DEALING WITH DEADOUTS

by MEGHAN MILBRATH

Honey bee colonies die. At some point you will stand over the sad sight of a dead colony, and will have to make decisions about what to do with the equipment. Do you dump a new package of bees straight into the hive and move on with life? Do you burn everything in a fit of rage and quit beekeeping? The right answer is likely somewhere in between, where we take some action to make the hive better for the next inhabitants, but we don’t overdo it and set ourselves back. How do we know how much work we should do? When we deal with deadouts, we need to find a balance: On one hand we want to save work and precious drawn comb, while on the other hand we want to reduce risk to the bees.

The boxes, lids, and bottom boards from a winter deadout can usually be safely reused with not too much effort. Scrape off dead bees, and take time to repair and repaint what needs it. Most of your focus should be on the comb, because that is where most of the risk lies. There are three reasons why you would want to get rid of old comb: It can hold pathogens, it can hold pesticides, and it can be structurally unusable.

**Pathogen risk** — Old comb can contain many pathogens. Colonies with old comb are more likely to have chalkbrood (Koenig et al., 1986), nosema disease (Bailey and Ball, 1991) and American foulbrood (Gilliam, 1985). It even seems like the varroa mite prefers old combs; one study showed that old combs were four to five times more infested with varroa than new combs (Piccirillo and DeJong, 2004). We know that some pathogens like Nosema and P. larvae (the bacterium responsible for American foulbrood) can last for years in wax, but we know much less about the viruses that are responsible for so many bee deaths these days. We do know that it is possible for viruses to end up in wax (Coldwell et al., 2017, deGuzman, 2019), but we don’t know much about how long they last, or if viruses in wax remain infectious to honey bees.

Switching out old comb does seem to help with pathogen loads. One study on virus risk showed that there was a higher presence of Acute Bee Paralysis Virus in colonies where comb replacement was not common practice (Molineri et al., 2017). Colonies that had comb switched for foundation in either the spring or fall had less nosemata the following spring than colonies raised on old combs (Fries, 1988). Likewise, colonies infected with AFB that are shaken onto new comb have much lower infections than those left on old comb (Pernal et al., 2008).

**Pesticide risk** — Because wax is made of hydrocarbons, it acts like a sponge, holding onto many chemicals. Studies have shown that most hives contain pesticides in the wax and stored pollen (Mullin 2010). Because in-hive pesticide exposures are so complex (each hive has its own signature blend of chemicals), the effects of these stored chemicals are really difficult to study. However, there are studies that show that Nosema ceranae infections were higher in adult bees, and occurred earlier in young bees reared in combs with high pesticides (Wu et al., 2012). Even in the absence of nosemata, bees reared on high-pesticide combs had delayed development and died earlier (Wu et al., 2011), and there is a relationship between a high number of chemicals in the hive and the risk of mortality and negative queen events (Traynor et al., 2016).

**Structure** — New brood comb is pure wax, but old brood comb is a combination of wax and silk and propolis, and has different properties. Just before pupation, honey bee larvae cover the walls of their cells with silk. Each following generation will apply more silk to the walls, and the cells
Rule 1: Remove poop. It is always the first to go. If you find a dead-out, the most important thing you can do is remove the oldest frames. While frames with spotting are good to discard, we want to remove the frames that will likely have the most pesticides and pathogens.

Rule 2: Pollen doesn’t get better with age. It is a protein, and even if it is properly stored, it will break down and become less nutritious over time. Bees happily move nectar and honey around, but don’t usually move stored pollen. Pollen is also highly likely to contain both pesticides and pathogens. A frame full of old pollen may look like a great resource, but it should be the first thing to get culled. If the pollen is entombed (covered with wax), that is even more motivation to get rid of the frames, because entombed pollen has been associated with high pesticides and colony mortality (vanEngelsdorp, 2009).

Rule 3: Remove the oldest frames. Many people recommend marking the frames with the year that you make them. It’s a great idea, because if you are consistent, you can tell how old each frame is, and remove the oldest. If you are like me, you will do it only one spring, and you will know that back in 2015, you were feeling optimistic about how much time you would have to devote to marking frames. Even if the frames aren’t marked, you can get a good sense of which ones should go on the chopping block by their color and cell size. Dark frames with small cells should get culled.

Rule 4: Anything that came from someone else’s operation should be removed as soon as you can. If you buy a nuc, even if it is from someone you know and trust, it is good to get rid of those frames. You don’t know their history, and it is much better if you can take biosecurity seriously, and limit outside equipment in your bee yards. You can cull frames right away, or you can make decisions when the weather is warmer and the comb is less fragile. The bottom box is likely going to have the most brood frames and pollen, so I will often bring that back to the shop, leaving the rest of the hive in the field. Either way, my main concern is keeping out mice. Mice can quickly move in, fouling your frames, ruining comb, and chewing through top bars. Other pests like hive beetles and wax moths won’t show up until summer/warmer weather, so they aren’t a concern during the winter. I use old queen excluders, corks, screens, and lids to make sure that my boxes are mouse proof.

How to reuse old frames. While the wooden parts of frames can contain some pathogens, they are way less risky than the wax comb. You can get rid of the entire frame if you are super risk averse, or you can just replace the comb. I use beeswax...
foundation, so I melt out the wax in a melter, and put in a new sheet of foundation. If you use plastic foundation, you can scrape the wax off and reuse the foundation. However, it is essential that you re-coat the foundation with clean beeswax. If you just put the scraped plastic foundation back in the hive, the bees will not follow the foundation at all and make a huge mess. It often isn’t worth it to melt down old comb from the brood nest. Old comb is usually mostly silk, and there will be little wax, and the wax that you get is going to most likely have pesticides, so it isn’t good to sell (you don’t want someone making coumaphos flavored chapstick). I use what comes out of my melter to make firestarters. Usually it isn’t worth the effort, and you can just compost the pollen/wax scrapings.

Usually, when we assess risk, we like to have measurements, so we can know the danger to our bees. However, it is virtually impossible for the average beekeeper to assess the risk in the combs. You aren’t going to rent a lab and test for every virus and potential chemical.

I have been making an effort this year to really get rid of old frames. It is hard to throw away drawn comb, when I know how badly I will want it mid-summer — you will look at a frame, and think about how easy it would be to just let the bees use it. However, it is important to think about all the things you can’t see — the pathogens and pesticides that are in old comb that can really slow down the growth of your new colony. You can keep the nice looking frames, and those without brood and pollen, and a new colony or split will do great on a combination of used drawn comb and fresh foundation. Remember, you can never know the overall risk to your bees with certainty, but you can make an effort to at least reduce the hazards in the hive.

1 When most beekeepers see spotting in the hive, they automatically blame nosema. However, nosema isn’t the likely cause. The type of nosema that we usually see, Nosema ceranae, isn’t associated with in-hive spotting at all. Spotting just means that the bees had to go empty their rectums, but they couldn’t. This combination could be from too small of a cluster (usually from viruses), bad food (yeasts, etc.), or any other pathogen that upsets digestion. Regardless, these are good frames to remove.

Take a cardboard egg carton, and fill it with sawdust. Heat up wax slowly, and when it turns liquid, slowly pour it into each cell of the egg carton. Let it cool, and when you need to start a fire, rip off one cell, and light it!

2

REFERENCES


de Guzman LI et al. Insects. 2019. Comb Irradiation Has Limited, Interactive Effects on Colony Performance or Pathogens in Bees, Varroa destructor and Wax Based on Two Honey Bee Stocks. Jan 8;10(1). pii: E15


Piccirillo and Defong. 2004. Old honey bee brood comb are more infested by the mite Varroa destructor than are new brood combs. Apidologie. 35, p359-364.


Meghan Milbrath is a beekeeper and honey bee and pollinator researcher and Extension specialist at Michigan State University.