

Foundationless frames – How and Why to Use them

When I first started beekeeping, I was fortunate to buy a long-time beekeeper's entire stock of equipment. He had made bulk purchases of frame materials and wax foundation. What he had left by the time I bought his stock was lots of top and bottom bars for frames, lots of deep side bars and some medium wax foundation. Since some of the equipment had dates as old as '78 (as in 1978) etched in them, I have no idea how old the wax foundation was. It was 2005 when I started, and at that time it was beginning to be the norm to use plastic foundation. I found medium side bars that fit the top and bottom bars I had, and used what wax foundation was left in the collection I had bought. I bought plastic foundation for the deeps, which I used for brood boxes, and also for the rest of the mediums, which I used for honey supers.

My bees did well on the plastic foundation. Although I had some wax foundation in the honey supers, I had mostly plastic. The bees do definitely prefer the wax foundation, and will draw that out first, but for several years I had no issues with them drawing out the plastic foundation as well. Of course once it is drawn out, if you re-use the drawn comb, there is no difference to the bees what is underneath it. Other beekeepers routinely complained that the bees would not draw out the plastic foundation and they had issues with swarming and absconding because the bees refused to draw out the plastic. After a period of time, I also began to see some of this happening in my own hives. After reviewing some older bee literature, I realized why it was the case. With traditional wax foundation, the bees literally "draw out" the wax into cells. They do not need to make any new wax to make the cells. Of course this would be the easiest route for them. Plastic foundation is coated with a thin coat of beeswax over the cell imprints. What I would often see was a small section of shallow comb pulled out on the plastic foundation, which constituted all of the wax coating that had been on the foundation. I realized that the bees have to manufacture almost all the wax on plastic foundation. So, the difference between no foundation at all and plastic foundation amounts to the width of the plastic piece that makes up the foundation. This gave me some cause to think.

One objection I heard from other beekeepers was that they would never get any honey if they used foundationless frames because the bees would have to use all their resources to draw out the natural comb. In actual practice, I realized the bees were doing almost as much work with the plastic foundation, so it turned out that this was really not an issue. In fact, the bees seemed to prefer to draw out the foundationless frames and built them out faster than frames with plastic foundation. As with any type of comb, once the frames were drawn out, there was no difference to the bees.

I had purchased some deep foundationless frames to put in an experimental horizontal hive I started in spring of 2013. I decided to go ahead and get some medium foundationless frames to try in traditional vertical hives and see what happened. I used the deeps in the horizontal hive for the purpose of having natural comb in a horizontal configuration, but in frames so the equipment was compatible with standard Langstroth equipment. I reasoned that the advantages of natural comb would be just as useful in a traditional vertical hive. I knew from the start that there were several issues that would have to be dealt with to make foundationless frames as useful as frames with traditional foundation. I will detail each issue and how I found solutions to them.

The first issue is how to get the bees to keep the combs straight in the frames and not "cross-comb", meaning attaching the top to one frame and the bottom to the next. In my first horizontal hive I put two frames of straight drawn comb (with foundation underneath) in the front of the hive for the bees use as a guide. I later discovered that the very most important thing for a horizontal hive is that it be perfectly

level. If it is level, the bees will build the comb plumb. That is not too difficult in a horizontal hive, which is all on one plane. However, it is nearly impossible in a vertical hive. With each box the vertical hive changes its pitch, especially if boxes are manipulated and propolis or any other thing you can think of gets in the cracks and puts the hive off level. The easiest way to keep the comb straight is to place frames of already drawn straight comb between each empty foundationless frame and then when they are drawn out, they can be used in any way you choose. This of course assumes you have drawn comb. For a new beekeeper, it may be necessary to use frames with foundation between the empty foundationless frames until everything is drawn out.

The second issue that was very important to beekeepers was the ability to extract the foundationless frames. We found that medium depth foundationless frames worked quite well in a manually cranked extractor if given a little care, especially the fresh, new combs. I found that they were not any more fragile than frames with wax foundation that wasn't wired. We just had to crank slowly at first, then increase speed, then wind down before stopping. Like all drawn comb, the bees would repair any cracks when replaced in the hive, and would strengthen the combs with propolis, so older combs were quite strong. The deeps needed a little more care simply because of weight. We had to be careful when handling them to make very sure they were lifted straight, not tipped at all to the side, or the weight of the honey would rip the comb out of the frame, especially if it was warm. However, even deeps, handled with care were extracted successfully.

Other differences in the comb structure are that the bees will build the comb to suit them, meaning they will build the drone comb right into the structure, making brood frames about 1/3 drones and about 2/3 worker brood. Some beekeepers consider that a problem because they don't want excessive drones. I personally like to encourage drone production in good, strong hives so those drones can go out and populate our region, hopefully strengthening the local bee population. The down side of this is that the beekeeper needs to carefully choose which combs to re-use in honey supers and brood boxes. The bees will naturally make the larger cells in honey frames, which are drone sized cells. You don't want to put those down in your brood box the next season, for obvious reasons. So, folks who have been using all one size equipment so they can interchange frames from the honey supers to the brood boxes may need to examine the frames one at a time to decide which goes in which box.

The question one will logically ask is why use foundationless frames instead of foundation? My first reason was the plastic foundation was starting to be rejected by the bees. I could have used wax foundation, but newer wax foundation has tested positive for miticide residues and agricultural chemicals. I didn't want to introduce that into my hives. This left me looking for a third option. The second reason was I wanted to see what the bees would do if given the choice to make their combs without the worker cell imprints in the foundation. They do organize it differently, which I find interesting. The third is the ease of which the beekeeper can make comb honey. I struggled with the thin wax foundation required for comb honey. It would sag and fall out of my frames and make a mess during the hot months, before the bees had a chance to draw it out. With natural comb, I can choose any frame I like to make into cut comb honey and I can be assured there is no sheet of questionable origin wax in the middle. The last reason is cost and upkeep. I can buy bulk quantities of foundationless frames for \$.87 a frame. That is my total cost. When the frames need cleaning up, there is no plastic to deal with, just scraping and back into the hive. I feel they are cleaner, more environmentally friendly when their useable life is over, and in the end, easier to use.

Since 2013 I have been transitioning all my frames to foundationless frames. As my old drawn comb with foundation becomes unusable, I take it out and replace it with foundationless frames. I find it

makes my clean-up easier. If I have wax moth damage or mold, I just remove the comb and the frame is almost completely clean. A little scraping and it is ready for re-use. With plastic, I had to scrape the plastic, then determine if it was re-useable, then pop it out of the frame if not and dispose of that separately (into a landfill), while I put the old frames in the burn pile. Since clean-up is easier, I find myself being more proactive in removing questionable old comb, which makes for a healthier hive. I don't have to buy new foundation to replace what I remove, so it saves me money, too.

Another advantage for me personally is that I have a lot more wax to use for craft projects. If a honey comb does fall apart, it is easy to crush and strain it and then I have much more wax to render. I once collected around 20 deep frames from dead hives in the winter. It was too cold to extract, so I crushed and strained and got a lot of wax. The honey obtained from the crush and strain method has no tiny air bubbles like extracted honey, so it is exquisitely clear. I don't do it all the time because of course like all beekeepers I want to re-use drawn comb, but it is nice to have the option if the frame or situation warrants. If I had foundation, it would require trying to scrape the honeycomb off the foundation, which might work for plastic foundation, but would be quite difficult for wax foundation. This is also a nice option if the frames fall apart in the hives (poor frame construction) or get damaged when transporting from the hives to the extractor (bumpy roads).

I buy manufactured foundationless frames with a "v" in the top bar which serves as a comb guide. There are several ways of modifying frames intended for foundation to serve as foundationless frames. The important element is to have a comb guide for the bees to begin comb building from. This can be a short strip of foundation or a piece of wood. I like the purchased frames because they are less work – actually no extra work at all – and the comb guide is secure because it is part of the top bar, so it makes a secure connection for the comb to the top bar. The only current source for these frames is Walter T. Kelley. The other bee equipment companies do not offer the option. Maybe if there were more demand, others would, I am not sure.

So, why use foundationless frames? I feel for myself they are easier and make nicer honey and I feel I keep cleaner comb in the hives which results in healthier bees. In the end, it saves me money and I think the overall life span of any given frame will probably be longer because all that can go wrong is the frame falling apart, which I can repair if I desire. I keep looking for ways to make my beekeeping easier on me and my bees and more productive. Adding foundationless frames to my operation has been one of the methods of achieving that goal.