to the average beekeeper, but there are a few other observations that we would like to identify in the context of swarm cause and effect. Review this list of assorted observations to see if you can tell where we are headed in Part II. These observations were noted from over a hundred hives of bees of unknown ancestry. From their appearance, several origins are represented. They were accumulated from swarms and tear-outs of buildings and are generally feral bees in hives, so the observations are made on a fairly good cross section of genetic background.

1. A vigorous queen can lay enough eggs to keep about two and a half hive bodies of brood rotating in successive brood cycles. If she is constrained to less brood volume than her peak production capability, she has idle time. In our 9-frame-brood boxes, the outside frame of honey is held in reserve and the second from outside is normally the pollen stash. This leaves 5 frames for brood.

2. The bees resist storing above their honey dome. This may be because in the wild the top is a constant. A new swarm settling in a cavity, goes to the top and builds comb downward. Any excess honey is stored at the top and sides of the brood nest. In this configuration, there is no place to store nectar above their band of open-cell feed honey; any additional space is sealed honey. Our flexible top hive is an aberration to the bees and "moving into the supers" is an unnatural course for them.

Pursuing this thought one step further, when supers are added above a queen excluder, the excluder is a barrier initially. Fortunately for us, the bees are quite adaptable and learn to cope with both the flexible top and the porous barrier.

3. When the nectar flow starts, brood-nest expansion stops. The nectar has to be stored in cells available. The band of open-cell-feed honey is expanded downward into the brood nest. In this area, we often have the second hive body full of nectar, where brood had been, prior to storing in the supers.

4. We see reason to suspect that the newly emerged bees are loyal to the area of comb from which they emerged. When a frame of perfect brood comb is added for brood taken, the bees ignore the new frame of brood comb, even in the middle of their brood nest, for some time ("It's not MY room to tidy up.") The work force to prepare that frame for eggs emerged elsewhere. A frame of foundation substituted for a frame of brood during the buildup becomes a ladder only. All that happens to it during the buildup is that it becomes travel stained. Drawing comb is not in the "Swarm Game Plan" at all.

5. In the buildup to swarm commit, the bees only look up. The configuration of the hive below the brood nest is not of interest. We know they are reluctant to expand into an empty lower hive body. The primary focus is on the area of open-feed cells between the brood nest and the stores above. That is where the action is. The effort is concentrated on raising brood and expanding the volume of the brood nest up into stores.

6. Bees not required to support the primary mission, or not mature enough for foraging, like to lounge in the warmth rising off the brood nest. This concentrates most of the bees in the top of the hive. The likelihood of congestion increases with each wave of newly emerged bees generated by another brood cycle. Congestion is the goal, because it is necessary to initiate "swarm commit".

The increase in bee population is sometimes referred to as an explosion. It's only an explosion if you do not understand the mechanics of the process. The air space between combs cannot contain the bees that emerge from both sides of that space. Further, the brood volume will about double by the third brood cycle. We'll let the college kids do the arithmetic, but it's easy to see that the hive soon runs out of air-space upstairs in which to contain the additional bees. The new bees created by brood-nest expansion into consumed honey have much greater volume than the stores depleted.

The extra bees are overhead in two senses of the word. They are literally "upstairs" and the intermediate age bees are not gainfully employed in the primary mission. The growth in numbers of overhead bees causes the density to increase

and the volume to move downward. This is occurring at the same time that brood nest expansion is moving the activity center (feed cell band) upwards. When the two overlap, the excess bees interfere with the primary mission of feeding young.

7. The bees will make brood space to raise drones even if they have to rework worker cells to drone size. They will even locate drone-sized cells in the overhead honey across several inches of capped honey. They will dry those remote cells and escort Mama up there to fill them with eggs. Those cells may be out of the general outline of the cold-night cluster, but some bees are detailed to take care of that mandatory drone brood.

8. The bees prefer to expand their brood nest laterally rather than upward. If you look at freestyle comb on a flat overhead surface, you find many slabs of comb that are wider than they are deep. The outside slabs are solid honey top to bottom, and there may be several on both sides. Since the attachment surface is only inches above the brood nest, any expansion of the brood nest has to be into adjacent comb.

We recognize that this entry is contrary to conventional wisdom on the subject, but we feel that is a result of that wisdom being distorted by the limitations of the standard hive (see item 1). A small cluster will move laterally into capped honey before there is any significant expansion upwards.

9. It seems that when the bees start to work in the supers, the drive to swarm is lessened. They may still swarm while working in or filling the supers, but the route to swarm commit is not quite as direct or single purpose. Further, if the brood nest breaks through the honey barrier and brood is raised in the honey supers, all interest in swarming is gone.

(Part II will be printed in the April issue.)



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