

# The Advantages of Using Nucs in Beekeeping Operations<sup>1</sup>

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Nucleus colonies, commonly called “nucs”, are smaller versions of full-size Langstroth colonies (Figure 1). They usually have the same length and depth dimensions as full-size colonies, but nucs are not as wide. As such, nucs may hold 3-5 frames compared to the 8-10 frames typically held by a full size colony. A second type of nuc, commonly called a “baby nuc” or “queen mating nuc”, exists but is smaller than full-size colonies in every dimension and is used primarily for queen bee production. Queen mating nucs will not be discussed in this document. Rather, we will focus on five-frame nucs exclusively, although three- and four-frame nucs can be used and managed almost identically.



Figure 1. A five-frame nuc is a hive that is often preferable because it can accommodate standard equipment (notice the queen excluder and medium super on the nuc).

Credits: A. Ellis

## Creating a Nuc

Because Africanized honey bees are present in Florida, it is recommended that Florida beekeepers purchase mated queens from known European queen providers for use in newly made nucs. Nucs can be made during much of the year in Florida and elsewhere. Here we discuss making nucs in spring before the primary honey flow, though many beekeepers in Florida use similar techniques to produce nucs in summer and early fall. The techniques described here can be used throughout most of the year in Florida (February–September) and can be amended to meet one’s particular goals. Before creating a nuc, the full-size or “parent” colonies (those that will be split) need to be prepared. Parent colonies should be fed a 1:1 sugar water mixture in mid to late February, or when daytime temperatures consistently exceed 60°F. Pollen patties may be fed to the bees as an additional stimulant, but are not always necessary. Both sugar water and pollen patties stimulate colony build-up/brood production and make colonies prematurely strong (stronger than they otherwise are this time of year). The goal is to split the colonies early enough so that they can rebuild their population before the primary spring honey flow begins. Feeding the parent population three to four weeks before the main flow allows the population to grow to pre-split levels.

Weather plays an important role in determining when one should split colonies. If late winter or early spring is

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unusually cool, feeding and split dates should be postponed. Nucs also can be made in the summer after the major nectar flows conclude. If done this way, one can forgo feeding the parent colony because colonies are strong enough to be split without being stimulated artificially. That said, feeding colonies while making nucs usually is advantageous to both the parent colony and the nuc.

Once the parent colony is strong enough to split, take two frames of eggs, one frame of capped brood, and one frame of pollen/honey from the parent colony (leave the queen in the parent colony), all with bees, and place them into an empty nuc box. Finally, add one frame of foundation to the nuc. A nuc can be made with as little as one frame of eggs and one frame of capped brood from the parent colony with three additional frames of foundation. If the nuc is made this way, the nuc colony will need additional feeding since there is no frame containing pollen and honey. If choosing the latter method, an additional frame or two of bees will need to be shaken into the nuc to ensure enough bees are present in the nuc.

Fill the voids in the parent colony (which still houses the queen) with four frames of foundation (pulled combs are even better) placed toward the outside of the brood box. Continue to feed the parent colony a 1:1 sugar water solution to build the population to the pre-split level (if done in spring) and to pull out the foundation if you did not use pulled combs. The parent colony generally does not need to be fed any longer than two to three additional weeks because the honey flow will be approaching quickly and the bees will be able to pull out the foundation using incoming nectar. If nucs are made during summer, the parent colony must continue to be fed in order for the bees to construct comb on the foundation. If pulled combs are supplied to the nuc and the parent colony, it is possible that neither will need to be fed.

## Rearing Queens for Nucs

At this point, the newly made nuc is queenless. This may be addressed in one of two ways: purchase and install a caged queen from a queen breeder or raise your own queen. **Note: In Florida, FDACS and UF/IFAS personnel recommend that you requeen your nucs with queens produced in areas where Africanized bees are not present or from queen breeders who follow FDACS Best Management Practices for rearing queen honey bees ([http://www.freshfromflorida.com/content/download/24006/486787/bmp\\_hbq.doc](http://www.freshfromflorida.com/content/download/24006/486787/bmp_hbq.doc)) rather than allowing colonies to requeen themselves. In areas of the country where Africanized**

**bees are not present, a nuc can be allowed to requeen itself.**

The bees in the queenless nuc will construct queen cells on the frame(s) of eggs you placed in the nuc. When the queens emerge, they will mate with drone bees in the surrounding area. If you maintain fewer than 10 colonies, it is best to move your queenless nucs to another beekeeper's apiary so that the risk of queens mating with related drones (inbreeding) decreases. Always be sure to inspect the beekeeper's apiary to be sure disease is well managed and a good bee stock is maintained; otherwise move the nuc to another one of your own apiaries. If the nucs are located in another beekeeper's apiary, when virgin queens emerge from their cells, there will be an ample supply of unrelated drones with which to mate. Queenless nucs often make a large number of queens cells (10+). We recommend that one week after creating the nuc, you go into the nuc and remove all but the two or three largest queen cells. The first queen that emerges will kill her competitors and becomes the reigning queen. If four or more queen cells are left to develop, the likelihood that the nuc may issue swarms with multiple emerging virgins increases.

Three to five weeks may pass before the newly created nuc has a mated and laying queen. As such, the colony population will shrink until the new queen's brood begins to emerge. The population will grow rapidly once the queen begins laying. The nuc should be fed 1:1 sugar water solution until the spring nectar flow begins. Sugar water stimulates the growing colony. We recommend that you clip and mark your queens once they begin laying (Figure 2) for two principle reasons. First, queens are easier to find when they are in nucs, giving even the beginner beekeeper the opportunity to find and mark/clip her. Second, clipping and marking queens is a good defense against Africanized bee invasion. If you see an unclipped/unmarked queen in a colony that originally had a clipped/marked queen, we recommend that you requeen the colony with a queen from a known European bee source.



Figure 2. Clipping/marking a queen. It is easier to find a queen in a nuc, so this is the best opportunity to clip and mark a queen. Credits: A. Ellis

## Why use nucs?

There are many reasons nucs are invaluable beekeeping tools. Here we list and discuss the 7 most common reasons people use nucs.

1. *Creating nucs is a good way to alleviate swarming tendencies in crowded colonies.* Taking bees and brood from a colony to create a nuc is, in essence, a controlled swarm. The creation of nucs four to six weeks before the primary nectar flow alleviates the stress of growing colony populations in crowded colonies. Nest congestion is a swarming stimulus. If the swarming stimulus is removed, it greatly reduces the chance the colony will swarm. It is impossible to eliminate the swarming tendency completely; however, splitting a colony before the primary nectar flow greatly reduces the swarming tendency at a time when that reduction is most needed.
2. *Having nucs is a good way to keep your production colonies strong.* Many people keep nucs as support colonies. A good rule of thumb is for every two to three production colonies one has in an apiary, keep one support nuc (Figure 3). The job of the support nuc is to keep the production colonies as strong as possible so they can make as much honey as possible. Remember, nucs are full-size bee populations housed in small-sized bee boxes. As such, nucs have unusually high swarming tendencies. You can take advantage of this by removing brood and worker bees from the nuc and adding them to the production colonies weekly during the nectar flow. Doing this weakens the nuc, which is not in production, and strengthens the production colonies.

To use nucs to strengthen production colonies, remove empty frames or frames of honey/pollen from the brood nest of the production colonies and replace them with frames of bees and sealed brood from the nucs. This should be done during the three weeks prior to and during the primary spring nectar flow. If nucs have little brood to donate, shake up to four frames of bees from the nuc into the supers of the production hives. If you keep your support nucs in the same yard as your production colonies (Figure 3), some of the bees you shake from a nuc into a production colony will return to the nuc. This generally is not a problem; however to avoid this situation, remove capped brood from the nuc and put it into the production colony. Newly emerging bees do not know to go back to the parent colony and will remain with the production colony.

If nucs remain strong after removing bees/brood, you can purchase nuc queen excluders and nuc medium supers

in order to manage the nuc as a regular colony. Many companies carry equipment—excluders, supers, feeders, etc. (Figure 1)—for five-frame nucs but not for three- or four-frame nucs.



Figure 3. One support nuc can be used for every two to three production colonies.

Credits: A. Ellis

3. *Having a nuc on hand allows you to deal with untimely queen problems encountered in production colonies.* No matter how long you have been keeping bees, it is inevitable that some of your production colonies are going to swarm or lose their queen during the nectar flow. In both instances, the colony is forced to make a new queen, thereby ruining your chance of making honey in the affected colonies. If your colony produces a surprise swarm, or you check and notice it no longer has a queen, you can requeen the colony with a nuc. Requeening with a nuc gives one the advantage of having a laying queen with brood and bees immediately, while not having to wait for a caged queen to arrive in the mail. Requeening with a nuc is simple. If a parent colony goes queenless, remove five frames (at least one with queen cells) from the center of the hive. Cut the queen cells from the frames remaining in the queenless, parent colony. Next, take the five frames from the support nuc and put them, queen and all, into the center of the parent colony (Figure 4). If you are worried that worker bees from the queenless colony will kill the queen from the nuc, the queen can be caged and put in the center of the colony and released three days later.

This method works most of the time with little fighting between bees from the full-size queenless colony and the nuc. The frames from the parent colony (at least one with queen cells) go into the now-empty nuc box to become the new support nuc. A queen will emerge from the cell, mate,



and re-establish the support nuc. Again, we do not recommend allowing nucs in Florida to requeen themselves. In this instance, requeen the nuc with a purchased, European queen. If you do requeen with a purchased queen, you will need to remove all queen cells that the bees will construct in the nuc. Queenless colonies do not accept caged queens well if queen cells are present in the colony.



Figure 4. Requeening a full-size colony with a nuc. If you worry about the bees in the queenless colony killing the queen from the nuc, you can cage the queen for three days once she is in the queenless colony and then release her.

Credits: A. Ellis

Production colonies also may have failing queens that need to be replaced. Maybe the queen from the production colony has developed a spotty brood pattern or is producing less brood. If this occurs, you can kill the queen. If you choose to eliminate weak queens, leave the colony queenless for two to three days. After the colony has been queenless for a period, remove all of the queen cells that the workers make during this time and requeen the production colony with the nuc as before.

4. *Nucs help strengthen weak colonies.* If you have a sick or weak colony, you always can strengthen it by giving it bees and brood from a nuc. Likewise, if a colony is too weak to occupy a full-size box, you can put it into a nuc box where it is easier to feed and manage. This is especially pertinent because colonies too weak to occupy all the frames in a fullsize colony are prone to takeover by wax moths and small hive beetles. Condensing the colony into the nuc allows you to prevent colony pest problems before they occur.

5. *Producing nucs is a great way to make colony increases.* It is easy to take any nuc available in spring and put it into a full-sized hive body with five frames of foundation to create a new hive (Figure 5). This is a quick, easy, and cheap

way to expand your operation. In one year, it is possible to double the number of production colonies using nucs. Depending on the target size for one's operation, this potentially can save thousands of dollars by keeping the beekeeper from purchasing bees. Remember, production will not be maximized until colonies and nucs are in a stable rotation. Splitting colonies has an initial production cost, however this method is quite advantageous in the long run.



Figure 5. Having a nuc. It is easy to make a nuc into a full-size colony. This is a great way to increase the number of colonies you manage. Once the colony is strong, you can split it to make another nuc.

Credits: A. Ellis

6. *Having nuc equipment on hand provides a place to hive swarms.* Nuc boxes are smaller and cheaper than full-size boxes. As such, they are more convenient to have on hand when you get a phone call from someone who wants you to come collect a swarm. Many beekeepers constantly keep nuc equipment in their vehicles for such situations. Swarm trapping is easier to do with nucs than with full-size colonies.

7. *Producing and selling nucs is a good way to add value to one's beekeeping enterprise.* The average colony of bees in the United States makes 60–80 lbs of honey per year. Considering that the price of wholesale honey hovers around \$1.00/lb, the average colony produces about \$80 of honey per year. You can package and market your own honey for \$5.00 or more per pound. Even this way, the average colony produces <\$400 of honey per year. Nucs, on the other hand, can be sold for \$15–20 per frame. If a beekeeper produces 4 five-frame nucs from a colony, the value of the nucs is \$300–400. The advantages to producing and selling nucs are clear. A beekeeper does not need expensive equipment to produce nucs but will need it to extract and process honey. Furthermore, honey

production is contingent on rainfall, location, management, floral availability, etc. Nucs, on the other hand, almost always can be produced. Finally, the demand for nucs is at an all-time high, so it is relatively easy to find customers.

## Problems Associated with Using Nucs

Though there are many benefits to using nucs in a beekeeping operation, nucs can present their own unique problems. Here we list a few of the problems nucs can have and what action(s) might be taken to remedy the issue.

1. *Nucs require more attention during the year than do full-size colonies.* Their populations often expand beyond what is allowed by the equipment in which they reside, making them more likely to swarm—especially in the spring. Keep populations low by removing bees and brood from the nuc and adding them to full size production colonies periodically (or create more nucs). If your full-size colonies no longer need bees and/or brood, consider hiving the nucs (putting them into full size equipment) or splitting the nucs to alleviate congestion.
2. *Nucs can exhaust their food supplies rapidly, especially during winter, if not watched closely.* To that end, nucs must be monitored at least monthly to determine if they have an adequate food supply. If not, they should be fed. Nucs are easy to feed so starvation should not be a problem, if they are watched closely.
3. *Nucs should not be made during late fall or winter months because it often is hard for new nucs to survive winter.*
4. *Nucs may be more susceptible to pests and diseases than are full-size colonies.* For example, nucs seem to be more susceptible to damage from small hive beetles than are their full-size counterparts (for information on small hive beetles and their control, see EENY474/IN854 *Small Hive Beetle, Aethina tumida* Murray (Insecta: Coleoptera: Nitidulidae) <http://edis.ifas.ufl.edu/in854>). Furthermore, disease/pest treatments and medications often are dosed for full size colonies. Consequently, beekeepers must monitor diseases and pests in nucs closely and respond to their pressures with appropriately dosed treatments.

Despite these issues with their maintenance, nucs can be maintained much like a regular colony, with a brood chamber, a queen excluder, and a winter super full of honey for their consumption. The usefulness of nucs may vary around the country and under different management

practices. However, most bee operations, whether large or small, will benefit from beekeeper use of nucs. Be aware that some techniques will need to be modified to work under varying circumstances (such as recommendations for producing your own queens in Florida). This article serves as a general guideline for people interested in adding nucs to their operations, but as always, check your local laws and regulations before starting any beekeeping endeavor.

**For more information on Africanized bees, visit:**

ENY-147/IN784: *Differences Between European and African Honey Bees* <http://edis.ifas.ufl.edu/in784>

ENY-140/IN738: *Frequently Asked Questions about the Africanized Honey Bees* <http://edis.ifas.ufl.edu/in738>

EENY 429/IN790: *African Honey Bee, Africanized Honey Bee, Killer Bee, Apis mellifera scutellata* Lepeletier (Insecta: Hymenoptera: Apidae) <http://edis.ifas.ufl.edu/in790>