

ESTABLISHING A HONEY BEE COLONY

SUCCESS IN THE FIRST YEAR

Meghan Milbrath, April 2016

Honey bees colonies should live from year to year in most climates where they are kept. Just like other perennials, new honey bee colonies require different care when they are started and their management changes as they become older and more established. In beekeeping, an *established* colony is one that has survived a winter with a queen and cluster of bees, will generally reproduce (swarm) in spring, have sufficient comb built, and has enough bees to ensure survival (if it is kept free from environmental threats and disease). A *new* colony is started by one of four ways 1) purchased packages, 2) purchased nucs, 3) caught swarms, and 4) splits. In all of these cases, the population will be much smaller, will not have the same ratio of all ages of bees, and will not function like a fully operating colony. A new honey bee colony has one goal - grow large enough to have enough food to survive its first winter. In Northern climates, where the season is shorter, new colonies often cannot become fully established by the time winter sets in without extra help from the beekeeper.

Picture a new colony like a baby animal, or a new fruit tree. While an older animal may be able to fend for itself, a young one cannot. And while an older fruit tree will bear fruit, a young seedling will put its energy into root production and growth. Likewise, a new honey bee colony will need more support while it is small, and it will likely not provide a crop during its first year. One of the most common mistakes in beekeeping is to expect a new hive to act like an established colony, or to follow management advice for a full grown colony. Many beekeepers will put a package or nuc into new equipment, and expect it to 'take off' on its own. If the colony does not have all of the resources that it needs, then it can't be expected to thrive or survive, let alone 'take off.' New colonies have very specific requirements and require more and different inputs.

What resources does a new colony need?

Food

Most new beekeepers *underestimate* the amount of food that a new colony needs. Remember that you have a small animal under your care (3-5lbs when it starts, and growing to 15lbs!). Your job as a beekeeper is to make sure that they have the nutrition they need to stay healthy and grow. Nutritionally stressed bees are more likely to get sick and die. All colonies need food to survive, but your new colony also needs food for *growth*. Just like growing kids need more food, so do growing colonies. The bees will be expending a lot of energy on wax production if they aren't on drawn comb, and they will be putting a lot of energy into raising more larvae.



Figure 1. This is a good example of a cheap feeder. The sticks allow the bees to drink syrup out of the holes in the lid of the jar. This beekeeper did not add a new jar quickly enough, and it went dry. If your bees need feeding, don't let them run out of food! The amount they need will depend on weather, strength of the colony, and other resources, and it may be more than you expect.

Your bees will always get as much food as they can from the environment, and feeding doesn't make them lazy or promote bad bees. Honey bees will only take food from you if they *need* it. Bees would prefer to get all of their food from flowers, but sometimes they can't.

If the following 4 conditions are met, your bees should be able to get food on their own. If they aren't met, then you will need to provide food.

a) ***There must be available forage in the environment.*** This means that appropriate flowers must be blooming in the flight range of your bees. It doesn't matter if you hear other beekeepers talk about the basswood flow being on if you don't have basswood trees within 2 miles of your beehives.

b) ***The weather must be conducive to foraging.***

It doesn't matter if their whole flight range is in full bloom if the bees cannot go out and get it and bring it back. This was very evident in the spring of 2015 in a lot of states, where constant rain kept foragers in the colonies, and a lot of bees were hungry during May and June. The trees and dandelions still bloomed, but there wasn't good weather to leave the hive.



c) ***The flowers must be putting out nectar.***

During times of drought, flowers will save their water for their own survival, and won't produce nectar. Some flower shapes don't store nectar well through rain, and it will get washed out. This means that even if you get a break in the rainy weather, the bees may not get much from the blooms that they visit, or you can see blooms, but they don't have food.

d) ***There must be enough workers to get food and bring it back.*** It doesn't matter if all the blooms in the world are out, and the weather is perfect, if you only have 10 foragers. This one is the most important for new beekeepers. It takes a lot of bees to gather nectar, store it, and dry it, and it may be a while before your new colony has enough to do these tasks on their own.

In order for you bees to get all the food they need without your help, they must be a sufficiently large colony in a location with flowers in constant bloom, with good weather to promote nectar and foraging.

You always want to make sure that there is EXCESS food in your colonies. You should always see stored pollen, and at least a few frames of honey/nectar. If not, then you need to feed your bees. Bees that are raised in nutritionally stressed conditions are more likely to get sick, and are worse at raising bees themselves. Even short periods without enough food can have long lasting effects on your bees.

Wax

Everything that a colony does happens on the comb. If a colony is put in a new hive without sufficient comb, then they have to first draw out (build) the comb BEFORE anything else can happen. First, the queen needs comb to lay her eggs, then more workers can hatch, then they can raise more brood, so that they can forage and then finally make honey for winter. Until there is enough comb, the colony cannot grow, nor can it store food. **If the queen does not have sufficient room (clean comb) to lay, the colony will not grow.**

Wax is created by the bees – it is excreted from glands in their abdomen (see photo), and this process takes an *enormous* amount of energy. Think of how much you would have to eat if you had to use your body to create the building materials for your house. If your bees need to make comb/draw wax, then you need to provide them with ample food/energy to do so. They need lots of calories so you should keep feeding them until they have drawn out the wax in the brood nest (the area where the queen will lay).

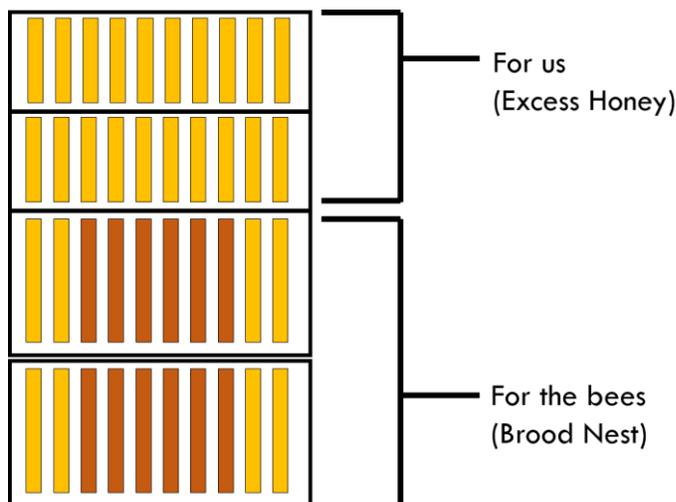
Your bees need to fill the area they will be wintering in (usually 2 deeps or 3-4 mediums) with comb as soon as possible. This is called the brood area, and the space that the bees need to live. Once this is filled with drawn comb, your bees have enough space and can focus on making honey for winter (and for you!).



Figure 2. Wax flakes emerging from the abdomen from a young worker. These excretions take a lot of energy to create, and require bees of the right age.

Plan to feed your new colony 1:1 sugar (sucrose) water until one of the following conditions are met:

- a) **The brood nest is completely drawn out (2 deeps or 3 mediums),**
- b) **They stop taking the sugar water in (it goes bad before they finish it).**



Bees need heat to build wax, so they will build the most wax on the sides and above the brood nest. Sometimes, bees can feel crowded if there is honey over their heads, even if there is space to the sides. You can increase their ability to draw out frames by occasionally putting a new frame just above or just next to the brood nest, and moving completed frames filled with honey or nectar down and to the outside (where they don't like to work).

Don't move frames with brood on them. Only move frames with honey/nectar, and leave the brood frames alone.

Time

It takes a long time for a colony to grow. In order to raise a lot of brood, they need a lot of nurse bees, but in order to have a lot of nurse bees, they need to have a lot of brood. The growing larvae and pupae need to be kept warm by nurse bees, and colonies tend to grow very slowly until they have enough nurse bees to cover a full frame (and then they will really take off). It takes 21 days for a newly laid egg to emerge as a bee. This means that with a package, it will be three weeks before you will see growth, and your colony will actually get smaller (as old bees die) for the first few weeks.

In many parts of the country, especially in Northern states, the honey flow (most flowers with available food) is the strongest in the early summer. While established colonies are storing this nectar away as honey, beginning colonies are turning all this energy into wax production and raising brood. Many beekeepers get their packages and nucs in April and May, and by the time they build up enough foragers to get honey, the nectar flow could be over! You may have to provide food for your bees their entire first year. Don't despair – next year your overwintered colony with lots of drawn comb will be able to get honey with the rest of the established colonies!



Space

A common myth is that a first year colony won't swarm. It is true that a first year colony will not issue a *reproductive* swarm (this happens in the spring with established colonies), but **any colony of any age will swarm if it gets too crowded**. If your colony swarms, it can be disruptive enough for the colony not to recover. The new queen may not go out and get successfully mated, or you may lose so much of your work force that your bees can't build up for winter.

Your colony will swarm if they feel that they do not have enough space. To a bee, space is not just volume, but rather a place to put nectar - they want drawn comb. You can put a super of foundation on a colony, and they will still feel 'crowded.' If the nectar flow is not too strong, this may never be a problem, because the wax makers can keep up. In times of heavy nectar flow, the foragers will bring in nectar quickly, and will have nowhere to put it except in the brood nest as bees hatch out (backfilling). This will reduce the number of workers that you will have in the future, and it will start triggering the urge to swarm.

To make sure they have enough space in times of heavy nectar flow, practice 'nectar management.' Make sure that there is empty space directly above and next to the brood nest by moving frames that are full of honey or nectar to the outside of the box. When you put a honey super on (this is a box that is going on top of the brood nest after it is filled out), the bees will most likely draw out / fill in the middle frames first. On your next inspection, you can move these partially full frames to the outside (if there is no brood in them), so the bees will have room to draw more wax above the brood nest. You may not ever have to do this, or you may have to do this once a week, depending on the rate of the honey flow. Understanding the rate of incoming food is something that comes with experience, and no one can predict the future weather / honey flows so don't worry about trying to do this perfectly. The general principle is to make sure that the bees always have space above the brood nest during honey flows.

Free From Disease

Honey bees are animals, and just like other animals can get viruses, bacterial diseases, and parasites. If your bees are sick, then they have a very poor chance of surviving the winter. A small colony is often more susceptible to disease because they are stressed, can't clean the colony as quickly, and can't stay warm as easily. Make sure that you monitor for disease, and deal with any disease as soon as you can.

Currently, the worst pest for honey bees is the varroa mite (*Varroa destructor*). This mite damages growing bees, and it transmits viruses in the colony. The mite population generally peaks in the fall, right when the colony is preparing for winter, and damage at this time is particularly devastating. It is a common myth that first year colonies do not have to worry about the varroa mite. The continuation of this myth results in a LOT of dead colonies for beginner beekeepers. If you live in the United States, then chances are you will have a problem with varroa mites. Go into your season prepared to manage this pest, as it is a huge reason for colony death among hobbyist beekeepers. There are many options for managing varroa, and make sure you take time to educate yourself on how you can prevent them from taking over your bees.



Figure 3. This poor worker has deformed wings caused by a virus transmitted by varroa mites. This colony is infested with mites, but you may not be able to see any. Make sure you learn how to monitor for them.

Make sure that you have a plan to monitor and manage the varroa mite in your colonies, and that your colonies are free from varroa mites before mite populations have a chance to peak in the fall. Many beekeepers do not think about managing varroa mite populations until it is too late, and the bees are already damaged.

A Good Queen

Many beekeepers rush to blame the queen for any issues in the colony. When a colony isn't performing, many beginner beekeepers think that the first step is replace the queen, even though it is rarely her fault. Most package and nuc producers provide good queens (they wouldn't stay in business if they didn't), or if she is damaged or failing, the bees will just replace her themselves. If your queens aren't marked, your bees may have already made one they like, and if you rush to replace the queen in a poorly performing colony you will disrupt the colony and may be killing a perfectly fine queen.

You would know if your queen was poorly mated if you start seeing only drone brood, or are seeing drone brood in cells where workers should be raised. In this case you would need a new queen. In all other cases where you think she is underperforming, make sure that you 1) give her enough time to do her job *under normal circumstances* (remember that establishing a colony from a nuc or package is not normal), and 2) you are sure that you are evaluating her in an optimal environment (more below). Most experienced beekeepers only replace queens for poor performance after monitoring her through a full season in an established colony. In most cases when a colony is not performing well it is because of an environmental reason, and has nothing to do with the queen. The queen's only job is to lay eggs, while workers determine what to raise. In stressed conditions, workers will eat eggs that the queen lays to protect the colony – you wouldn't see eggs, but your queen is laying just fine. Bees that hold back on brood rearing during stress ('thrifty' bees) are ideal in some locations. Replacing the queen in this situation would set your colony back, and may cause you to lose on genetics that may work well in your area.

Optimal conditions for colony growth

1) **Available cells for the queen to lay in.** Your queen cannot lay eggs if there is no clean, drawn comb in the brood nest. If you don't help the bees draw wax in the brood nest, you cannot expect the queen to lay any eggs. Even the most enthusiastic queen in the world will not lay eggs on foundation. Once they have drawn comb, your bees will be able to expand much more quickly.

2) **Temperature.** The brood always has to be kept warm (above 90 degrees), so the bees can never raise more brood than they can cover. With a small cluster, the bees won't be able to keep a very large area warm, and so initial growth will be slow. Also, if all the bees are busy keeping the brood warm, there won't be anyone to forage or build wax.

3) **Food.** Bees will only raise as much brood as they can feed. If they don't have enough food, they won't raise more brood. Workers will actually eat the eggs that the queen lays to save precious resources. If you don't see eggs or larvae in your colony, first check to make sure that your bees have excess food.

The spring of 2015 is a great example of how the environment limited colony growth; it was very cold and rainy in Michigan and many other states all the way into June. Beekeepers who purchased packages or nucs and installed them on foundation had a very difficult time, because the weather was too cold to draw wax. Since there was no new wax, the queen did not have anywhere to lay eggs. Packages that were installed during this cold period didn't show significant growth for weeks (if it took 2 weeks to draw wax, it was 5 weeks after installation before brood hatched out). Even nucs, which were installed with brood and some drawn comb, could not expand the brood nest - there weren't enough bees to keep another frame of brood warm in the cold weather, and they couldn't draw wax past the original five frames until they could leave the cluster keeping the brood warm. Colonies that weren't fed really struggled, because the weather didn't allow for much foraging, and the cold meant that even when they could forage, most bees had to stay home and keep the brood nest warm. Even the best packages and nucs are not going to take off under these conditions!



Your bees need nice warm days to forage and draw wax, and will need ample food to maximize the number of new workers they can raise. Warm days and lots of food will really drive colony growth. Once the colony is in full production and all its needs are met, you can start to examine the nuances of individual queen performance.

Successful Colony Establishment

You and your bees have the same goal - to make sure that your colonies have enough food and bees to survive winter. This process will take months, and your actions this spring determine your success. You and your bees will be working *all season long* to get those boxes full. It takes a long time for bees to collect, store, and dry nectar, and to cap honey, so you have to prepare weeks and months in advance. You want the comb in the brood area to be drawn as quickly as possible, and to make sure that they have plenty of honey weeks before the last frost.

If you have drawn comb, and are installing a nuc into a colony that has some honey, and you have great weather, you may not have to feed your colony at all. If you are installing a package onto foundation, and there is a drought, you may have to feed your bees all summer long, and into the fall. Many beekeepers want to know 'how long should I feed?' or 'when do I put on another super?' looking for a calendar based response. If you focus on your end goal of getting your colony established and keeping them well fed and free of disease, your bees will guide your management. There is no 'right' way to keep your bees, as long as they are healthy and well fed.

Be kind to your new colony, and give it the attention that it needs.

1. Make sure that it always has enough food (feed while it is small, and in times when it can't get food from the environment).
2. If you have foundation, keep feeding sugar water until the entire brood nest (2 deeps or 3 mediums) is drawn out.
3. Manage for mites and other diseases.
4. Make sure that they are on track to be full of food before winter.

While becoming established, a young colony from a package or nuc often grows slowly. Next spring, once this established colony will take off, and amaze you at how quickly it can grow. Make sure that you are prepared to make a split and manage swarming in the spring, and will have all the equipment to deal with an established colony in full production!

Remember, a healthy, thriving colony next year begins with food, care, and disease management while they are becoming established.

Best of luck to you and your bees!