

'Bout a 100 – Sideline Beekeeping

CELL FINISHERS, DRONES & EVALUATING QUEENS

Larry Connor

Natural, healthy hives produce some of the best-fed queens during swarming and supercedure.

Cell finishers (or builders) attempt to duplicate the high population and crowding conditions found during swarming, and create an area of reduced queen pheromone similar to supercedure.

The Cell Finisher

Select a strong colony; or several, depending on your queen production needs. Early in the season select overwintered colonies with young queens and stimulate brood production by feeding protein and syrup. In Northern states, start feeding pollen patties in late February or early March. When weather permits sugar syrup feeding. Or use a candy board starting in February. In Southern states, feeding may start in January or early February. Once you start feeding, stay with it; do not leave the bees in a growth mode without food available to support that growth.

When maples are in bloom, these colonies may be ready to swarm because of your feeding. Watch carefully and eliminate queen cells (save some for royal jelly). You may want to remove bees and brood for an increase colony. You must keep the population at full throttle without permitting swarming.

There is a late-season option if you decided to raise queens and did not have a plan of prior feeding. You can compensate for the reduced colony strength by adding frames of ready-to-emerge worker brood to the cell finisher to boost bee populations. I find this better than adding bulk bees (packages) to the colonies, since this sometimes starts fighting.

You may begin grafting queens when you have over



Placement of drone comb in the number three position in the brood nest of a good strong colony from which you want to make drones.

100 drones in the purple-eyed stage or older for every queen you intend to produce. Because drones take longer to develop and are slower to reach sexual maturity, this delay in queen cell production will produce right-aged queens and drones. It is critical to check this anytime you start to graft. If you are producing queens in the late Summer and Fall, make sure there are still drones in production or you may have virgins flying to drone congregation areas (DCA's) with a reduced and ineffective population of waiting and eager virgin drones.

Below we discuss drone production. For now, just remember that the drones in your cell finisher will probably not mate with the queens if they are both in the same apiary. But cell finishers will produce drone brood, so be ready to deal with it. Rotate comb into the colony for drone production only if the queen is of a type producing target drones for your operation.

When you are ready to start cell production, follow these steps every 10 days. This will insure plenty of bees in the hive and keep the colony booming. It will also keep a large number of queen cells in production.

1. Find the queen – You need to position the queen below the queen excluder in a two-box unit (deep or medium). Check all frames for the queen, and when you find her, set her aside and look for a second queen.



Close-up of cells in cell builder. Some webbing is taking place.



Inspect the emerged cell to confirm that the intended queen emerged from the cell. If the time line is correct, the queen you installed is yours.



Integral to any bee breeding program must be some selection against Varroa mites. Hygienic cell cleaning is known to reduce mite loads. Researchers are looking at grooming.

Mother-daughter queen combos are not unusual during the spring when queen replacement is linked with strong colony strength.

2. Put sealed brood and empty frames in the box below the excluder. Make sure the queen is carefully moved to the lower box, preferably while on a frame of brood, and the frame gently pushed together with another to prevent damage to her large body.

3. Carefully position the queen excluder on top of the lower hive body. In a hive body above the excluder center all open brood (eggs and larvae) plus one or more frames of pollen. Center the brood frames, and place the food frames at their side. Fill the rest of the box with frames except for the space needed for the grafting frames between brood frames.

4. Leave space for one or two grafting bars in the top box or have frames marked so they may efficiently located and removed when the queen cells, “the graft” is added to the cell finisher.

5. Feed the colony with thin sugar syrup, starting several days before you position the cells into the colony. This is true even when the colony is strong and there is a flow going on. Feed anyway. Don’t sell the honey, cause now it’s funny. Add fumigilin as a medication against Nosema of both species.

6. Every 10 days rotate the brood frames. Above the excluder the formerly open brood above will be sealed so put it down into the lower hive body. Either find the queen or carefully brush the bees off frames of open brood into the lower hive body. It is absolutely essential that you keep the queen downstairs. Because of all the heavy feeding you may have more frames of brood than you can correctly position. In that case, remove some brood frames to strengthen another hive or make an increase colony.

Drone production

Most beekeepers consider drones as part of their

colony’s everyday life, and there are plenty of them. The biology is simple: drones are produced and maintained only as the colony’s needs dictate. There are rarely too many drones. Then the workers execute them at the end of the season.

For even the smallest queen producer, the maintenance of strong colonies of desired stock will ensure good drone supplies for ordinary mating. When you want to make queens, you will need a lot of drones to mate with one queen. I think that 100 drones, at sealed brood stage will give you enough drones for one queen. Drones die virgins 95% of the time.

Installing drone comb foundation and comb into desirable colonies will keep the number of drones at an optimal level. Pierco makes a green plastic comb that is easy to spot in the hive. It can be added to the hive as needed four to six weeks before grafting will start. Dadant makes a wax drone comb foundation. Paint the top of the frames green so they will be easier to locate.

Adding drone comb will unintentionally stimulate *Varroa* mite reproduction. *Varroa destructor* breeds better in 24-day drones than 21-day workers by a factor of three to five to 1.2. A few generations of that and the hive is dead. So have a control plan. Or it will be more than the drones that must face the executors pale.

Queen and Nucleus Evaluation

The big difference between a queen propagator and a bee breeder is the effective use of selection techniques used by the breeder often overlooked by the propagator. Many queen producers propagate only, like cooks with cookie cutters, making many copies from the same old formula used by granddad years before. Many graft from the best colonies in their operation in a southern state, Hawaii, or California. These are not the same environments as the rest of the beekeepers use. Fortunately, some of the more progressive propagators are making

efforts to become bee breeders. For starters, they are buying stock selected for hygienic behavior.

Queen breeders are usually university and USDA employees charged with stock improvement. I was fortunate to know three of the best: Drs. Bud Cale, Jr. (Dadant & Sons, Inc), Walter Rothenbuhler (Ohio State), and Harry Laidlaw, Jr. (Univ. Calif. Davis). Bud Cale was unique since he worked for a bee supply company and earned his doctorate with corn geneticists in Iowa to develop true hybrid bees using the hybrid corn model of inbreeding and crossing these lines utilizing instrumental insemination. His Starline and Midnite hybrids no longer exist, but the Starline was the beginning gene pool for the Minnesota Hygienic strains.

We are in a new era of bee breeding and queen production. The new breeder can be any beekeeper with the training and skills that allow them to select more than just their "best colonies," but use standardized testing for making controlled measurements. Success will come to those who develop a reliable, predictable, mite-resistant and productive line. If you have one or a few survivor colonies, that does not make you a bee breeder, since the selection was non-directed. But if you set up apiaries with high mite loads and test for hygienic behavior from the survivors, you can start calling yourself a bee breeder.

Evaluating new queens

To evaluate the queens produced by our method of starters, finishers and mating nuclei, we must keep in mind that it takes time for the queen to turn over the population of bees in the nucleus. Also, that small colony

"Long before Shakespeare, before the Ra God of Egypt, the male honey bee has had really rotten press. Well, it is time to change that attitude."

is only a predictive tool for the full colony. As the nucleus is allowed to grow, or the queen is used in a full-sized unit, the dynamic within the colony between the workers and the queen will change. Defensiveness may become more pronounced in a larger colony than a small one. Small colonies seem to be better at *Varroa* mite control when compared to larger colonies. This may be something to do with the ratio of nurse bees to field bees.

Brother Adam, in his effort to find tracheal mite resistance, used overwintered nucleus colonies as his basis of comparison before putting queens into production colonies. This is a two-step evaluation requiring years of careful observations. The queen was kept in a small nucleus from mid-summer to spring and evaluated there. Many queens were removed at this point if they failed to meet the monk's expectations or testing levels. The second year the colonies were in full-sized colonies and evaluated for mite resistance, productivity, and general characteristics.

Brother Adam's approach was borne, in part, out of limited economics. How does a small bee breeder with finite resources test a large number of queens? Brother ➤

“Success will come to those who develop a reliable, predictable, mite-resistant and productive line.”

Adam found that the overwintered nucleus was an ideal answer.

Evaluation in the nucleus – Once the queen has replaced the bee population, you can look at several characteristics. Check egg-laying rate, buildup rate in the spring, temper (defensiveness) of the bees, temperament (how quiet are the bees on the combs), housekeeping (removal of debris), propolis use, uniformity of the brood pattern (sex alleles), hygienic traits (removal of frozen brood), and much more.

Evaluation in the hive – All of the observations listed above may be revisited, as well as full-colony issues: wintering (or summering in the tropics and desert), production (pollen and nectar), defensiveness, and hygienics. Larger numbers of bees may provide more individuals of each sub population that support traits that are not clearly expressed in the nucleus. Each subfamily comes from each drone the queen mated with.

How do you record data? Make it easy for yourself. Instead of weighing each colony and counting every bee, count the number of frames of honey produced and the number of frames of bees. Make estimates of the percent-

age of missed cells due to inbreeding and pollen stores. Use a one to five scale to record subjective observations: defensiveness, temperament, housekeeping, propolis use as examples.

Selection of high or low lines for certain traits – Let’s take a trait like pollen collection. You can select for both high and low pollen collection simply by measuring the total pollen collected in pollen traps during an identical time period. Then cross daughters from the very highest pollen collector with drones from the next highest via instrumental insemination. I suggest you discuss your ideas with someone who conducts II. Dr. Joe Latshaw in Columbus, Ohio is set up for this in the Midwestern U.S.

Something to keep in mind when you learn about bees and queen rearing:

Eggs Hatch – Adult Bees Emerge

When a bee egg hatches, there is no shell. The protective layer, the structurally complex but very thin chorion, simply softens and the tissue is reabsorbed by the larva that lies on the bottom of the cell. **BC**

*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. You can also find information about the Second North Central Queen Assembly, set for October 11, at the website, including a registration form and payment options.*