

**2017 ACORN Conference & Trade Show
Best Western Glengarry, Truro, NS**

Workshop Title: Beginner Beekeeping and Pests and Diseases in Hive Management

Speaker: Jerry Draheim, beekeeper and bee-breeder

Executive Summary: Jerry covers beekeeping basics, such as bee life-cycle, equipment, and common pests and diseases, with a focus on prevention of disease, and restoring and maintaining healthy hives.

Detailed Notes: Jerry has kept bees since 1972. In the 1970s, a package of bees cost \$7 and the accepted practice was to kill off the bees annually and buy new ones in the spring, whereas now a package costs \$220 and beekeepers over-winter their hives.

Be careful buying used bee equipment due to diseases (such as American foulbrood), which can transfer from equipment to your bees. It's important to cull old comb/frames regularly (roughly every 3 years).

Jerry once had a beehive that produced 300 pounds of honey (at least twice as much as any other hive), so he figured it was probably due to genetics and decided to get into bee breeding, which not many people were interested in at the time. He went to California to study with Steven J. Tabor III and worked there for a season. In his bee-breeding program, Jerry selects for honey production, gentleness, disease resistance, and hygiene.

There are now over 600 registered beekeepers in Nova Scotia, and Canada has more now than ever before. There is lots of attention on bees right now. Jerry thinks that bees will outlast humans, but that there's a legitimate concern about poisons and pesticides. Bees have learned to seal off contaminated pollen in their hives, but we need to learn different practices for food production.

Honeybees are warm-blooded. They live in a colony (a superorganism) and can't exist by themselves, so individual bees don't need to have a great immune system as the whole colony has an immune system. Up until recently, honeybees were wild and unmanaged, but now are dependent on humans given the disease situation. Honeybees would not survive on this scale on their own.

The biggest challenge to honeybees right now is Varroa mites. These mites are often found on top of the thorax of bees (an area that the bees have a hard time reaching to groom themselves and remove the mites).

Keeping Honeybees Healthy: To keep bees healthy, you need to know a bit about their biology. Bees have different life cycles depending on their role: the worker bee (non-egg laying female) takes 21 days from egg laying to emergence, the drone (male bee) needs 24 days, and the queen bee takes 16 days (she is fed a richer diet and grows faster).

Worker bees have different jobs throughout their lives, starting with cell cleaning when they initially hatch. The worker bees then graduate to feeding larvae and then become house bees, guard bees, and finally field bees. In summer, worker bees live approximately 6 weeks.

Equipment: There are different hive models, but the Langstroth hive (patented in 1858) is the most common. Langstroth observed that bees needed a certain amount of space between combs/frames and the side of the hive and lid. Before Langstroth, bees were just kept in boxes and the honey had to be cut out to harvest it. Bee space (5/16 ") was a significant revolution. If the space was too small, the bees would just seal it off, and if it was too big, the bees would make free form "burr comb" to fill it in.

Jerry changed from using 10-frame Langstroth hives to 8-frame hives. The hives aren't as heavy and so are easier to move, and the bees don't have to heat as much space during the winter. One drawback is that with two fewer frames, the hive will crowd more quickly and potentially swarm.

Bees naturally swarm to reproduce. You need to monitor hive population and make splits as needed to prevent swarming (so you don't lose bees). When putting hives out for pollination in the spring, you don't want them to be too strong or they may swarm.

There are also different depths of beehive supers: shallow, medium, and deep. Shallows are easier to lift but have more horizontal travel space for bees so it can be harder to find the queen bee when looking for her.

A queen excluder is a piece of equipment used to control where the brood (the eggs and larvae) is. It is usually used in August to make sure there is no brood in the same super with honey when it comes time to harvest the honey.

Jerry makes bottom boards for his hives with a screen for ventilation, and also to slide in a white mite board easily (to test for the presence of Varroa mites).

An inner cover for the beehive has a notch and screen holes to help with air circulation (taking excess moisture and gases from respiration out).

Styrofoam hives are also available. These also have an open screen in the bottom that is good for air circulation and reducing condensation, but they don't have an upper entrance.

Top bar hives were developed in Kenya, which is a very different environment from Nova Scotia. The Kenyan season is long with no winter and the bees swarm a lot. Jerry thinks that the top bar hive doesn't work well here and would be hard to commercialize.

To start, Jerry recommends keeping it simple with minimal standardized equipment.

Integrated Pest Management: Integrated Pest Management (IPM) is a useful tool for all agricultural enterprises, using a broad-based approach (different methods such as mechanical and chemical, and different degrees) to control pests and disease.

Some mechanical methods of pest management in beehives include:

- Screened bottom boards;
- Drone comb traps (mites prefer drones because of the longer time drones develop in the cell);
- Other traps (small hive beetle);
- Break in the brood cycle (for example when splitting hives).

Monitoring: Count the number of Varroa mites (at the end of June and into July). To do this, put a greased whiteboard in the bottom of the hive for three days. Count the number of mites after three days. If there are more than three mites/day on the board some intervention needs to be done.

Treatments: There are different degrees of chemical treatments: hard and soft. Hard chemical treatments are oil soluble and off-gas into the wax and accumulate. Mites evolve quickly and so treatments need to change. A variety of hard chemicals can accumulate and combine with unknown results. In general, Jerry finds that bees are not as strong as they once were.

There are a variety of organic treatments (these are usually left on for 1 full bee cycle (46 days?) and usually with no honey on):

- Formic acid (in pad/strip form, slowly gases off);
- Oxalic acid (use when its warm; the hives needs to be sealed up briefly to be effective; or can mix with sugar and apply directly to the surface of the bees in the fall, but the bees don't like it);
- Thymovar (based on thymol (from thyme), gases off over 3 to 4 weeks; will go into wax);
- Hopguard (a new product based on chemicals from the hop plant).

Jerry prefers Thymovar and uses oxalic in a dribble as a follow-up.

Seasonal Activities: Spring management of bee colonies involves evaluating colony conditions and needs, feeding if needed, and pollination rentals. The sole job of winter bees is to provide warmth. If mite treatment is needed and not used, winter bees may be weaker and not survive the winter. Mites stay active all winter, though not reproducing.

Bees need pollen and honey to make brood, so many beekeepers feed pollen substitute in the spring. Jerry feeds early, and commercial beekeepers feed a bit later. When feeding pollen, it's best to know where it comes from. You can even collect your own using pollen traps. Jerry collects pollen at the end of the dandelion flow for about one week, as well as at the beginning of the goldenrod flow (again for about one week). He doesn't do as much pollen collection because of mites weakening the bees and climate change reducing the goldenrod flow. Jerry's ideal would be to have bees in pollination nearby so that he could super up his hives easily and get more honey (rather than splitting before pollination).

Due to the occurrence of mites, honey needs to be taken off earlier (around September 1st) because of mites and treatment needs. Jerry generally has his bees fed by Thanksgiving. He feeds about 28 to 30 pounds of sugar syrup per colony, but he mentioned that with good fall flow of honey this year, he didn't need to feed as much. If feeding sugar late in the fall and the bees don't get all the moisture out, the syrup can ferment and lead to disease (dysentery). Fondant can be used as an emergency spring feed.

Swarming: Swarming happens usually in late spring/early summer or the end of July/early August. Reasons for swarming include overcrowding, reproducing, and a failing queen. Bait hives can be used to catch swarms.

Summer management for beekeepers involves honey production, mite monitoring, and pollen collection. Honey supers are put on hives once they are back from pollination. After blueberry pollination, it's a good idea to look for any signs of European foulbrood.

Fall management activities include honey removal, Varroa mite treatment, supplemental feeding, and winter protection.

Honey Bee Diseases and Pests:

- Varroa mite is public enemy #1. It reproduces in closed cells and emerges when the bee hatches. The mite spreads easily from bee to bee and hive to hive. One idea to help with this could be to space hives from each other to help prevent drift of bees from hive to hive.
- Tracheal mite (this led to the border for bees closure in the 1980s).

- Nosema. This is fairly common. There are different strains. It is often associated with dysentery and fermented bee food in the hives. Treatments include Fumadil B, acetic acid, and oxalic acid.
- American foulbrood.
- European foulbrood.
- Chalkbrood. This is a fungal disease. There often seems to be a genetic weakness and susceptibility to chalkbrood. There is no registered treatment. One method to help is to try re-queening the hive with a disease resistant queen.
- Viruses.

Other pests include:

- Black bears (the best treatment is an electric fence baited with tinfoil smeared with peanut butter).
- Skunks.
- Shrews (evidence of shrew damage is the hollowed out thoraxes of bees).
- Mice (will damage comb, eat bees and honey, and may build nests in the hive).

Questions:

Q: Can you leave honey on for the bees?

A: Generally, beekeepers feed bees sugar syrup for overwintering. Fall honey is challenging for overwintering. Early clover honey can be fed back with more success.