

Using Virgin Queens

In Theory, A Single-Colony Beekeeper Could Use The Same Colony To Graft From, Start And Finish Queen Cells

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Pausing in the thread I have been writing on teaching beekeeper instructors, this month I want to discuss the role of using virgin queens in a beekeeping operation, the advantages, disadvantages and proven methods. I first experimented with using virgin queens in the late 1970s using 'double queens' in mating nucs. This system doubled up the queens in a mating nucleus so that an older queen was in the colony and free to mate and start laying. A second, younger, and newly emerged virgin queen, was added to this colony about seven days after the first queen was introduced, confined either as a queen cell ready to emerge or as a virgin queen in a cage with a candy plug. As the older queen was harvested, the almost ready-to-mate queen was released by removing the cork from the candy end of the cage. It is important to let this queen emerge while the colony is not disturbed, and best if she emerges at night and cannot fly out of the unit. This also allows for the queen pheromone from the first queen to dissipate and the pheromone from the younger and still present queen to dominate bee behavior.

The system works, and it is possible to increase the output from a nucleus by having a 'virgin in waiting' while an older one is mating and laying in the colony. There was little incentive to continue with this system because of the extra time, additional visits to the mating yard, and record keeping required. I still believe it is a technique northern-based beekeepers should consider to increase queen output during their shorter system.

Advantages of using virgin queens

This taught me an important lesson – beekeepers can use unmated queens in mating units just like ripe queen cells. Here are the advantages of their use:

1. The virgin queens are a few days older, and theoretically closer to mating, and thus closer to harvesting.

2. Virgin queens may be evaluated for color or defects. Many beekeepers select for color of queens, and emergence of virgins and sorting them by color means that only the desired colored queen is mated. Some beekeepers only want yellow queens, thinking they are Italian. It does not work that way, as color is one of the least accurate methods to use to determine genetic background. But for beekeepers that want all-yellow or all-back bees in their apiary, this is an advantage.

Defects, such as damaged wings, dented body parts, or a non-functioning leg, are easily determined and the queen is discharged from further advancement.

3. Virgin queens may be weighed. Dr. Tibo Szabo of Canada, (retired and working with his son in a queen rearing business in Ontario), collected data that showed that weighing newly emerged virgin queens provides queen producers with a method of selecting only large, vigorous queens. They weigh each queen using sensitive scales and refuse to use any virgin weighing less than 210 mg. Larger queens develop into laying queens that have more ovarioles in their abdomen and are able to produce more eggs. It is felt that larger queens also produce more queen pheromone and are more attractive to worker bees that feed and care for her.

4. Virgin queens may be marked. This allows for accurate identification/confirmation when you open a mating nucleus and see the marked queen. I have seen no indication that there is any problem using marked queens in a natural mating situation, just as long as the queen is not damaged in the process.

Disadvantages of using virgin queens

Compared to ripe queen cells, those that will emerge in the next 12 to 24 hours, virgin queens require additional handling and add another step in the queen rearing process. This is why they are not used in commercial operations. But in small-scale queen production and breeding programs they are useful.

Compared to mated queens from a mating unit, virgin queens are like ripe cells and have the risk of failing to mate, failing to find their way back to the mating unit, and being eaten by dragonflies, birds or toads. As a means of requeening an operation they represent an



Virgin queens in plastic holding and introduction cages. Queen candy fills the tube into the base. When the queen is introduced to a nucleus a plastic cap is placed on the end of the tube to prevent queen release.



This drone models marking of queens. Hold the queen by the thorax while putting on a drop of paint on the center of the thorax. Use different paint colors to reflect different queen lines, or use the international marking color to reflect the year the queen was produced.

affordable method of replacing queens or making up increase colonies, but beekeepers should expect a 15 to 20 percent failure rate of virgin queens compared to mated queens. Hopefully the success rate of virgin queens compared to ripe queen cells will be higher.

My reasons for using virgins

In my tiny queen program at the farm in Galesburg Michigan I faced the reality that I did not have much time to spend running a mating yard for queens, and I did not have the required number of bee colonies to set up mating nucs to more than a dozen or two queens a season. I wanted to be able to produce hundreds of queens, and by using virgins I had a mechanism to do this.

In theory, a single-colony beekeeper could use the same colony to graft from, start and finish queen cells. These cells could be moved to an incubator (like an old chicken incubator) and the newly emerged virgin queens



Virgin queens in cages that hold cells. The frame is placed between two frames of open brood in a cell-builder/queen holder area above a queen excluder with the hive's queen below the excluder.

distributed to waiting beekeepers. If the queen in this single colony is from a known mite-resistant stock line, or from a survivor strain of queens, or the only strong colony in a large metropolitan area, it could be important in adding mite resistance or survivor genes to an area.

In 2011 I produced hundreds of virgin queens with the help of Craig Fuller and Cathy King at the farm. We had five breeder queens, but if necessary we could have used just one. We had four cell finishers and one starter-finisher, so we could have had just six colonies producing 50 to 100 virgin queens a week for a 10 to 15 week period in southern Michigan. Because the virgin queens were grafted from some of Tom Glenn's instrumentally inseminated breeder queens we sold them for about half of the price of a fully mated queen. Beekeepers understood that they could only get the queens by visiting the farm and getting a short tutorial (a mini lecture) from Cathy, Craig or I about how to use the queens to make a new colony or replace a queen that had failed in acceptance or buildup. We did not make much money, but we proved (to me, anyway), that the use of virgin queens was a viable method of getting excellent stock into the hands of small-scale beekeepers.

The Use Of Virgin Queens Was A Viable Method Of Getting Excellent Stock Into The Hands Of Small-Scale Beekeepers

We received excellent public relations from the website of the Kalamazoo Bee Club – perhaps too good because people think we have a huge operation. The truth is painfully modest.

Steps in using virgin queens

We produced queens using the starter and finisher colonies as outlined in *Queen Rearing Essentials*. We also used the cell builder colony that is made from frames of brood from all the colonies that form a queenless colony with very little open brood for cell production but a swelling number of nurse bees producing royal jelly but having no place to put it! They were very receptive to feeding the larvae we grafted into cells and put into this colony. Just one was all we needed, as once the cells were started we move the cells into cell builder colonies (queen below, brood above a queen excluder).

I selected the JZs-BZs plastic cell cups with the wide base as our grafting cells. We had a different color for each breeder queen, so we could look at the cells and visually know the colony that produced the larvae we grafted. These cells were removed from the grafting bar before the queens emerged (the closer to emergence the better, but we often had to adjust the bee schedule to our own because of work, travel, and other activities).

The sealed but not yet emerged cells were put into wood and screen cages that fit into a standard frame. These can be made at home or purchased. We returned the cells in these cages to the cell finishers. Other beekeepers emerge cells in an incubator with the temperature at 92 to 95°F.

When the virgins had emerged (we followed the calendar for this most of the time) we removed the frame holding the cells, brushed off the attendant bees, and carried the queens to Dad's barn, rebuilt about 1951 and carefully maintained in that condition ever since! While a nice lab would be wonderful, we made this space work. We removed the queen cell base from the top of the screen-wood cage and let the virgin queen crawl out of the cell 'toward the light.' Unfortunately it requires some practice to carefully pick up rapidly moving virgin queens before they fly out the barn door (the barn is hot). Sometimes they buzz on the floor and we chase after them like the three stooges. Cathy and Craig use a queen 'mitt' for virgin handling inside a screen cage. I am pleased to report that most queens were properly handled, marked and transferred to a plastic queen cage filled with queen candy. These were put onto holding bars and returned to the queen holding colonies. Each cage was marked with line name (this year I want to incorporate color tags or pins that can be used on the outside of the hive to mark the colony as to line type).

Once counted, we let folks know the kind and number of virgins we had available. Most of customers just wanted a queen, many did not know they needed to mate, and I am sure our short mini lectures were way more than they wanted to hear!

The key to using virgins

Most of the mini lecture to people who purchased, bartered or were given virgin queens focused on the need to hold the queen in the colony or nucleus for three to five days before removing the plastic cap that prevented the queen from fast release in the hive. Because these were virgin queens they need to be housed in the colony for several days to allow their pheromones to increase in production and to mature more. Keeping the virgin caged prevented her from flying out of the entrance of a small colony and never being seen again! We also advised that when they returned to the colony to remove the cap that they time this at the end of the day, so the bees can consume the candy during the evening and the queen emerges from the cage at night, and cannot fly out. Since we tried to provide virgin queens that were between a few days to up to two weeks post emergence, these queens were quite close to mating age when they were released.



Emergence.

Users had good luck with virgins two weeks old. Our oldest reported mating (a friend who got free virgins at his own risk), was with six-week-old virgins. I do not recommend you use anything after two weeks, but it is nice to know how flexible Nature can be with bending the 'rules.'

Biggest problem

My biggest problem in using virgins is keeping good records so you know exactly which colony holds a caged virgin and when she should be uncapped and allowed to emerge. It is embarrassing to open a nucleus and find a virgin in a cage with the cap on the cage, and to do this three or four weeks after she should have been liberated. It is always good to know that there is room for improvement in the apiary. **BC**

Bee-sentials: A Field Guide by Dr. Connor is available for immediate shipping. Order from your favorite bee supply dealer or directly from Wicwas Press, 1620 Miller Road, Kalamazoo, MI 49001. The price is \$29.95 postpaid in the United States. If you live outside the US, please email LJConnor@aol.com for a quote payable via PayPal. Or check out the www.wicwas.com website for PayPal purchase. This full color book is ideal for use in bee classes and training programs, so contact Dr. Connor for quantity discounts to bee clubs.

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