NEW METHOD FOR RAISING QUEENS

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Paper 138, Oral Presentation

XXXVIIIth Apimondia
International Apicultural Congress
Ljubljana, Slovenia, August 24-29, 2003

Abstract

Raising queens is an important aspect of beekeeping. There are three main problems in raising queens: using old larvae, using dry larvae and providing poor nutrition during the raising of the queen. Each of these conditions causes serious problems when the resultant queens start to lay eggs. First, many of the new queen's eggs will not hatch after three days. Second, the colony cannot create solid brood. Third, the bees from these weak queens will have short lives. Fourth, the colony will supercede the queen at the first opportunity. If breeders and beekeepers do not have a proper nutritional methodology the queen larvae will not receive enough jelly in the first two days. Healthy queen larvae require high levels of royal jelly. Royal jelly production during queen rearing must be stimulated by the presence of pheromone and larvae. Many starter hives do not include these two factors, therefore, the bees have no reason to eat pollen and produce royal jelly. A starter colony must include proper levels of pheromone and sufficient numbers of larvae at least three days in advance of the grafting. A one-day-old graft must be covered in a large amount of jelly.
A new method for queen rearing starts with a strong hive containing a queen, strong population and brood. The pupae and larvae are removed from this colony and the remaining population is fed a mixture of royal jelly, pheromone, pollen, honey, sugar and water. This population will produce large quantities of jelly because: they have a queen, until recently they had larvae, and the nutritional supplement provides an even greater stimulus to produce jelly.

Introduction

The raising of queens offers a great opportunity to guarantee the future success of a beekeeper's colonies. Beekeepers throughout the world have always recognized that some colonies, in certain conditions produce strong queens with large bodies (measured by shoulder width or other pertinent dimensions). These strong, well-nourished queens have superior immune systems and a natural resistance to chalk brood disease. Once these queens are mated and ready, all of their eggs hatch after three days, which leads to same stage larvae and solid brood. It is important to understand why bees, when they

raise their own queens, and beekeepers, when they use queen raising techniques fail to produce strong queens. Inevitably there will be one of three main problems present: using old larvae, using dry larvae or providing poor nutrition during the raising of the queen.

Selecting Old Larvae

If old larvae are selected the resultant queens will most certainly be small, weak queens that will have difficulty managing the hive. The queens produced from old larvae will have a weak immune system and be vulnerable to chalk brood disease; some of their eggs will not hatch, therefore, eggs will be discarded destroying the possibility of same stage larvae and solid brood. Colonies that lose the opportunity to create same stage larvae and solid brood will encounter a host of other problems. Inevitably a weak hive struggling with a weak queen will supercede her, further damaging the colony's vitality. To return to the root cause, why is an old larvae selected as the future queen? Old larvae are selected for two reasons: one is based solely on the nutrition level in the hive and the second is linked to the behaviour of the beekeeper.

First, if a malnourished hive loses their queen or if the queen is extremely weak they will immediately begin to discard the eggs. In most observations of this condition the bees discarded 80% to 90% of the eggs. It is only after the egg disposal is complete that the bees will turn their attention to the selection of larvae to become queens. This delay means that the colony has selected old larvae and perpetuated the problem of poor nutrition.

Second, if a beekeeper is using grafting techniques there will be a bias in the larvae selection process, a bias toward older larvae. The cause of the bias is quite simple, old larvae are easier to see and easier to pick up and handle with grafting tools.

Selecting Dry Larvae

The problem of the selection of dry larvae for queen raising is fundamentally linked to the nutrition level in the hive. During days one and two of the larval stage the larvae should be bathed in worker jelly. This level of nourishment not only guarantees the health of the future worker population, but it brings the health of the selected larvae to the level necessary for the full impact of the royal jelly in the queen cell to be realized. If the larvae has been dry (malnourished) for the first two days royal jelly cannot overcome this disadvantaged start. This amount of worker jelly will only be produced if the bees have access to protein (pollen) and the necessary stimulus from the brood and pheromone are present.

Beekeepers use many different observations to assess the nutritional level in their colonies with the most popular being population. The best way to gauge the nutrition of any colony is to look at the amount of worker jelly that the one and two day old larvae are being given. Queen raisers report that the size of their queen cells change with the different seasons and this seasonal variation is most certainly linked to the protein (pollen) resources available from the environment.

Providing Poor Nutrition During the Raising of the Queen

It is obvious that the central theme of this paper is nutrition or more specifically the protein potential in the bees and their ability to produce jelly. Successful queen raising must begin with the selection, be it by the bees or a beekeeper, of young larvae that are bathed in worker jelly. Once the queen larvae are selected and the queen cells begin to receive royal jelly the need for high levels of nutrition in the queen raising system is now paramount. In the Material and Method section a technique to guarantee high protein potential in the bees and large quantities of royal jelly production for the queen cells will be described. This technique does not rely on protein resources from the area surrounding the queen-raising yard, but incorporates a protein rich supplement that also contains pheromones that stimulate the production of royal jelly.

Materials

Queen Raising Equipment: Beekeepers use a wide variety of queen raising systems that may include starter hives, protector hives, incubators or other custom configurations. Over the years our investigative teams have used a wide variety of systems with equal success.
Queen Raising Tools: As with the Queen Raising Equipment beekeepers use a wide variety of devices in queen raising systems and, over the years, many different tools have been used successfully in our methodology.
Caspian Solution: a blend of royal jelly, pheromones and other all-natural ingredients.
Pollen, sugar, honey and water.

Methods

To make royal jelly bees must eat pollen and honey. There are two stimuli that compel bees to ingest the necessary levels of pollen and honey; these stimuli are the presence of larvae and pheromone.
This queen raising technique included preparation and set up steps in which the bees received the needed stimuli both from the physical presence of a queen and larvae and from feeding the hive a liquid supplement that included Caspian Solution (a royal jelly and pheromone solution), pollen, honey, sugar and water. Each colony was then altered as described below to first, further increase the bees' pollen intake and then redirect the bees' protein potential to the production of royal jelly due to the sudden removal of the queen. The set by step process was as follows:

1. A preparation step in which a mature queen, 10 frames of population complete with a number of frames of brood are selected and this colony is fed a mixture of Caspian Solution, pollen, honey, sugar and water. These queen raising colonies were established 7 days before the placement of the first queen larvae (in cells or cassettes or other systems). The Caspian Solution supplement was fed to the colony twice a week.
2. A preliminary set up step in which, in each colony, the brood and larvae were suddenly removed, but the strong population and queen were left behind, and
3. A final set up step that included the removal of the queen and the placing of a queen larva in each hive. Because of repeated trials and successes with this technique it has

been discovered that four frames of population can make 26 queens and two frames of strong brood.

Results

The following results have been seen season after season in Iran and Canada.

The bees' behaviour is dramatic and as predicted. In the preparation step there is a compounding effect of the stimuli from the brood and queen pheromone and the added stimuli from the pheromone in the Caspian Solution supplement. The bees eat large quantities of pollen and the consumption of the supplement in which the pollen is suspended in a liquid is very high. The larvae that are present at this point receive large quantities of royal jelly and this is the ideal situation for the selection of larvae for grafting.
In the preliminary set up step the sudden removal of the pupae and larvae returns the hive to a condition that the bees recognize as an early spring or first generation condition. The bees understand that the first generation must be properly nourished and again they ingest large quantities of pollen in anticipation of the needs of the larval bees. Once again the uptake of pollen is dramatic.
In the final set up step the removal of the queen and the introduction of the queen cells has the predictable effects. The bees not only feed large quantities of royal jelly to the queen cells, but they also select larvae from the frames and produce large well-nourished queen cells on the frames. The frame of brood that is now in the hive is bathed in worker jelly and produces a large strong generation of workers.

Four frames of population that have been managed in this way have, in annual queen raising activities that date back to 1988, consistently produced 26 large, strong queens and two frames of brood.

The Resultant Queens

The queens raised in this way are large (large body dimensions including shoulder width, abdomen size and the structure of their internal organs). The queens have strong immune systems and queens from any lineage are resistant to chalk brood disease. This raising technique was selected because of the subsequent fecundity and productivity of the queens. The queens produce large quantities of eggs that all hatch after three days, as a result their colonies consistently produce same stage larvae and solid brood. This does not mean that the health of the subsequent generations cannot be affected by malnourishment or diseases, but in comparable conditions queens raised in this fashion are consistent top performers. The resultant colonies collect large quantities of pollen and honey or yield large population increases depending on the preference of the beekeeper.

Discussion

Compare the results described above to any number of queens that have been examined and then traced back to queen raising conditions that included the conditions of old larvae, dry grafting or malnourishment. Disadvantaged queens (raised under poor conditions):

1. are small and vulnerable to chalk brood disease,
2. will not live as long or will be quickly superceded,
3. produce generations with shorter lives,
4. consistently lay eggs that die and must be discarded, and
5. produce generations that are small and most notably produce generations of bees that have small, white and narrow digestive systems. This digestive system deficiency is most troubling because it limits the amount of pollen that the bees can digest and this in turn limits that bees' ability to raise their protein potential and produce jelly.

In conclusion it can be reported that queen rearing is most successful in an environment where there is proper nutrition and the stimuli from both the larvae and pheromones are clearly understood and manipulated for maximum effect. With the addition of a properly constituted supplement and the careful movement of frames of brood and mature queens, strong new queens can be produced consistently and repeatedly.