SMALESCALE QUEENREARING

Sideline Queen Production Objectives

Larry Connor

The easiest way there is to raise good queens.

In November I attended the 85th annual Florida Beekeepers meeting in St. Augustine, where the topic of African honey bees (AHBs) took up a major part of the agenda. The presentations reviewed a wide range of this topic, but by the end of the day it was pretty clear that AHBs are present in many areas of Florida, but – few notable exceptions – at very low levels. A large crowd of beekeepers from Florida and neighboring states attended to learn about the depth of this invasion. When Florida Apiary Inspector Jerry Hayes showed an animated graphic that added dots to a map of the state of Florida where AHB samples had been confirmed, the audience seemed to comprehend both the depth and breath of the invasion.

The current status of AHB in Florida means several things. First, all beekeepers in Florida and neighboring states will need to be very sensitive to the presence of AHB in their apiaries, regardless if bees are kept in suburban or rural areas, since bees are moved so much from one area to another within the state, and to other states. Florida has many points of concern, with its large retirement age population (less able to run away from stinging attacks), countless pets, a valuable horse and cattle industry, and those seasonal creatures that move into the state from the North each Fall and spend the Winter.

Second, as brought out by the Florida Farm Bureau and others, is the recognition that existing beekeepers are the solution, not the problem in regards to the African bee genes in the state. Managed colonies pose less of a threat than unmanaged feral colonies. This leads directly to the balance of this and future articles.

Third, swarms of unknown origin are a liability and clearly no longer an asset. Should new or hobby beekeepers collect swarms and install them in their hives? Probably not. Colony removal from buildings and other structures will require professional training, offering a new niche market for the willing beekeeper with the proper training, governmental certification and liability protection.

Fourth, the level of colony management increases, again. In addition to the usual hive manipulations, beekeepers add to their mite and hive beetle controls the need to check for invasion of their hives by small swarms of bees and a queen, bees that will wait to slip into the entrance of the hive and let the African queen destroy the queen in the hive. Military teams would benefit from the skill of invasion these small swarms possess.

Finally, of course, the media and public responses are heightened wherever there is a stinging incident. While this has lost the luster of attracting the national news, it will make great fodder for local papers and TV's "if it bleeds, it leads" mindset.

So what is a Florida beekeeper to do about a queen supply? What should a Massachusetts beekeeper do when bees from Florida are brought into nearby cranberry bogs for pollination this Spring? What will beekeepers throughout the country do when bees from Florida are spread out for honey production in their backyards?

Initially, most of these beekeepers will not need to do anything but keep their eyes open for defensive behavior by colonies in their apiaries. They should visit their apiaries often, and walk the yard, staying close to the hives (without smoking first, and while wearing protective gear) and observe those colonies that send out bees that hit the head and body without stinging. This is a step in the defensiveness behavior that precedes stinging. If bees hit you in the head or veil repeatedly, they are suspect, and must be watched carefully. If the bees are very defensive and sting a lot during colony manipulation, a sample should be sent in for testing.

Any highly defensive colony should be moved to an area away from potential harm to people and animals, and requeened (if possible) or depopulated with a solution of soapy water.

This article is the first of several to deal with the development of a small-scale queen rearing operation in areas where there are, or are not, AHBs in the area. Some of the same strategies apply to both, and we will carefully note the differences.

Stable supply of quality queens

Prior to the widespread find of AHB in Florida, there were a number of states with AHB, and all have provided protections of various types to minimize the spread of bees from those areas. But the widespread, albeit low level finds in Florida will make it very easy for AHBs, which are hybrids between European and African bees, to slip out of the state as they go to California for almond pollination, or to your state for honey production.

A second, widely-discussed topic in St. Augustine was the general problems with queens this past Summer. There are many, many reports of queens failing and then not being superceded. In these colonies, the queen disappears and no replacement cells are found. The colonies become hopefully queenless and respond

poorly at any effort to requeen them. The frequency of these losses was *staggering*, with 50 to 100% of all increase colonies losing queens during the summer of 2005. There are reports that this behavior had stopped or at least slowed in the Fall.

There is no clear indication of the cause of this failure to supersedure. There were many unrelated stocks demonstrating this behavior, which tends to rule out a genetic cause for the problem. Likewise, this is not a behavior associated with poor mating, since there were few colonies with drone layers. The queens just disappeared and were not replaced.

Chemical contamination is still a possible explanation, but no hive chemicals have been directly linked to this behavior. I'll refer to this as a "failed supersedure syndrome" in the rest of the article.

Beekeepers who did not experience this should be appreciative, and watchful for such a development in the future.

Stock acclimatized to area

Most beekeepers understand the value of using a bee stock that is fine-tuned to local environmental conditions of the area in which they are kept – timing their seasonal buildup to coincide with available nectar and pollen sources. When found, they use local stock with good wintering, buildup and production for queen propagation. This is excellent, but has limitations, since it may overlook improved stocks available to enhance these locally acclimatized colonies. Some effort should always focus on stock improvement utilizing the local, acclimatized stocks as the base of such efforts.

Stocks with proven mite tolerance/resistance are highly desired by most beekeepers, as are stocks with proven hygienic behaviors that will reduce disease losses. These stocks must also produce a nice brood nest, a satisfactory honey crop, and meet other needs of the beekeeper.

There are many stocks available in the marketplace that will serve as either breeder queens or drone mothers for stock enhancement programs. ***Breeder queens*** are usually instrumentally inseminated or mated in isolation, and are a good source from which to produce multiple queens for commercial and large sideline beekeepers. Because of their cost, they may be unjustifiable for many hobby and sideliners.

When an instrumentally inseminated (II) or isolated-mated (IM) queen is used as a breeder, all her daughter queens are a suitable source for drones of the stock the queen incorporates. We call these queens ***drone mothers***, and the II/IM queens are called ***drone mother breeders***. Their use in breeding programs presents a lower cost option for many hobby and sideline beekeepers, for the beekeeper may obtain numerous queens for less cost than of a II/IM breeder queen. Once safely installed in colonies, they can be stimulated to produce drones that carry the genetic traits equal to those of the queens. When enough of these drones are produced in an area they will make a significant (but not total) change in the genetic makeup of the production colonies in the area.

Mating a mixture of drones from survivor stock queens with some level of local acclimatization along with drones from purchased drone mothers will increase the genetic diversity of the drones mating to all queens in the area. There is growing evidence that this diversity is key to good disease control as well as mite tolerance/resistance.

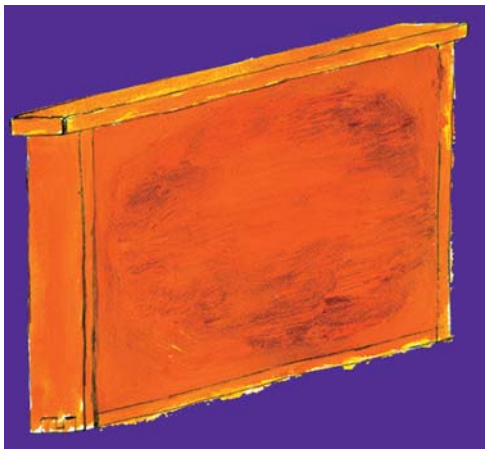
Cost of self-production

Delay in availability

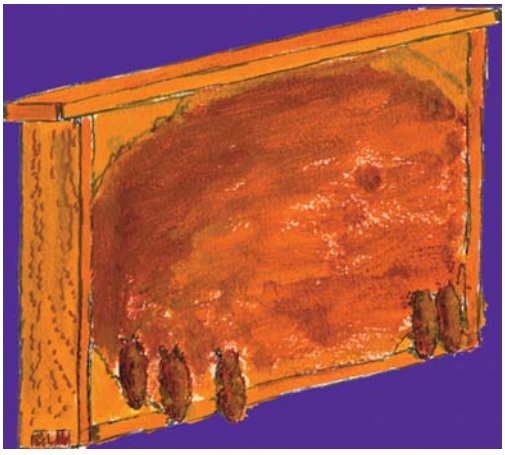
Many beekeepers avoid producing queens for the simple reason they think they MUST have all the queens they need for the year very early in the season. For many Northern beekeepers, this means having all queens from early April to the middle of May. The common perception is that after mid-May the queens cannot be employed in colonies that will be productive that same year.

This "calendar argument" starts to fall apart when 30, 50 or a larger percentage of the early season queens

Step 1. In order to use swarm cells for the production of new queens, you will need to make up a new colony called a nucleus or an increase colony. Select frames where most of the brood is sealed and preferably those with young bees emerging. You can actually see where the bees are cutting open the cells from the inside! These young bees will help grow the population of bees very quickly. You may find brood frames in more than one strong colony and remove them from the hive. Carefully shake or brush all the bees off the frame, making special effort not to injure the queen. Place two, three or four of these brood frames in the center of a 10 frame hive body.



Step 2. Go to the colony in which you found swarm cells. These will appear as peanut shaped cells positioned between the frames, and usually at the bottom. Make sure you do not damage any of these cells. You may use frames with multiple cells and let the virgin queens fight to decide which one will survive. Later you may cut out cells. Remove this frame and carefully BRUSH off the bees that appear on that frame. When the bees are removed, place the frame into the center of your nucleus colony, between frames of brood.



fail the first year, usually within the first month. Since the loss of the genetic traits is 50% each generation when no "like" drones are in the area, in three supersedures, a colony has only 12.5% of the original genetic material remaining. In addition to increased defensiveness (a frequent consequence of supersedure), these bees are nowhere near what they were supposed to be in the original colony.

Northern beekeepers can start queen rearing in late April or early May, depending upon the season, drone production, and local beekeeping history. This generates queens laying in increase nuclei in May and early June. If carefully done, these queens may not experience the high queen loss and will often out-produce colonies that have been subjected to multiple queen failures.

Over wintering mated queens

Brother Adam kept new queens in small hives for a year, including the Winter, before using them in production colonies. These were strong, vigorous, tested queens he used to requeen production hives the next Spring. Over wintering queens in nuclei is possible, and though not guaranteed, has been demonstrated on these pages. When successful, queens are not only available for the season, but they are tested and known to the beekeeper, and produce a viable option for queen success for both sideline and hobby beekeepers.

Benefit of self-production

Quality colonies from unstressed queens

The stress a queen experiences when shipped from a distant production yard to your apiary is considerable. If the queen is removed from a mating nucleus (called a baby nuc because of its small size), she will have laid just 500 to 1000 eggs for a day or two before she is removed. Thrown into a shipping cage (wood or plastic) and shipped with worker bees either in the cage with her or surrounding her and other queens in separate cages, she will be subjected to the rigors of shipping that include overheating, chilling, rough handling and even perhaps, pesticide exposure.

If introduced quickly into a colony she will not have yet produced normal pheromone production and will still be under stress from the shipping experience. She will be dehydrated, lighter in weight due to shrunken ovaries because her egg laying has been shut down, and probably hungry. This too is associated with reduced queen pheromone production.

Compare this to a queen that is laying in a nucleus in the apiary, and is simply transferred – queen, bees, frames and all – into a colony to be requeened (having removed the old queens before hand). She is subjected to very little stress, she will continue laying and the general disruption of adding a nucleus to a hive seems to deflect any fighting or aggression toward a new queen in *European* stock. If requeening an AHB colony, use the newspaper method to combine the two hives. If she is laying and vigorous, the new bees will accept her without question. A light feeding is required, of course, at any time you introduce a queen.

A queen may be obtained by moving a frame of queen cells into a queenless colony. The beekeeper finds swarm cells and then moves the frame and cells into a nucleus colony. Or the beekeeper may have produce a queen cell using some other method and add it to the nucleus when it was made up. With good rearing conditions and gentle handling, the queen has little stress exposure from heat, cold or pesticides.

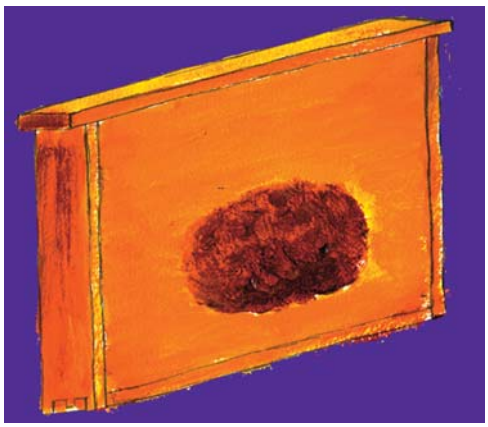
There is the risk of not having enough drones to mate with, and a knowledgeable beekeeper will have stimulate in advance certain drone mothers so as to have abundant drone brood sealed for at least five days before starting queen cells. If swarm cells are used, the beekeeper should see abundant (many hundreds) of drones *emerged* in each colony dedicated to drone production for queen mating.

Sale of extra queens to area beekeepers

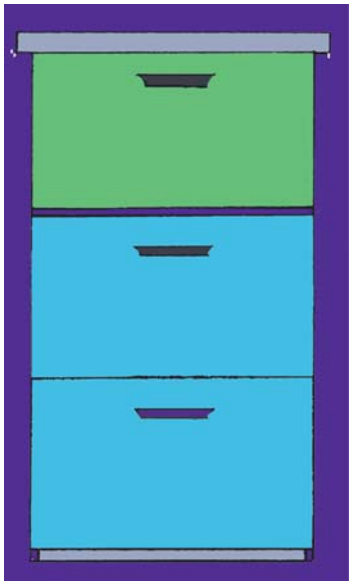
The sale of surplus queens is a growing potential for most beekeepers. Even if you sell one added nucleus colony, at 2005 prices of $65-75 for a five frame nucleus, the income will be worth the extra bit of effort required to produce the colony. And, from my perspective, that fee is more than fair to the purchasing beekeeper if the seller is a known, trusted area beekeeper.

A sideline beekeeper with just 25 hives may keep

Step 3. Find frames of honey and pollen from your strongest colonies, or from stored comb. Select at least two of these combs, since they will provide 10 to 12 pounds of honey if filled. One of these frames should have an area of pollen on it so the bees have a quick source of protein for brood rearing. The bees will continue to forage and add to this food supply, so this acts as an insurance against inclement weather. Place these two frames at one end of the nucleus colony.



Step 4. Arrange the combs you see here. From the top of the image: Two frames of honey and pollen (yellow). Three frames with emerging brood, one of which holds queen cells (gold). These must be carefully moved so as not to damage the cells. A frame of brood and pollen, or lacking that, an empty comb (brown). Three or four frames of drawn empty comb (red), that may include a drawn drone comb (green). This image shows nine frames total, a precaution I use because it is so easy to damage queen cells by squeezing frames together. With nine frames you have extra space. Once the queen is laying, you should add a tenth frame.



Step 5. Place the increase hive body on top of a strong colony in the apiary, preferably not one you have removed brood from. Separate the two hives with a queen excluder. Since the brood is not covered with bees, young nurse bees will crawl through the queen excluder to cover the brood. After several hours it will be easy to remove the increase colony to a new permanent bottom board in the same or another apiary. It is not necessary to move these bees since they are all young and have not flown. For further details on this procedure, consult G.M. Doolittle's, A Year In An Out-Apiary*, reprinted in 2005 by Wicwas Press.*

20 to 40 five frame nuclei at all times during the season, housing self-produced queens for a constant supply in his or her own operation and for sale to other beekeepers. If the queen came from cells produced during the Spring buildup and mated when forage and weather conditions were optimal, the queen should will be ideal for local conditions.

Queen cell production methods

Simplest method: using queen cells from swarm cells

G.M. Doolittle promoted the production of queen bees by transferring larvae from one cell to a queen cup in a process commonly called grafting. But Doolittle also championed the use of queen cells that were naturally produced by bees under the swarming impulse, and by doing so, eliminating the need to deal with the entire queen cup, grafting tool, cell starter, cell finisher process needed for other methods of queen rearing. He considered these to be the best produced queens a colony could make.

Doolittle always kept a minimum of 20 pounds of food (stored honey) in Spring colonies, and added frames containing honey if the colony has less than that amount. During the spring, all colonies were watched carefully for buildup, and equalized by moving both brood and food resources so all colonies were building at the same rate. When one colony started to build swarm cells, all the colonies were at roughly the same point of development, and Doolittle would harvest the frames with queen cells to make up new colonies.

This process removed bees and brood from colonies, and by doing so reduced their swarming instinct in the colonies. Repeat visits ensured the colonies did not swarm by removing additional brood/bees and yet keeping the colonies at a maximum population for nectar gathering in late Spring and Summer.

While it is possible to look at all the frames to be removed from a colony to make an increase colony and find the queen or queens, many newer or timid beekeepers will find it easier to gently brush off the bees with a bee brush from frames possessing queen cells. Every effort must be made not to touch the cells themselves. There will probably be multiple cells. Some may be removed if small, but nature generally sorts these matters out better than humans and I leave all the cells on the frame on the chance that my clumsiness may damage the cell I want, so another will be there to do the job.

Once the bees are removed from the frame of brood with the queen cells, remove two to four additional frames of brood from the same or other colonies (depending upon colony strength). Place this brood in a hive body over a queen excluder placed on top of a strong colony you have not removed bees or brood from. Put on the lid and leave the brood for an hour or more. When you return the nurse bees from below will have moved through the queen excluder to cover the brood.

Carefully move this hive body to a new position (since these are all young bees, you do not need to move the bees to another apiary). Place the hive body on a hive stand and fill up the box with three frames of honey and empty combs. Reduce the size of the entrance of the hive at this time if you have not done so already.

The emerging bees from one frame of brood generates up to 3,500 worker bees, so four frames of sealed and emerging brood will add up to 14,000 bees to this colony over the next 10 days or so. A sealed queen cell has no more than five days before the queen emerges and then 10-12 days to start laying. While the queen is finishing her development and mating, the bees will grow the colony with additional food reserves and build comb. So within three weeks after you make up the colony you should have a healthy laying queen in the increase nucleus. I recommend you mark the queen at this time to identify her as the queen from the colony source you removed the queen cell from.

At this point you may consider this colony a regular production colony, checking during the season that the queen is still present. If the queen is marked, you can compare her survivorship against queens you purchase from other sources, and reach your own conclusions about your ability to produce a quality queen.

Next month: Non-grafting methods for queen rearing. BC

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