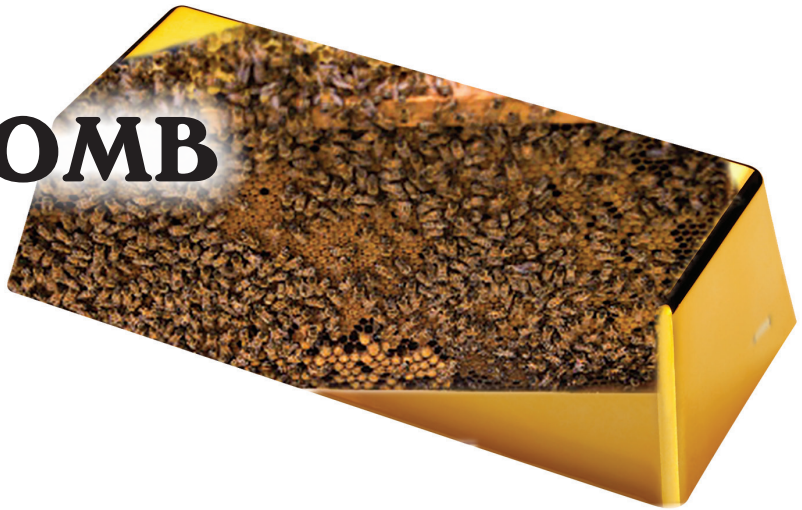


Beekeeping Basics

DRAWN COMB IS GOLD



by MEGHAN MILBRATH

In April I wrote about methods for swarm control. I've been giving a 'live' version of that article all over the country — talking to bee clubs through zoom to make sure beekeepers everywhere aren't going to lose their valuable overwintered bees to the trees (or to their neighbor's softies). After every talk, the main question that I get has been, "What do we do if we don't have drawn comb?" This question amazes me, because I can't believe how many beekeepers are making it through their first (and sometimes second or third years) without learning one of the most important lessons of beekeeping: *Drawn comb is gold*. If you don't have drawn comb, your main goal should be to get your foundation drawn as fast as possible. If you do have drawn comb, one of your top priorities should be to keep your drawn comb safe.

Why is drawn comb so important? We all know that bees need comb for every key function in the hive: They raise young in the brood comb, they communicate on the comb dance floor, they use the comb to pack tightly in a winter cluster, and of course they use comb for processing and storing honey. Having drawn comb in the hive means that the bees have space to perform all their essential duties. Until there is comb, the colony cannot function completely. This is especially obvious in spring, when the key essential duty of a colony is to raise brood — an overwintered colony is focused on growth and needs maximum space for brood rearing. However, during this time flowers be-

gin to bloom, and the foragers start to bring in nectar. Without the space of drawn comb, the foragers are forced to put the nectar into the brood nest. Every cell that is filled with nectar is a cell that cannot be used for raising brood. Even if the backfilling is not sufficient to cause a swarm, it will slow down brood rearing, reducing the workforce that will be available to keep the hive functioning over the next few weeks.

It is important to be prepared with drawn comb because honey flows are transient and limited. If we miss a good nectar flow, it is over, we miss it, and we don't get a second chance from those flowers. If we want the bees to be able to live off of the food resources in their environment and to make us delicious honey, we need to ensure that they have somewhere to put all the incoming nectar. When a house bee takes a full crop of honey from a forager and there is no honey comb for her to deposit it in, she will be forced to use cells in the brood nest as described above, or will have to digest it, making her unavailable for more work, and making the nectar unavailable for future use or harvest. Good beekeepers will keep extra supers of drawn comb on strong hives during the honey season, ensuring that there will always be room for every drop of available nectar, and all available incoming food resources are stored.

It is essential that beekeepers prioritize drawing comb their first year. It is a common mistake is to assume that comb just happens naturally. Many

beginners think that you add your package or nuc to a hive full of foundation, and the bees just get to work drawing comb. If the colony is slow to draw comb, the beekeeper complains that the colony is "not taking off," and usually blames the queen. What they don't understand is how unnatural their situation is, and how dependent comb building is on the environment. In nature, the only scenario when a colony has to build a lot of comb is after a swarm (and not all the time if a colony moves into an abandoned cavity). When a colony is preparing to swarm, there are a lot of actions taken to ensure that the new colony will be set up well to draw lots of comb. First, the bees only swarm naturally when there is warm weather and a nectar flow. Even more importantly, the swarm will be full of bees of the right age for wax building. When you install a package or nuc, the weather is usually not warm, there is often no nectar flow, and who knows the age structure of your bees? Most beginners are asking their bees to draw lots of comb with the conditions that are not good for drawing comb.

If we want our unnatural new colonies to draw comb, we have to help them by creating the ideal conditions for wax building:

- **Lots of carbohydrates.** Wax building uses a lot of energy. In building comb, a colony will consume 6-7 times the weight in honey of the new wax produced.¹ So for every pound of wax produced, the bees will use about 6



New foundation is added to the hive by pushing the drawn comb (without brood) to the sides, and putting the new foundation frames directly in the middle above the brood nest. Before this colony will be closed and fed, another frame should be added and the frames straightened and evenly spaced. Otherwise the bees will fill in the large gaps with burr comb, making it difficult to remove frames without causing damage. It is common to use 9 frames in a 10-frame box after all the comb is drawn, but if you have multiple frames of foundation, it will be easier to get straight comb if the box has 10 frames. Eight-frame equipment is more widely spaced, so beekeepers with 8-frame equipment almost always use 8 frames.

lbs. of honey, or between 1-2 lbs. for every frame.² This means that the bees need to have constant feed. A heavy nectar flow is best, but in the absence of a good flow or in a small colony, a beekeeper can feed syrup. Since bees need the energy, heavy syrup (2:1) can be used, and a feeding stimulant that uses lemongrass oil can be added to attract the bees. The most important thing is to keep the feeder full. Don't make the common mistake of feeding the occasional jar and refilling once it is empty. Use a large feeder that can hold at least a gallon and has a large surface area so the bees can take the feed in quickly (like a bucket, frame feeder, top feeder, or multiple mason jars). A single pint jar in a Boardman feeder at the entrance won't cut it.

- **Warmth.** Anyone who has worked with foundation knows that wax becomes brittle and unworkable in the cold. Similarly, bees need warmth to work the wax into comb. Ideally, we will be drawing comb during a warm season. Regardless of the outside temperature, however, the brood nest will

always be warm. Beekeepers who need to draw out comb should make sure that there is always foundation above and directly adjacent to the brood nest. As soon as that comb has been partially drawn, it can be moved to the outside of the box, and another frame of foundation added in its place. Moving the partially drawn frames to the outside does two things: It prevents the bees from tunneling straight up the hive (only paying attention to the center frames), and it always keeps the frames that need to be drawn in the place where it is the best for the bees to work (right above the heat). This method can also be used in horizontal hives, adding a top bar or new frame in the space between the honey frames and the brood nest.

- **Good timing.** Bees are only likely to draw comb when they are in a period of growth. In northern states, the colony builds during the early warm season, and then shrinks back down before winter. Many beekeepers make the mistake of adding foundation too late. They will wait until the

colony fills the drawn comb that they have, and then add a box of foundation. If it is too late in the season, the bees will not touch the foundation, even when there is plenty of food. A better strategy would be to give the bees a mix of foundation and drawn comb early in the season, to ensure that foundation is drawn as quickly as possible.

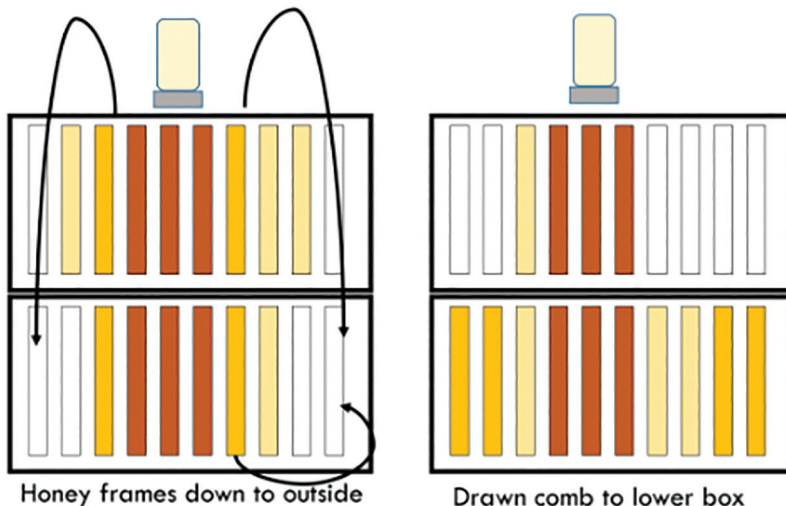
- **The attention of the bees.** Many times when a box of foundation is added, the bees will not recognize it as part of their hive. They would rather fill up the brood nest than start drawing wax in a box that is completely foundation. This problem can be solved with some frame management. First, make sure that you are not using a queen excluder. The bees will not draw foundation through a queen excluder. Second, you can "seed" or "prime" a box of foundation by bringing up at least one frame of drawn comb. Usually, this can be done by taking a frame without brood and putting it in the outside position of the upper box. Even one frame of drawn comb in a new box will help the bees take interest in the super. For larger colonies, this can be done by bottom supering, or nading — putting a box of foundation above the brood nest, but under the existing drawn comb, or by checkerboarding, alternating drawn comb and foundation in the honey supers.

- **A large population.** Good comb production needs a lot of bees that can afford to spend time digesting sugar to create wax, and to physically build the comb in the hive. The proportion of bees available to do this work changes throughout the stages of colony development and time of year. Because caring for the brood nest is always priority, the number of bees available for house duties depends on the population that remains after the brood rearing duties are taken care of. In a strong hive, the ratio of bees to brood may be 3:1, where small colonies may have a 1:1 ratio, meaning that there are no extra bees to focus on comb building.³ Wisconsin scientists found that a colony of 15,000 bees had 11,850 brood cells, or 79% as many cells

as bees, while a colony with 30,000 bees had 18,300 cells of brood, or 60%. A 60,000-bee colony had 15,000 brood cells, or 25% as many brood cells as bees.⁴ This big colony has plenty of workers to spare for comb production. If you need to have drawn comb, it is better to have fewer, bigger colonies than to have more, smaller colonies.

If you want to maximize wax production, add foundation to big colonies right after swarm season, make sure they have lots of incoming food, and make sure that their foundation is above and close to the brood nest.

Last week I spoke with a beekeeper who had just come out of his first winter with most of his bees alive. He was super excited, and was getting tons of woodenware ready so he could focus on maximum growth this spring. His plan was to not worry about honey this year and split everything heavily, breaking each of his 7 hives into multiple nucs. While he would end up with more hives, each one of those tiny nucs would struggle to draw out wax. Next spring, he would be faced with many more hives, and no drawn comb to facilitate swarm control and splits. He would be setting himself up for a lot of stress and excess work. A much better strategy would be to do enough management this spring to prevent swarming, but to leave the colonies large, using these large colonies to draw lots of comb. He can still expand, pulling splits later in the season, but he would be setting himself up for a more sustainable operation in the future if he prioritized drawing comb. A common rule of thumb



As the colony becomes established, you can move frames to maximize comb drawing. Brood frames (reddish brown) should always be kept together in the middle. Frames that are heavily filled/fully drawn can be moved to the places that the bees are least eager to work — down and away from the brood nest.

for beekeeping is to never more than double each year while you are growing. The main reasoning behind this rule is wax — drawn comb can either limit or drive your growth.

There are multiple ways to maximize wax production, and a good place to learn methods is from beekeepers who sell nucs or comb honey — both products that use a lot of drawn comb. One interesting system was taught to me by a beekeeper in Kentucky who learned it from a Wisconsin/Mississippi beekeeper as a method for drawing frames for baby nucs, which are mating nucs with half-size frames. In this system, about 10 pounds of young bees are “shook” into a primer box — a box about the size of a deep and a shallow with no frames and with screen on both sides and a hole for a feeder bucket. Keep

the box in a dark place and feed about a gallon of 2:1 syrup with Honey-B-Healthy or lemongrass oil. Since there are no frames, the bees are forced to digest the food, activating their wax glands. The next evening (after 24 hours, but before 48 hours), bring your equipment into the dark cool room, and unstaple a corner of the screen so you can scoop out the bees. If you need comb drawn in baby nucs, you can use about a Solo cup worth of bees in each nuc. If you are looking to draw out full-size frames, you can add about the number of bees you would find in a package. After you scoop the bees onto your foundation, close up the equipment overnight — by the next morning they will have drawn it out.

A second good strategy is to dedicate one large, crowded hive to draw



Two options for seeding a new box of foundation: On the left, a fully drawn honey frame is brought up from the lower box and placed to the outside of the second brood box that is to be added. On the right, a frame of capped brood is brought up from the lower box, and placed right above the brood nest in the new second box. This can be done when there are enough bees and it is warm enough that the brood won't get chilled by expanding the brood nest area. In this case it was warm out, and the nuc had grown quite large.

wax. This works even better if you use a caught swarm since they are all the right age to draw comb. Add frames of capped brood to your wax-builder hive to ensure a large population of young bees, and keep feed on it constantly. As it draws comb, remove these supers to add to smaller/weaker colonies, always making sure that the wax-drawing colony has some foundation to be working on. This system allows you to maximize the potential of your large colonies to support your overall operation.

A third strategy used by cut comb producers is to remove the brood nest from the wax-building hive, reducing the amount of non-wax-building work for the colony. This can be done through a shook swarm, and is explained nicely by Phil Craft in a 2015 "Ask Phil" column: "The procedure involves moving a strong hive to a new location within the same bee yard and replacing it with a new hive consisting of a single brood box with frames of foundation. Then half to two thirds of the bees, along with the queen, are shaken from the strong hive into the empty box and topped with a queen excluder and honey supers. This constitutes the artificial, shook swarm. Placing it on the site of the original hive ensures that it will inherit that colony's entire field force, further strengthening, and crowding, the new colony. Since there are no cells for the queen to lay eggs in, the bees concentrate on drawing comb. They will quickly draw out the brood box and turn their attention to the frames above the queen excluder. Meanwhile, the original hive will be fine in its new location. It can be re-queened or, if it was a strong colony already in swarm mode and making queen cells, it will produce its own. With lots of capped and uncapped brood and a new young queen, it should rebound, and may even be capable of producing a super or two of honey."⁵

PROTECTING YOUR DRAWN COMB

Wax comb is precious — it is the thing that allows your bees to function, and it is expensive to make. Unfortunately, beekeepers are not the only creatures who like drawn comb. Other pests, namely wax moths and mice, will move in and destroy it. In his book "A Ton of Honey," Grant Gillard states that there are two types of beekeepers: "There are those who protect their honey supers from wax moths, and those who wished that they had."⁶ Wax moths won't de-

stroy comb when the frames are on a strong, healthy colony. The danger is when the frames are removed from the hive, and the bees can no longer guard the equipment. Wax moths are most attracted to comb that has protein, so old brood frames are most at risk, but they will go for new honey frames, and will even destroy wax foundation in a heavy infestation. It is important to remember that even if you didn't see any moths, they may have already laid eggs on your frames. If you take boxes off and put them directly into storage without killing the eggs or newly hatched larvae, you can have a real problem. I've heard of beekeepers who tightly wrap their supers in trash bags, only to unwrap a moldy, wax moth-ridden mess. You can kill the moths a few ways. If you only have a few supers, you can put them in a chest freezer for over 24 hours to kill the young, and then store them somewhere where they cannot become re-infested. If you don't have the freezer and moth-free storage space, you can use Para-Moth. In my area, wax moths are only a problem from around July until the first frost. After I take honey off, I will put the wet comb above inner covers on the hives to let the bees clean them up. Then I will take the dry comb and put it under my lean-to, tightly stacking the boxes 10 tall on an upturned outercover. I'll add Para-Moth, and then top with an outercover.

After the weather turns cold and we get a hard frost, I won't have to worry about wax moths again until late next summer. My only concern for my drawn comb at this point is mice. Mice love to make nests in hive boxes, chewing through your drawn comb and defecating on all your lovely (food production) equipment. Queen excluders work great to keep mice out. After a frost, I restack my supers on pallets with queen excluders on the bottom, corks in any auger holes, and screens stapled over any rotted corners. This allows the frames to air out the paramoth, and to not get moldy from any excess moisture, while keeping mice out. The dogs and I also work to trap mice heavily in my storage areas to keep the pressure down. It will take only one disgusting, destructive nest to make you appreciate the damage that these little creatures can do.

When you are thinking about your long-term goals and plans for you bees, remember that lack of drawn comb can often be a limit to your suc-

cess and your growth. Also keep in mind that you will need to replace 10-20% of your comb each year to lower the risk of pesticides and pathogens. Make sure that comb building is a top priority this year, and that you set your bees up for success.

ENDNOTES

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