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REGIONAL TRAINING OF TRAINERS (TOTs) ON BEEKEEPING TECHNOLOGY, HONEY PRODUCTION, POST-HARVEST HANDLING OF BEEHIVE PRODUCTS

• Algiers, Algeria, 5th – 7th October, 2015
Why rear your own queens?

- Cost
- Time
- Availability
- Mite and Disease Resistance
- AHB
- Acclimatized Bees
- Quality
Cost

- A typical queen costs about $20 counting shipping and may cost considerably more.
Time

- In an emergency you order a queen and it takes several days to make arrangements and get the queen.
- Often you need a queen yesterday.
- If you have some in mating nucs, on hand, then you already have a queen.
Availability

- Often when you need a queen there are none available from suppliers.
- Again, if you have one on hand availability is not a problem.
Africanized Honey Bees

- Southern raised queens are more and more from Africanized Honey Bee areas.
- In order to keep **AHB out of the North** we should **stop importing queens** from those areas.

Importing queen = disease
Mite and Disease Resistance

- Tracheal mite resistance is an easy trait to breed for.
- **Hygienic behavior**, is not difficult to breed for.
- Hardly any queen breeders are breeding for these traits.
- The genetics of our queens is far too important to be left to people who don't have a stake in their success.
Acclimatized Bees

- It's unreasonable to expect bees bred in the deep South to winter well in the far North.
- Local feral stock is acclimatized to local climate.
- Even breeding from commercial stock, you can breed from the ones that winter well in your location.
Quality

- The quality of your queens can often surpass that of a queen breeder.
- You have the time to spend to do things that a commercial breeder cannot afford to do.
- For instance, research has shown that a queen that is allowed to lay up until it's 21 days will be a better queen with better developed ovarioles than one that is banked sooner.
- A commercial queen producer typically looks for eggs at two weeks and if there are any it is banked and eventually shipped.
Bees rear queens because of one of four **conditions**:

- Emergency
- Supersedure
- Reproductive Swarming
- Overcrowding Swarming
Bees rear queens because of one of four conditions!!:

- Emergency
  - There is suddenly no queen.

- Supersedure
  - The bees think the queen is failing.

- Reproductive Swarming
  - The bees decide there are resources and enough of the season left to cast a swarm without endangering the survival of the colony.

- Overcrowding Swarming
  - The bees decide that there are too many bees and not enough room or not enough stores to continue under the current conditions.
We get the most cells and the best feeding for the queens if we simulate both Supersedure and Overcrowding.
Why Queen Rearing?

- We can easily get a queen simply by making a queenless split with the appropriate aged larvae.
- So why would we want to do queen rearing?
Concepts of Queen Rearing

To get the most number of highest quality queens from the least resources.
To illustrate, let's examine the extremes.

- If we make a strong hive queenless. They could have, during that 24 days of having no laying queen, reared a full turnover of brood.

- The queen could have been laying several thousand eggs a day and a strong hive could easily rear those several thousand brood.

- We have lost the potential for about 30,000 or more workers by making this hive queenless and resulted in only one queen.

- This hive made many queen cells, but they were all destroyed by the first queen out.
To illustrate, let's examine the extremes.

- If we made a small queenless nuc we would only have a couple of thousand queenless bees rearing several queen cells and those couple of thousand bees could only have reared a few hundred workers in that time.

- But again they made several queen cells and the results were only one queen.
Queens from selected stock

- By using queen rearing techniques we can choose the mother of a large number of queens and hopefully improve our stock.
Some Biological facts with queen rearing.....

- Queens are produced from fertilized eggs.
- Fertilized eggs produce both workers and queens.
“Queen time”

<table>
<thead>
<tr>
<th>Egg laid</th>
<th>Larva</th>
<th>Pupa</th>
<th>Adult</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Egg laid" /></td>
<td><img src="image2" alt="Larva" /></td>
<td><img src="image3" alt="Pupa" /></td>
<td><img src="image4" alt="Adult" /></td>
</tr>
</tbody>
</table>
| Day One to day three | Day four to nine. Cell sealed on approximately day eight | Day nine to 15 | Day 16
|  |  |  | Adult virgin queen emerges from cell |
Methods used to raise queens

- Use natural swarm cells
- Use emergency cells
- Use non grafting methods such as Miller Method, Alley Method, Jenter System
- Use Doolittle grafting method
Non Grafting Methods

- Miller’s Method
Non Grafting Method

- Alley Method
Non Grafting Method

- **Jenter** System
- Requires specific equipment shown here.
Grafting Method

Doolittle System

This system requires the removal of young larva (less than 24 hrs old) from its worker cell and this larva is placed into a cell cup. (Either plastic or wax).

The cell cups are placed on a bar within a frame and this frame is placed in a cell builder hive for the bees to feed the larva and create queen cells.
Doolittle Method
All of the methods discussed will produce queens. (However!)

- You will need a hive to build the cells. This hive is called a “cell builder hive”. Again, many individual methods exist for raising queens in cell builders.
- Some prefer what is called a “queen-right” colony.
- Others prefer queen-less hives.
- You many even run into the term “cell finishing colony”.
- Your method will vary,
- according to the number of queens you want to raise.
A cell builder hive supplied with a large population of well fed nurse bees. The cell builder I use.

- My cell builder was used to start and finish queen cells. Thus the cell bars or in the (Alley, Miller methods--the frame with young eggs or larva) is placed into the center of this hive and it remains there until the queen cells are ready for harvest.

- When queen cells are harvested, I use the bees and frames to build nuc’s.
Hive well supplied with syrup and pollen.

- It is important that the cell builder hive is supplied with syrup before queen cells are started and after they are placed into the hive.

- It is important to provide frames of pollen to the hive. (Note—some individuals use pollen patties)
Mating Nucs

In my opinion, it works best if your mating nucs take two of your standard brood frames. This allows easy setup and tear down of mating nucs. To set up you just put a frame of brood and a frame of honey in each mating nuc. To combine at the end of the season you can just put them all back in one hive with a laying queen in one of them. Subdividing standard equipment, or blocking off a portion of the box, will probably pay off in the long run as well.
Mating Nucs

- Cells should go in the mating nucs on day 14 from when the egg was layed.
Queen Banks

- You can keep a number of queens in one hive if you get bees that are in the mood to accept a queen (queenless overnight) or a mixture of bees shaken from several hives and the queens are in cages so they can't kill each other.

- Put a frame of brood in periodically to keep them from developing laying workers or running out of young bees to feed the queens.
THANK YOU FOR YOUR ATTENTION
Conditions created to cause the bees to build queen cells.

“To produce good queen cells, the conditions that exist in nature when a strong colony produces cells under the swarming impulse should be approximated.”

From Queen *Rearing and Bee Breeding* by Harry H. Laidlaw Jr and Robert Page Jr. Page 44

Thus, the following needs to be observed……
Conditions created to cause the bees to build queen cells.

1. Crowded condition of the brood nest.
2. An over-abundance of nurse bees – to create the production of royal jelly.
3. Comb builders stimulated by feeding syrup.
4. Good supply of pollen – used producing royal jelly.
5. Good ventilation
6. Lack of queen substance (pheromones). If present, it suppresses queen rearing. (Queen-less hive)
7. Presence of selected young larva.
How I build my cell builder

I start with a bottom board, an empty deep super and a division board feeder.

I fill the division board feeder with syrup and keep it full.

I shake three or four 2 pound packages of bees to put into my cell builder. Sometimes this might be 3 pounds in each package. The number of worker bees determines the number of queens to be raised.

I collect 5 frames of capped brood. I try to avoid any with eggs but sometimes it can not be avoided. I get 2 good frames of honey and pollen. I also insert one frames of new foundation –which is removed when the cell bars are placed into the hive. This is a great way to get new foundation started.

I check for emergency queen cells two days later and place my grafted cell bars into the hive.
Another method is to shake a lot of bees into a swarm box aka a starter hive and give them a couple of frames of honey and a couple of frames of pollen and a frame of cells.
Timing is critical

### Bee Math

<table>
<thead>
<tr>
<th>Caste</th>
<th>Hatch</th>
<th>Cap</th>
<th>Emerge</th>
<th>Laying</th>
<th>Foraging</th>
<th>Flying to DCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queen</td>
<td>3½ days</td>
<td>8 days</td>
<td>-1</td>
<td>16 days</td>
<td>-1</td>
<td>28 days +/-5</td>
</tr>
<tr>
<td>Worker</td>
<td>3½ days</td>
<td>9 days</td>
<td>-1</td>
<td>20 days</td>
<td>-1</td>
<td>42 days +/-7</td>
</tr>
<tr>
<td>Drone</td>
<td>3½ days</td>
<td>10 days</td>
<td>-1</td>
<td>24 days</td>
<td>-1</td>
<td>38 days +/-5</td>
</tr>
</tbody>
</table>

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**QUEEN REGISTER.**

- Eggs: No. ....
- Missing: Brood.
- Laying: O
- Approved: Cell.
- Not Approved: Hatched.

**DIRECTIONS.**—Tack the Card on a conspicuous part of the Hive or Nucleus box; then, with a pair of Pillers, force a common pin into the centre O of each circle, after it is bent in such a manner that the head will press securely on any figure or word.
# Queen Rearing Calendar:

Using the day the egg was laid as 0 (no time has elapsed)

<table>
<thead>
<tr>
<th>Day</th>
<th>Action</th>
<th>Concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>Put Jenter cage in hive</td>
<td>Let the bees accept it, polish it and cover it with bee smell</td>
</tr>
<tr>
<td>0</td>
<td>Confine queen</td>
<td>So the queen will lay eggs of a known age in the Jenter box or the #5 wire cage</td>
</tr>
<tr>
<td>1</td>
<td>Release queen</td>
<td>So she doesn't lay too many eggs in each cell, she need to be released after 24 hours</td>
</tr>
<tr>
<td>3</td>
<td>Setup cell starter</td>
<td>Make them queenless and make sure there is a VERY high density of bees. This is so they will want queens and so they have a lot of bees to care for them. Also make sure they have plenty of pollen and nectar. Feed the starter for better acceptance.</td>
</tr>
<tr>
<td>4</td>
<td>Transfer larvae and put</td>
<td>queen cells in cell starter. Feed the starter for better acceptance.</td>
</tr>
</tbody>
</table>
# Queen Rearing Calendar:

<table>
<thead>
<tr>
<th>Day</th>
<th>Action</th>
<th>Concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Setup mating nucs</td>
<td>Make up mating nucs, or hives to be requeened so they will be queenless and wanting a queen cell. Feed the mating nucs for better acceptance.</td>
</tr>
<tr>
<td>14</td>
<td>Transfer queen cells to mating nucs</td>
<td>On day 14 the cells are at their toughest and in hot weather they may emerge on day 15 so we need them in the mating nucs or the hives to be requeened if you prefer, so the first queen out doesn't kill the rest.</td>
</tr>
<tr>
<td>28</td>
<td>Look for laying queens in nucs</td>
<td>If found (in nucs), dequeen hive to be requeened</td>
</tr>
<tr>
<td>29</td>
<td>Transfer laying queen to queenless</td>
<td>Transfer laying queen to queenless hive to be requeened</td>
</tr>
</tbody>
</table>
Virgin Queens

- Emerge from cell. They don’t hatch!
- Mate in good weather – usually after the temperatures have warmed a bit.
- Must mate within 20 days – or they then become drone laying queens.
- Will begin laying within several weeks after mating.
- Young queens may lay several eggs per cell at first.
- However, a brood pattern can be detected within several days. The term “untested” usually refers to a queen who has not been a proven productive queen. “Tested” indicates that the queen has produced brood which has been examined and certified by the breeder that she is producing good brood.