

# Basic Fundamentals of Queen Rearing

Written and Presented by Rick Coor to the Wake County Beekeeping Association  
March 8, 2016

The survival instinct of the honey bee is both remarkable and fascinating. A healthy colony can handily re-queen itself, especially during the spring and summer seasons. This noted survival instinct can become a colony's down fall, however, especially, when in the absence of a queen, the workers begin to lay eggs. Bees are known to draw queen cells around an egg that was laid by a worker. Another situation occurs when workers mistakenly destroy their own queen. In the dearth of resources, the workers will still attempt to re-queen themselves, often with poor results. It is this instinct that the beekeeper must understand or order to have consistent success in queen rearing.

To study queen rearing, one should think of the process in to two parts: (1) cell building and (2) mating nucs, both of which have their particular challenges but the latter will prove to be more difficult in practice.

A student of queen rearing will realize that there are several different variations to the process that are employed by beekeepers and many of them work, but the results are not the same. The situation where a honey bee farm needs a numerous, steady supply of queens for multiple mating yards requires many more steps than the needs of a small queen rearing operation. The challenge in commercial queen production is to produce a steady, predictable number of mated queens throughout the entire season. This requires a different approach than the beekeeper that needs one batch of queens occasionally, or simply a spare queen. A working knowledge of the steps in commercial queen rearing is helpful in order for the beekeeper trouble shoot the variations used by small producers.

First, a beekeeper must understand the fundamentals.

It is very useful to begin by observing that the honey bee naturally produces a queen when needed, and that the behaviors that accomplish the process are the ones manipulated by the beekeeper in order to induce queen rearing by a colony.

There are five essential components to the process whether it is carried out in nature or by a beekeeper.

1. Abundant resources- The honey bee transitions into a natural period of increase during the spring when resources become abundant. The beekeeper must also assure that a cell building colony has plentiful resources of pollen and honey, open honey. Royal jelly is made from pollen and honey.
2. Nurse bees- A colony of old bees has a difficult time replacing a queen therefore the cell building colonies must have young bees. Royal jelly is produced by young bees in greater abundance.

3. Crowded conditions- Queen rearing for swarming occurs in the hive when the colony is crowded and the same behavior is induced in the cell builders by crowded conditions. Crowded conditions also create the necessary warmth inside the bee hive for the queen cells.
4. Queen-less conditions- Queen cell building is a natural response to the lack of queen presence or reduction of pheromones. It is important that cell builders be queen-less in order to start cells. A queen excluder is used to a degree of success in some situations.
5. Appropriate aged larvae- Larvae which are aged 12-36 hours work best. The larvae must be produced by a mated queen and sometimes this does not occur in nature.

There is another important component, clear weather for mating.

The queen rearing time line differs a little from the standard honey bee development timeline presented in beekeeping information. For the beekeeper raising queens, the important day is the day of the graft. In nature, it is the day the colony begins enlarging the cell into a peanut shape and feeding copious amounts of royal jelly to the larva. The day of the graft coincides with day five of the standard timeline of honey bee development. The cell is constructed and royal jelly fed to the larva for four days and then the cell is capped, four days from the graft. The cell remains capped for seven days after which the virgin will emerge a total of eleven days from the graft. A period of ten days is required for maturing and mating after which the queen will begin to lay. The middle of this ten day period requires clear weather for mating flights and drone presence. All told, this process occurs twenty-one days from the graft.

This time line used in commercial queen rearing applies handily to queen production in a colony. Once the queen cell is under construction it will be capped within four days. Timely observations should be made to determine when the cell is capped and then the seven day capped period begins.

Whether a beekeeper is using grafted cells or natural cells, it is important that the virgin emerge in the proper environment or order for success. This environment is a queen-less colony that is being re-queened, or a special colony termed a mating nuc.

To re-queen a colony with a natural cell, the beekeeper will need to observe the day of capping the cell and predict the day of emergence, seven days a later. Approximately two days before the virgin is to emerge, the frame containing the queen cell is placed in the colony and the virgin should be out two days later. The previously mentioned ten day mating process follows during which time care must be taken not to disturb the colony, lest the virgin become alarmed and fly away, usually not to return.

The construction or set up of mating nucs and subsequent maintenance thereof is of utmost importance to the queen rearing process. Much time and resources can be squandered if the mating nuc yards are not properly managed. There are different types of mating nucs but the type mentioned here is the five frame medium nuc box, which holds four frames and a feeder. It is best to establish the colony on two partially filled frames; one with partial open brood, the other with partial open honey. The frame with the brood contains about half of one side young larvae. The open brood will hold the bees in a cluster on the comb. The bees are likely to abscond from capped brood. The honey frame should be partially filled with open honey, not solid capped honey. This allows the bees room to work and also feeds the colony. The workers will reposition the honey and establish a brood area. The water content of open honey

makes for better brood feeding, water is a component of royal jelly. A small division board feeder is used inside the colony; this usually a homemade device.

The percentage of success in the mating yard can vary. A success rate of eighty-percent is considered to be excellent. This also coincides with a failure rate of twenty-percent. Each turn of the nuc yard, usually about every three weeks, the misses, as they are called, must be restocked or otherwise reworked in order to prevent the yard from declining in numbers of viable mating colonies. This requires time, resources and a degree of beekeeping skill not usually known to the non-queen rearing beekeeper.

Managing the mating nucs requires skillful evaluation of the queen conditions of the colonies upon inspection. A rule of thumb might be that if the brood nest is found to be filled with honey, there is no virgin present. If the cells are being cleaned and an area is ready to become a brood nest, that may indicate there is a queen in the colony. Periods of rain will delay mating and when no eggs are present, one must take care not to disturb the virgin queens as already mentioned.

Another situation with mating nucs is that they are subject to re-queening themselves which is not altogether undesirable but the timing of the cell to virgin to mated queen must be observed and noted in order to avoid prolonged queen-less periods in a mating colony due to improper evaluation by the beekeeper. Notes are necessary to record the various stages when the natural process is being allowed to take place instead of introducing prepared cells.

It is important to realize that beekeeping is not a perfect science. The behavior of the honey bee is influenced not only by individual and species specific genetic s but also environmental factors as well. The season of the year, honey flows and weather patterns all influence the outcome of the efforts of the beekeeper and the bees. Queen rearing is easy in the spring during the honey bee's natural season of increase. The spring honey flow also provides abundant resources outside the colony. Warm periods of weather with scattered showers are conducive to the process as well. As the season and weather changes, the beekeeper must sometimes adjust to maintain successful results. One such adjustment occurs as the honey flow begins to ebb and is evident in the size and quality of the virgin queens. In the fall season, mating becomes unpredictable and the process of queen rearing takes a timely and needed break for another season.

Bio for Rick Coor:

Rick Coor currently serves as President of the North Carolina State Beekeepers Association. In addition to his NCSBA duties, he is a North Carolina Micro-breeder. Queen Rearing is the primary activity of Spring Bank Bee Farm, Inc., which is owned and operated by Rick and his son, Colin. Their beekeeping business is located in Wayne County near Goldsboro, NC. Rick is active as a speaker to bee clubs and enjoys working with other beekeepers at his bee farm. With twelve years of queen rearing experience, Rick offers insightful information on how to raise queens, from hygienic testing to managing the mating colonies. A lifelong learner, Rick graduated from East Carolina University in 1983 with a B.S. in Industrial Technology and is currently enrolled at Wayne Community College where he studies HVAC technology. Rick is knowledgeable in the building trades and has professional experience as a public school teacher and as a building contractor. He manages his apartment business when not working with his bees.

The Wake County Beekeeping Association sincerely thanks Rick for his service to the NCSBA, for speaking at the March 2016 meeting, and for providing this written presentation.

