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Queenless hive problems

A common problem for beekeepers in summer is queenless hives, and sometimes “apparent queenless” hives. Hives end up queenless for a number of reasons - including swarming in particular - so we tend to see this occur more often in the early and mid-summer.

Causes of queenless hives - swarming

The most common cause of a hive going queenless this time of year is swarming. Typically when a hive swarms the old queen leaves the hive with the swarm and is replaced by a new queen. The new queen emerges from a queen cell which beekeepers will refer to as a “swarm cell” which the colony has produced in preparation for swarming. A hive preparing to swarm will typically produce large numbers of swarm cells, from a dozen to several dozen. For the new queen to successfully replace the old queen and start laying eggs, she has to successfully emerge, fly and mate, and start laying eggs. Failure in any of these steps may result in a queenless hive. When the first new queen emerges, she will attempt to destroy other emerging queens and queens still in queen cells. This often leaves the hive only one chance (the last surviving virgin queen) at a replacement queen. If anything happens to the new queen while making her mating flight (perhaps becoming bird food!), the hive is left queenless. If, while fighting other virgin queens, the last surviving queen is damaged, she may be unable to mate or to be suitable as a replacement queen. Fair weather is required for queens to make mating flights; poor weather will result in postponement of mating flights. If mating flights are postponed too long (3 weeks), the virgin queen will not be physically able to successfully mate, and will lay only drone eggs. (Workers and queens result from fertilized eggs, drones from unfertilized eggs.) A major obstacle to a virgin queen’s successful mating can be finding drones. It is believed that queens will fly a greater distance from their hives to mate than will drones from hives in the same beeyard. Thus your new queens need drones from other colonies with which to mate. (Queen producers overcome this problem by creating “drone colonies” some distance from their mating yards.) Queens from hives in isolated bee yards may have problems finding drones with which to successfully mate.

“Apparent queenless” hives

During the swarming process the old queen will normally greatly reduce, or cease the laying of eggs entirely about a week before the hive swarms. In addition, the hive typically does not wait for new (virgin) queens to emerge before swarming occurs. Swarming may begin as soon as the workers cap the queen cells that have been produced in anticipation of swarming. The queen cells may thus be capped, and a swarm (with the old queen), will exit the hive as much as a week before the new queen(s) emerge. Add to this time at least five days (can be longer) before the new queens make mating flights, and a day or two for the flights to be made.. Actually mating flights can take place over a one to two week period. After mating it is 2-5 days before the queen starts laying eggs Thus there will normally be a period of at least three weeks (or more) during the swarm process when no eggs are being produced in the hive. During all of this time the hive is not queenless, but appears to be so, and may be mistaken for a queenless hive. I call this an “apparent queenless” hive. When virgin queens or mature queen cells are present –even in the absence of a queen - the colony does not consider itself to be queenless, and attempts to re-queen a hive at this time will most likely be unsuccessful.

Also, later in the summer, after the honey flow ends (late in July in much of Kentucky), queens may “shut down” or stop laying eggs. This lack of eggs or brood in a hive can easily be mistaken for a queenless state.

How to handle queenless and “apparent queenless” hives

Obviously, if a hive is queenless, the beekeeper needs to introduce a new queen. However, to introduce a new queen into an “apparently” queenless hive is a waste of time and money. One solution is to not get too excited about lack of eggs or larvae too quickly. Especially during swarming season, if the hive is strong and there is a possibility it is in a swarm condition (containing 8 to 10 or more queen cells) or has swarmed recently, wait and watch for the presence of new eggs. If a hive that has swarmed goes several weeks without eggs being seen, introducing a new queen may be in order.

Queenless hives – adding capped brood

Hives that are queenless may be more difficult to re-queen, partly due to the lack of young bees, and may further decline to a hive with laying workers. To help alleviate both these situations, moving frames of capped brood from stronger hives to the queenless hives is suggested. Better yet, capped brood from which the bees are emerging. This action reinforces the queenless hives numbers (which are reducing as bees die & no new ones are produced, and adds young bees which will add in caring for a new queen which likely will be introduced. Additionally adding capped brood to a queenless hive will inhibit the development of laying workers.

Unfertilized or poorly fertilized queens

Queens that have failed to mate, been poorly mated (mated with an insufficient number of drones), or have used all the stored sperm in their spermatheca, are able to lay only unfertilized eggs, resulting in only drones and drone larvae being produced. A colony in this condition, like a laying worker colony, will weaken and eventually die out. A colony with an infertile queen can be distinguished from a laying worker colony by: the presence of a queen, single eggs in the cells and continuous cells with eggs or larvae present (good brood pattern). Prompt re-queening of such colonies is called for. It is suggested that colonies with infertile queens be reinforced with capped brood from other colonies, and re-queened with the use of queen introduction cages (also called push in cages) or by first establishing a queen in a nuc and combining this nuc with the hive.

Laying workers

Under normal conditions worker honeybees, though having the ability to lay eggs, do not lay eggs. The instinct to lay eggs is suppressed by the presence of the queen, but actually to a larger extent by the presence of capped brood in the hive. But some worker honeybees in colonies that are queenless for long periods of time (several weeks) will start to lay eggs. This condition is referred to as "laying workers". When this condition unfolds, there are not one laying workers, but a number of workers laying eggs. Since workers have not mated, they will lay only drone eggs, and only drone brood will be present in the hive. In addition due to the absence of worker eggs or young larvae, this colony is unable to produce a queen. A colony with laying workers can be distinguished from one with an infertile queen by the presence of cells with multiple eggs and these cells being scattered among cells without eggs (an extremely scattered pattern). Workers, unlike queens, do not have the instinct to lay a single egg in a cell and tend to lay eggs in random cells on a comb.

However a colony with laying workers considers itself as having a queen and cannot be re-queened in a typical manner (with a queen in a cage). It is suggested that hives with laying workers 1/ only be re-queened by first establishing a queen in a nuc and combining this nuc with the laying worker hive. 2/ Combine the laying worker colony with a stronger hive or 3/ disassemble the queenless colony and shake the bees out on the ground a distance from the apiary. These bees (including the laying workers) will disperse to other colonies in the apiary, and the laying workers will be recognized as foreign queens and killed.

Re-queening hives that have been queenless for a long period of time

Hives that have been queenless for more than a week or two can also be difficult to re-queen. The bees may fail to free, or may kill, the new queen. Re-queening with a nuc (see above) is the most efficient manner to re-queen such hives. Another method that is sometimes effective is to prior to re-queening this type of hive, move a frame (two is better), of capped brood (with the bees) from a stronger colony, to the queenless one. Another alternative is the use of a queen introduction cage. If introducing with a regular queen cage, in addition to adding capped brood to the hive, do not remove either cork from the queen cage for two or three days after placing the new queen in the hive. After two or three days, return and remove the cork from the candy end. This gives the bees additional time to get used to the new queen before she is free. Do not poke a hole or remove any candy from the queen cage; give the bees all the time they need to free her.