SWARM PREPERATION

Walt Wright

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In this edition of survival characteristics, the operational changes of the colony during the swarm season are described. There are discrete steps in the swarm preparation process. Satisfaction of each step prompts a change in operations to reach the next step in the process. The progression through the steps in order protects survival of the parent colony. You will see how this works as we wade through the description.

The fact that you will find none of this information in your favorite reference book does not make it any less true. If you look for the effects in your hive, you can confirm that the concepts are valid. Of course, it is easier to just reject the concepts because they are new to you.

Species survival by generation of the reproductive swarm is the basic objective of every over-wintered colony. The whole build-up period is dedicated to increasing the population to support division by the reproductive swarm. Division needs to occur in time for the offspring swarm to have a chance at getting itself established that season. The target issue period is about hardwood green-up or leaf-out. There is substantial forage availability after that point in the season. Most trees bloom in the period of leaf-out, and the smorgasbord of forage sources helps the fledgling swarm to establish itself in its new location.

If you think about the build-up being dedicated to reproduction, you will know that it is true. Re-supply of the existing colony could easily be accomplished with half the build up population. That is exactly what happens in the swarmed parent colony. They have no problem re-supplying Winter rations with half the work force; even less in the case of after swarms.

The first activity of the colony in quest of reproduction is brood nest expansion. In the early expansion period, the emphasis is on honey consumption to free up cells for more brood. Early foraging is primarily for brood-pollen and water. Water is preferred to thin honey for feed consistency. If water is not readily available they can use nectar. Those forage sources that they work for brood-pollen generally have ample nectar also. In my area, American elm and maple both have good nectar that the bees will gather if they have empty cells in the cluster. The well-provisioned colony has no need for the nectar from these sources under normal circumstances.

The starting of drone rearing about mid build up was mentioned as an operational change on the summary of year-long changes. However, drone rearing does not seem to be a prerequisite for completion of the swarm preparation requirements.

FIRST OPERATIONAL CHANGE – REDUCE BROOD VOLUME

The colony does not use all the over-Wintered, capped honey for brood nest expansion if they have a choice. In northern latitudes where bee literature originates, and they leave marginal stores for wintering, this survival trait is less conspicuous. In the Southeast, it is obvious. The colony saves a reserve to offset extended periods of non-flying weather or a forage dearth. They feed on incoming nectar and maintain the reserve through the swarm preparation season. In my area, the reserve is equivalent to somewhat less than a shallow super of capped honey. However, if the top box *is* a shallow of honey, the reserve will be more. The colony generally will open no honey in the shallow at the top, and have the additional honey in the outside frames of the brood chamber(s).

The colony decision to stop brood nest expansion at the reserve limit initiates a change in operations. They have generated the maximum population possible for stores available. They can now safely move into swarm preparations. The first action of swarm preparation is the reduction of brood nest size. They must reduce the brood nest size to a level that can be managed by half the population after swarm departure. They start at the top of the brood nest, filling brood cells with nectar as brood emerges. With brood of all ages in the expansion dome at the top, the brood nest reduction may take three weeks or more.

Though the population continues to increase, the population/stores balance is roughly maintained by adding nectar all the way. They are also maintaining the capped honey reserve through the brood nest reduction period.

You were told up front that the steps to swarm commit protected survival of the parent colony. The brood nest reduction, by accumulation of additional stores, is a major part of that picture. Protection of the capped honey reserve until woodland nectar approaches peak is also significant.

There is considerable variation between colonies in their judgment of how much brood nest reduction is enough. It will usually fall between a third and a half of the maximum brood nest size. A little 5th grade arithmetic might help make the point. A colony with ample overhead space will generally have a cluster that is 50% greater than the brood volume. Although not normally seen in a colony restricted to a double deep, it is easily seen

when space above is provided. The total cluster then is 150% of the brood volume. If the brood volume is reduced by a third, to 66%, and half the bees leave with the prime swarm, the remaining bees can easily protect the brood. Seventy-five percent of the bees left, and 75% stayed. The safety margin is the difference between the 75% *bee* volume and the 66% *brood* volume. The bees have a safety margin built into nearly all survival characteristics.

This nectar congestion (pollen when nectar is scarce) is advance notice of swarm intent. For the beekeeper to monitor for swarm cells puts him at a disadvantage. When swarm cells are started, the colony is committed to swarm, and changing their mind is more difficult. If you intend to head off swarming, it would make better sense to monitor for brood nest reduction. You would have three weeks lead time on colony commitment to swarm.

SECOND OPERATIONAL CHANGE – START SWARM CELLS

When the brood nest is sufficiently reduced, swarm queen cells are started. Swarm cell generation is normally about a two-week effort. The earliest cells are populated with eggs on cups already in place for some time. Those primary cells are given the best care and produce quality queens. Back up cells are generated into the brood nest interior and are not generally as large or as well cared for.

Both the brood nest reduction and the starting of queen swarm cells must precede the seasonal operational change timing of reproductive swarm *cut off*, which is fixed with the vegetative season advancement. The colony development is dependent on a multitude of variables; colony strength, forage availability, flight weather, etc. The colony that has not started swarm cells *before* the season cut off date cancels reproductive swarm ambition. The cancellation is sudden and total, no matter how close they are to populating a swarm cell. They may have already started adding additional cups for back up swarm cells. Close is not good enough. Other operational changes associated with reproductive cut off are discussed in the seasonal operations summary.

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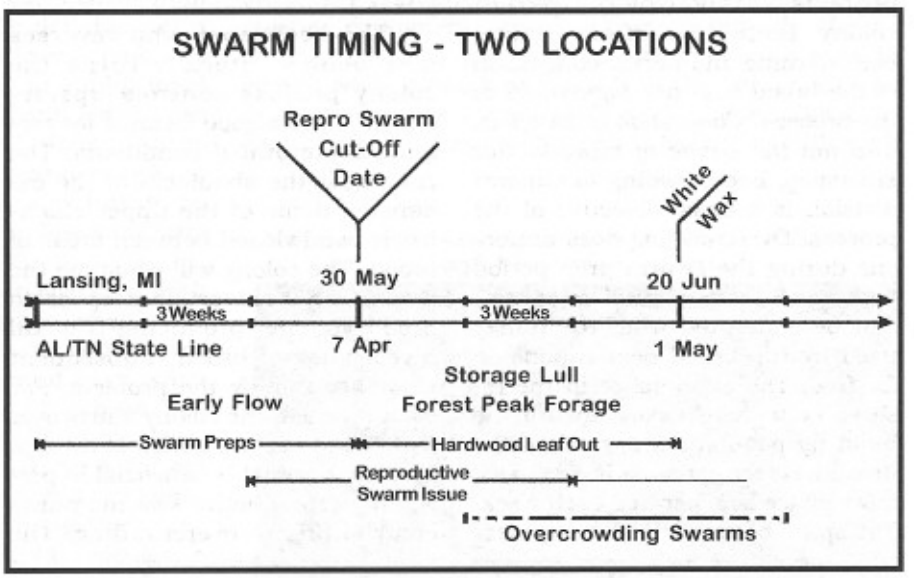
SWARM ISSUE

There are several factors that influence the colony decision to put the swarm in the air. They must have replacement queens nearing emergence and backup queens for later in case the primary virgin is lost for any reason. In addition, they must assess weather conditions, and adjust the issue date to protect the swarm that is exposed after leaving. They have techniques for delaying the emergence of potential replacement queens, but those are only effective for a few days. The colony would rather not, but if forced to by conditions, they will issue the swarm in less than optimum weather.

Reproductive swarms can be issued either before or after reproductive swarm cut off timing. Reproductive cut off produces major operational changes in colony activities, but swarm issuance has minimal effect on operations. Wax makers generated during swarm preparation that do not leave with the swarm will deposit their wax holding in the first few days after swarm departure. Those wax makers will normally deposit their wax as bridging or burr comb in the brood nest. They purge their wax holdings to prepare for foraging. The colony will generate a new wave of wax makers for the main flow.

Some of these same words were used to describe wax maker purging at reproductive cut off. Although both groups of wax makers were generated to support comb building of the swarm after relocation, their purging is triggered by a different reason. They are two distinct, separate groups of wax makers whose timing is different, dependant on whether the colony abandons swarming at reproductive cut off or issues a swarm. The next time you see swarm cells in tear down, note the new wax deposits in the brood nest. It may not be white, but it is definitely new.



An abbreviated summary chart of Spring operations for two locations for which I have data is included, plotted against the calendar. The dates for these changes will vary with latitudes as we move north or south of the two locations. The spread between my location and Michigan is about seven weeks. To establish when reproductive swarm cut-off timing occurs at your location, count backward on your calendar a full worker brood cycle *preceding* the main flow. If we use Dr. Farrar's brood cycle of 24 days, that's

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a strong three weeks prior to the appearance of white wax at the start of the main flow.

The dates are approximations for both locations. Seasonal variations can move the key milestones either way by a week, or slightly more. The primary timing judgment is reproductive cut off. Other milestones on the chart slide forward or backward on the calendar with reproductive cut off. But, ***your best indication of seasonal timing is the appearance of white wax at the beginning of the main flow.*** After a few seasons of logging white wax appearance dates, you can fairly well predict the date of reproductive cut off.

The reproductive swarm game plan is an orderly progression through steps to reproduction that protects survival of the parent colony. Both types of congestion, bee crowding and nectar congestion of the brood nest are *byproducts* of the process. *Congestion is an effect, and not the cause of reproductive swarming.* Bee crowding to support division is a basic objective of the process. Overcrowding does not occur during the swarm prep period because a limited number of bees can be generated from the honey used by the brood nest expansion for feed. The extra space in the reserve honey can easily absorb the build up population. And when the brood nest reduction is in progress, more space is generated each week. The space between combs is greater in brood combs because the cells are not as deep as capped honey. The space generated by brood nest reduction (nectar in brood cells) will absorb much more of the increasing population. And the number of new bees emerging is decreasing by virtue of brood nest reduction in size. If permitted to do it their way, overcrowding is not a problem in the swarm prep period.

The concentration of bees at the top of the cavity is actually an asset to the colony anticipating swarm. The swarm needs to leave the parent colony with substantial number of wax makers. We are told that wax makers need at least 100°F to have the wax glands secrete wax. The concentrated bees above the brood nest 90+° area can elevate temperature to the wax making range. (Bees can stand temperatures much higher than you might guess.)

The beekeeper who reverses hive bodies, literally turns the colony process controls upside-down. That's a good formula for creating overcrowded conditions. The reserve at the shoulders of the expansion dome of the upper chamber is sandwiched between areas of brood. The colony will consume the reserve and convert that space to brood volume, producing two full hive bodies of brood. Subsequent reversals amplify the problem. For each reversal, the colony starts over with brood nest reduction at the top. Periodic reversal is beneficial in preventing reproductive swarms but is contributing to overcrowding. The beekeeper who does not start adding space for the additional population with the first reversal is begging for overcrowding swarms.

The chart entry on overcrowding swarms is arbitrary. Overcrowding is the result of beekeeper management technique, and we would not presume to guess what that might be. If you have large swarms in the period of the start of the main flow, or later, you can bet that they are overcrowding swarms. Although increasing population of the colony is an advantage to the beekeeper from the honey production standpoint, it can be carried too far. When the colony is crowded to the point of affecting internal operations, and creating an overcrowding swarm, it becomes counter productive.

Overcrowding swarms are the result of another survival trait of honey bees. To protect survival of the existing colony (priority one) a swarm is generated to reduce an out-of-balance condition of excess population. That swarm is generated later in the growing season than the reproductive swarm and is expendable.

This abbreviated chart is included to show the relationship between the swarm season and the woodland seasonal development for two locations. A more complete chart of Spring colony internal operations will be provided in a later article. BC

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