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Making Summer Decisions That Affect Winter Management

By James Tew

From *Bee Culture* August 2008

Complaining about beekeeping - an unlikely art form

Like so many beekeepers, I have become an expert at complaining. I can do it well and on short notice. I can complain about a variety of dissociated topics. It's an acquired talent requiring years to achieve. *"My bees all died."* *"Varroa is killing us."* *"Insecticides are insidious."* *"We never see swarms anymore."* *"Today's queens are terrible."* *"Our bees are just not what they once were."* Accomplished complaints fluidly roll off my tongue.

This past Spring, I was completely geared for the usual bout of concerns and predictions. While my Winterkill was not too great, it was strange. Some of my strongest colonies last year died during the Winter with hundreds of pounds of honey on them. That alone predicted future bad karma for the 2008 season. I came through Winter with about a 25% Winter-loss. I have written about this in earlier *Bee Culture* articles. As Winter faded and Spring became established, I did the normal Spring preparations. I scraped bottom boards, removed entrance reducers, and rearranged food stores among the surviving colonies. I got the dead equipment out of the yards, and I did the Spring tune-up on the mower. I wasn't Johnny-on-the-spot, but I did okay. Then I mentally prepared myself for the usual late season freeze that had killed so many bees and blossoms in recent early Spring seasons. Time passed. The late freeze never came. That's strange. I already had my complaints and quotes prepared and edited. My bees built up nicely on the early pollen and nectar sources.

I began to hear that bees in the Southeast were looking good. Across the Mid-west, beekeepers were remarkably positive about the way their bees looked. After all we have been through in recent years, this upbeat attitude was an oddity.

The Spring flow started. I honed my negative attitude. *"It will rain."* *"Sure, there are blossoms*

everywhere, but they won't produce." *"Varroa will take the bees all out."* We have been through this over and over again. Why should I dare hope that this year would be any better? But the season was better - it was even gloriously better than previous years. In much of the country, everything came together and we got an old-fashioned nectar flow. I had put on the usual few supers per colony. This year, I should have put on many more. I should have brought some of the old, dusty equipment out of deep storage to net this entire crop. While I was completely prepared to complain, I was not completely prepared for a true nectar flow.

This "super" shortage was brought home in a personal way. I put on some supers and gave the remaining colonies a promise of supers to come. Then, for six days, I took a road trip to south Alabama to visit family. As I rode south along the interstate, I knew I had screwed up. Everywhere, locust and tulip poplar were hanging nearly to the ground. The world was green and lush. You could just tell, this was a good year. I phoned home - desperately trying to find anyone to put on a few more supers, but all my friends have now become far too smart to get caught up in a request like that. What I had given the bees was what they were going to get. The return trip home was stark. Just six days later, all the white blossoms were nearly gone. The nectar window had begun to close. I now had populous, packed-out colonies. Then the swarming started.

Swarms, swarms everywhere

In this regard, I was not the only one caught unawares. Everywhere, there were reports of swarms hanging about. And pleasantly, the caller usually started the call with, *"I know bees are in short supply so I didn't want to kill them* " At bee meetings, one beekeeper reported that he was being killed by swarming. Ninety-five percent of his 100 colonies swarmed. That seemed nearly impossible. We are accustomed to our season being killed by many things, but being killed by bees being so strong that they split themselves was not something I was expecting. Other beekeepers had comments like, *"I couldn't work for the phone ringing."* *"We have no more equipment so we had to stop going for swarms."* You see, as seasoned complainers, we can take a season that is so good that it becomes bad. Then we complain.

The 2008 season - a good year

After all our beekeeping tribulations, it needs to be said - it is even difficult to say - but the 2008 season

was a good year. At meetings, beekeeper spirits were high and significant numbers of new beekeepers were on hand. There was talk of crops and swarms and how to split big colonies. It seemed like beekeeping from years past. It felt warm. It felt good. Now what am I going to do with all this honey?

Removing the crop

A good nectar flow is something like a Summer storm. For most of us, it is sudden and intense. Scrambling for extra beehive equipment and trying to get it on strong hives is common during this event. Then, the nectar storm begins to pass and finally, is gone. Quietness and sanity returns. Now all those supers that I put on just a few weeks ago need to come off - but this time, they are much heavier.

Now, here is the real reason for my article. After all the past winter kills; after all the previous die-offs, after all the colony splits and after cleaning all that dead equipment; how much honey should I take? I don't want to go through all that headache again. Are happy days here to stay or was the season of 2008 just a fluke? Should I go by the old recommendations or should I still suspect that my bees are recovering from a long, bad bout of bad luck?

Bee colony management is not exact

All bee colony management is a "best guess" process. How much honey to take and how much to leave is just another guess that we are required to make. There appears to be no reason to leave too much honey on the colony. I continue to be shocked to have taken hundreds of pounds of honey from colonies that died during the winter of 2007-2008. Clearly, proper honey stores are only one of the requirements for successful colony wintering.

How much honey to remove and how much to leave?

The following plans are just for me and are not intended to be a recommendation for others, but for the next few years, I am planning to winter in three deeps. I may or may not implement the insulation ideas that I discussed in previous articles. Even though I took hundreds of pounds of honey from dead colonies early last Spring, I still plan to leave more honey on than I did 15-20 years ago. This management change is a clear result of my years of bad luck and complaining. So, right now, if my colonies have three full deeps of brood and honey and feel like dead weight when I heft the colony, I will take anything above that.

Now, yet another change - I will not rush to extract all the crop I removed. Indeed, I will let some of it sit around until well into the upcoming Winter. Before you ask, this is not particularly good for the honey and the supers must be placed upon drip boards, but as were

many of you, I was burned several years ago. I had colonies starving and I had nothing to give them but sugar syrup, which is a poor plan for truly subsidizing a struggling Winter colony. I wrote about the plan I have used for the past two years of supering only in deeps. Honey in these boxes are truly miserable to handle but I now have ready honey in deeps both in my lab and on the bees. This honey is my "*strategic honey reserve*." I will run the extractor and I will process some of the crop, but I will not be as greedy as I was just a few years ago.

An unintended side-effect of this procedure is that I will have to clean the processing equipment more than once or I will have to let that sticky mess sit there for several months awaiting the extracting of the second part of the crop - should I decide to do so. Dare I write it? I am drifting toward extracting honey in the Spring after it becomes clear that the bees will not need it for their Winter survival and Spring build-up. Is this drift efficient or sloppy? For those new to beekeeping, honey has traditionally been extracted in the Summer and Fall. But once you extract it from the comb, it is nearly impossible to give it back to wintering bees. Spring extracting would throw off the entire traditional management scheme for seasonally manipulating bee colonies.

As aside

While I was phone talking to a *Bee Culture* reader who had questions about his bees, he politely said, "*In your articles, you don't give specific recommendations.*" "*New beekeepers like me need somewhere from which to start.*" He was correct. I don't tend to make specific recommendations. Specific recommendations would require specific situations. So, in general, how much honey should you take and how much should you leave? I offer the following generalized honey stores comments.

Generalized wintering suggestions for late Summer / Autumn management of a average honey bee colony

1. During September or October, do whatever it takes to have the general colony in two deeps to weigh about 170 pounds. More weight is even better. When picked up from the back, the colony should feel like dead weight.
 - a. To achieve this colony weight
 - i. Leave abundant honey on the colony all season (best)
 - ii. Put honey (in combs) back on the bees as needed (good)
 - iii. Feed colony copiously until desired colony weight is obtained (poor)
 - iv. Wintering bees in two deeps is good and is the most common wintering sized colony. Wintering bees in three deeps may be best for most parts of

the U.S., and wintering in a single deep would be the riskiest sized unit.

- b. Gross colony weight (primarily honey) is not everything. The colony needs to be "balanced."
 - i. So much as possible, the colony should be disease and pest free (best) or at least disease and pest reduced (good).
 - ii. The colony should have a productive queen supported by abundant worker populations.
 - iii. Pollen supplies should be stored by the bees in frames for future springtime use. (Not much the beekeeper can do about this point.)
 - iv. Food stores should be positioned above and in constant contact with the brood nest.
 - v. Reduce entrances and provide for ventilation. Essentially, employ general winter preparation protocols.
2. We must accept beekeeper limitations. If statistics prevail, about 25% of your colonies will fall short in some of the categories listed above.
 - a. Do whatever is practical to address those shortages, but don't "over-manage."
 - b. Hope for a mild Winter and a bountiful Spring. (Luck - both good and bad - is an integral component of beehive management.)

Here's the guess

In order to meet the requirements for having a heavy colony in the late fall, I am required to make "best guesses" when removing honey crops in the late Spring or early Summer. In a very real beekeeping way, important wintering decisions are made nearly six months prior to the cold season. On those beautiful, productive early Summer days, you must imagine that same colony, during the coldness of February. How much to leave and how much to take is always a calculated guess.

Robbing - a comment

Robbing behavior deserves more than a paragraph, but just a mention is better than nothing. Logically removing honey after the flow is over is the norm, but it is also an excellent way to train bees to thief from each other and even kill lesser colonies or deplete strong colonies. Robbing is annoying and frustrating, but oddly useful. If there is a nectar flow on, I will not see a single live bee in my storage barn. If I drive by the barn and see robbers trying to enter the doors, it is a clear indicator that the present flow is over. No scaled colonies, no pulling frames, no looking for bees on blossoms - I just look at my barn doors to determine if the bees are on a nectar flow. Checking my storage barn doors before moving to my bee yard gives me an idea of how much robbing behavior I can expect from my management activities.

An odd way to address and old topic

To be sure you and I are on the same page, in summary, what I have been saying is: In recent Winters, I have had too many bees die - from starvation and otherwise. Abundant honey stores are part - but not all of the solution. As I did last year, I plan to leave my colonies heavier by leaving more honey on. Again, as I did last year, I plan to hold some of the honey supers I remove until early next year in order to have a honey reserve. If my bees don't need it, I will extract it in the spring of 2009. As will you, I will be forced to make wintering decisions while in the heat of Summer. As much as my energy, time, and funds allow, I will otherwise manage my colonies by employing current recommendations. Sorry, but I can't be any more specific than that.

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Size Matters

By Larry Connor

From Bee Culture August 2008

He was a soft-spoken gentleman serious in his intention of setting me straight. I had been discussing the importance of size of the queen to a group of beekeepers, and after he quietly challenged my thesis that big queens are good for the colony.

This happened a long time ago, and I don't recall where or the circumstances of the conversation, just the intensity of this man, himself of diminutive stature, who nonetheless appeared to be able to out-work and out-argue even the best.

The easiest thing to do with beekeepers like this is to immediately agree with their arguments, regardless of the content, and then try to swing them around to your point of view. His statement was simple and direct: Small queens are very good.

So I agreed with him, hoping that somewhere there really are small queens that produce quality hives and a good honey crop. That there are undoubtedly racial or genetic lines that produce variability in size, so if one wanted to use that stock, the queen may be smaller than what we ordinarily used.

I stood my ground that it was important to produce and use the largest queen that that genetic line could provide; that larger queens are superior to smaller queens, and last longer in the colony before being superseded.

Then he explained that he lets bees in nucs raise their own queens. The bees in the nucs came from strong colonies, he argued, and thus the queen they would produce would also be good.

I thought I had him. While the stock might be very good, the fact that a small group of bees, with perhaps

just 10 or 20 percent of the population of the full colony, was responsible for raising the queen. How can that queen be equal to a queen produced in a full sized colony, I argued?

They were raised by bees from a good colony, he countered. We were at a stalemate when someone interrupted our conversation and it was over. We had both started repeating our major points.

This gentleman did not change my opinion about queen size, but he did make me think about the role of smaller queens in bee colonies and in beekeeping operations. If everything has a time and a place, there must be a role for small queens as well.

Years later, I am still looking for that role.

That size thing ...

Queen size is determined by nature and nurture.

The genetics of the queen's parent lines (mother queen and father drone) are critical to the final size of a queen. Add to this the conditions prior to and under which the queen is produced: number of bees in the colony, overall food supply, status of the nectar flow, ratio of nurse bees to house bees, stores of food, amount of food coming into the hive, and its exposure to pesticide, disease and mites. The list goes on and on; topics that will make most beekeepers pull out their hair.

Research has shown that the largest queens are produced by colonies with excellent food reserves that select the right-aged larvae for the initial queen cells. Most of the queen stock available in North America features large queens. It is their nature to be large. There are a number of advantages to having large queens:

1. More eggs. Larger queens are able to produce a larger number of eggs per day than small queens. This is because the larger queens possess more ovarioles in their two ovaries. These structures nearly completely fill the abdomen. A laying queen is an egg-laying machine. Let's consider a queen with a hypothetical genetic potential to produce 1400 eggs per day. This queen may have about 350 ovarioles, each producing four eggs per day. Over the course of one 21-day brood cycle, the queen will lay 29,400 eggs. If these were all to develop into adult bees (they will not because of diploid drones), then there will be 8.4 pounds of new bees produced by the colony.

Consider if the same queen is poorly fed during her larval development, and she does not have as many ovarioles. If there are one quarter less or 262 ovarioles producing four eggs per day, there would be about 1050 eggs laid per day. In a 21-day brood cycle, this would result in 22,050 bees or only 6.3 pounds of bees.

Conditions present during queen development include the number of nurse bees present to feed and care for the developing queen cell during that critical

period from egg hatching to cell sealing. This is 5.5 to six days. If the colony is large, has an abundance of nurse bees, stored food, incoming food, and excellent health (no disease or significant mite load), the queen will reach her potential.

When these conditions are less than perfect - there are fewer nurse bees, food supplies are small, or the colony is suffering from a disease like chalk brood or has a mite load that interferes with queen feeding, then the queen will develop with fewer ovarioles.

We have known for years that the presence of *Nosema apis* in a colony will reduce queen productivity. Now, with *Nosema ceraena* in many hives, it is abundantly clear that a queen may be produced by *Nosema-infected* bees and the resulting queen is smaller and has fewer ovarioles. Moreover, when an adult queen is infected with a pathogen, her ability to lay eggs is reduced by the infection in her mid-gut. In fact, *Nosema* is often associated with queen replacement through supercedure.

2. More stored sperm. A larger queen will have a larger spermatheca than a small queen, and even a 10% difference in the size of this structure will make a volume difference of about 25% of the sperm stored in the fluid-filled sac. Since queens only mate (average of 13.2 drones) for a brief period of their early life and spend the rest of their life in the hive (except for swarming), then the number of stored sperm is directly related to the number of eggs the queen can fertilize until she runs out and starts to produce unfertilized eggs in worker cells. As a drone-laying queen, she may not be superseded by the worker bees, and the colony may not survive.

Evaluating queen cells

This Spring I've been teaching a number of queen rearing classes to hobby and sideline beekeepers. In the multi-session classes, we are better able to evaluate how we have done in our efforts. The challenge of teaching these classes is the limitations posed by using someone else's bees. Every beekeeper has his or her individual objectives in their craft, and for an outsider (me) to walk in and expect conditions to be ideal for queen rearing is not a reality. We can come close, but that is the best we can do.

I teach a traditional starter and finisher system of raising queens because it is the basic system. There are many variations for making queen cells, but I like to look at the essentials of starting the cells in a queenless, broodless, flightless mass of nurse bees, where the emergency instinct is strong and they will start many cells.

After the cells are started they are moved to strong, two-story finisher colonies where the queen is confined below an excluder and open brood, pollen, and nectar are placed in a second brood chamber above the

excluder. A feeder is provided as well.

The advantage of the starter system is we look at the cells 12 to 18 hours after the grafted larvae were placed into the starter box. At that point the larvae that have been accepted will have royal jelly added (if we primed the cells, the old royal jelly has been removed and replaced with new), and the two-day old larva is floating on a bed of right-aged royal jelly. When using plastic cell cups, you can see the royal jelly from the side. If the bees have added wax to the cell (like the tops of little volcanoes) and there is abundant food in the cell, then we know that the larva has been accepted and the starter colony has done its job. This is shown in the photos.

When the starter is not strong enough, there is a reduced amount of royal jelly in the cup. This is excellent justification to remove such cells from further production. In the transferal system we have taken a worker larva (that was never going to be a queen) and moved it to the starter colony where the bees feed it with the same food they feed to queens during natural queen replacement and swarming. The earlier this happens the more success we have with the final cells. When students move an older larva as they learn the process, it does not have as many hours of optimal feeding with royal jelly as a younger larva. That larva will come back to haunt everyone when the resulting queen emerges a day or more earlier than the rest and destroys the appropriately aged queens we want!

So, a simple inspection of cells from the starter colony will confirm if the starter did its job or not. The started larvae should be floating on a bed of royal jelly.

Those cells with adequate royal jelly are then moved to the cell finisher colony. That colony must also feed the developing larvae. The colonies are set up with lots of bees, stored food and incoming food. Under those conditions the bees will feed the started larvae well. In a few days the cells will be sealed by the worker bees and the queen larvae will complete the metamorphosis into an adult bee.

In one of the classes I taught the colonies used as cell finishers had been pulled down in strength by the removal of brood to make up increase colonies. While I am the first person to applaud the use of strong colonies for increase colonies, the removal of bees and brood from a colony makes it less than ideal for cell production. This was the case this Spring. The colonies that were the strongest in the apiary were not strong enough to be ideal cell finishers.

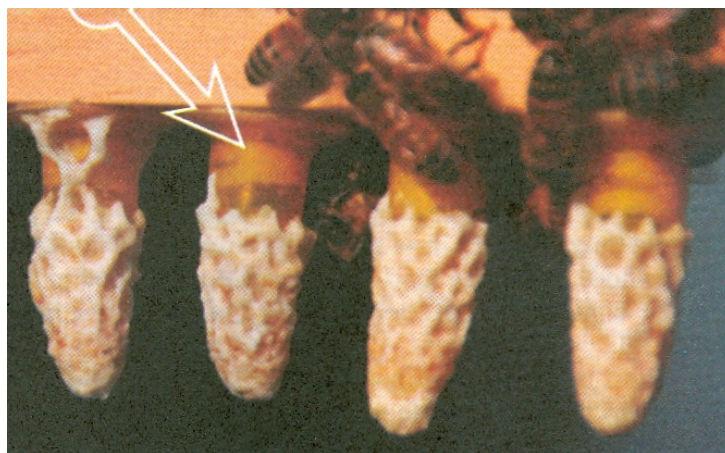
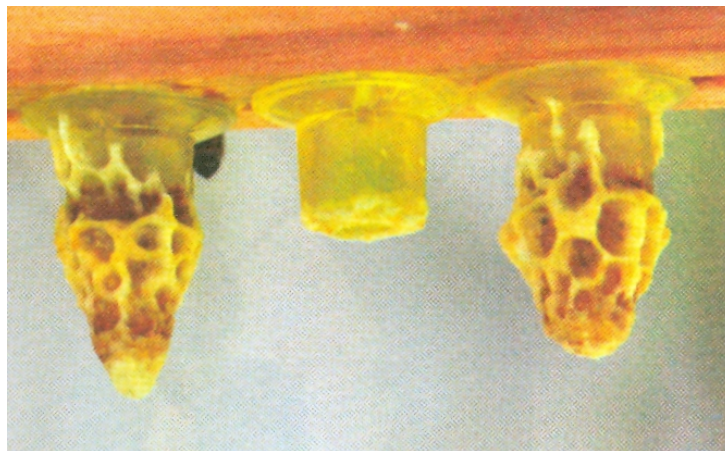
One of the students in the class with a little prior experience with queen rearing took the techniques home and raised queen cells of his own using a very strong overwintered colony. The differences were striking. The weaker colony, even though it is in the middle of a nectar flow, did not produce enough royal jelly to create well-filled queen cells. The cells were

shorter and there was only a thin layer of royal jelly on the bottom of the cells. With the stronger colonies, the difference is striking. The cell cups appear to be nearly full with the queen food. The cells appear to be much larger and longer.

Bottom line

Monitoring the amount of residual royal jelly is one of the best methods I can give beekeepers as a method of evaluating queen cells they produce. If the cells are well started and finished, they will have surplus royal jelly in the base of the cells. The use of plastic cells makes it easy to inspect the cells - it is not necessary to cut open a few cells to check them for food stores. This is perhaps the best way to control queen size.

Dr. Connor's books, including [Bee Sex Essentials](#), are offered for sale through many bee supply dealers, and at his website, www.wicwas.com. A PayPal store is available on that site for those who want to have the convenience of purchase via this option.



Two groups of cells. The first, upper, is from a cell finisher that had bees and brood removed prior to the cell introduction. The second group of cells shows the benefit of a much stronger cell finisher. Viewed from the side, the stronger colony produced larger amounts of royal jelly and larger cells, see arrow.

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DATES TO REMEMBER

General Meeting – September 2, 2008 – at Oregon Ridge Nature Center. 7:30PM. At our September 2 meeting, Bob Wellemeyer will speak on “Overwintering Nucs.” Bob is the Virginia State Apiary Inspector, formerly the Virginia State Apiarist. A beekeeper since 1961, his Windsong Apiaries provides pollination services in the mid-Atlantic area, and he also sends bees to California. In addition to honey, he supplies queens, packages, nucs, beeswax candles, and novelties.

Note: Open hive demo starts at 6PM.

Board Meeting – September 18, 2008 – 7 PM at Oregon Ridge Nature Center.

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