B-PLUS
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1993-94 WINTER MAY BE THE WORST EVER?

The analysis was certainly unscientific and probably incomplete. In a quick survey at the March, 1994 ANR Week meeting, beekeepers indicated that colony losses were in the range of 50-70% for most. It wasn't a particularly favorable winter from a weather standpoint as we had quite a long confinement period along with some very cold temperatures. However, most indicated that the dead bees were few and scattered in the hive with lots of honey left. The strongest indication is that mites, most likely varroa this time, was doing the damage. A good indicator could be the scale colony at the MSU apiary. It weighed 141 pounds the last week of October, 1993 and when examined in Mid February it still had 137 pounds. My estimate was that the colony most likely died the first week or two of December. We had treated the colony with formic acid in an experiment in September. That treatment may have been too late. (More on timing of treatments later.) In any event the winter loss was very great, and many of the colonies that were left are not the strongest either.

There was some interesting statistics regarding timing and number of treatments using Apistan strips in the Fall issue of the Wisconsin Apiary Newsletter. If you treated your bees in the spring or fall the mortality was 62-72%. These figures are surprisingly close to the winter losses that were reported by Michigan's beekeepers at the ANR Week meeting. It isn't until there were two treatments both fall and spring that somewhat "normal" losses occurred.

TREATMENT SCHEDULE FOR PESTS & DISEASES

We often become very narrow in our thinking because of the newness of a pest, or of the death of our colonies. I suspect that tracheal or varroa mites are not much worse than American Foulbrood disease (AFB) was in the early 1920's. What we have to guard against is becoming so myopic that we ignore all of the other pests and diseases and they begin to take their toll as well.

For example, I think that nosema disease has been contributing to some of the wintering losses that we are having the last few years.

AMERICAN FOULBROOD (AFB) AND EUROPEAN FOULBROOD (EFB)

Use the antibiotic extender patties as first described by W. T. Wilson in 1970. They are now approved for use, and research has shown that it is almost impossible to contaminate honey with this use. Springtime feeding is the most important, but since the vegetable oil has been shown to be somewhat effective against tracheal mites, use again in the fall. Do not use during a honey flow.

18 oz. Granulated Sugar
8 oz. Crisco
1 oz. Terramycin (TM-25)

(Mix the sugar and terramycin and then add the Crisco.) The above formula will make 5-6 1/4 in. X 4 in. patties. We flatten a scoop of mixture between wax paper and insert the patty with wax paper between the brood chambers. A formula for about 50 patties has 7 lbs. of sugar; 3 lb. can of Crisco, and one 6.4 oz of terramycin. Some people use only 6 lbs. of sugar (2:1 mix). I find the greater amount of sugar helps mix and make the patties.

NOSEMA

Use a syrup mixture with fumagillin (Fumidil B). (1:1 or 2:1; sugar to water) as the sugar amount is not critical, unless the bees need the food.) There is only a little data on other means of effectively applying fumagillin. For example, dust mixtures made up like terramycin or mixed in sugar syrup sprays. Fumagillin does not work in extender patties as the patties take too long to consume. Basically you want to get the antibiotic into as many bees as possible at the right concentration. The mixtures recommended are designed to deliver between 50 and 100 milligrams of fumagillin/gallon of syrup. The early studies were directed at using Fumidil B for package bees in order to reduce queen supersedure. More recent studies have shown that spring and fall feedings more than pay for the cost of the antibiotic in increased honey yield. When a colony has a severe case it is important to treat for two, or more, years to reduce the infection level.

Fumidil B comes in 0.5, 2.0 and 9.5 gram bottles. These figures are in the amount of active ingredient found in the package. The 0.5 gram bottle (500 milligrams) indicates to use in 5 to 6 gals of syrup. Five gallons would deliver the 100 mgs./gal. recommended level.

CHALKBROOD

There is no antibiotic or fungicide that has been cleared for use on this disease. The difficulty with chalkbrood is that the fungus has wind borne spores that can infect a colony at any time during the season. For the most part the disease seems to become important during periods of stress to the larvae. That is, when there are more larvae than the nurse bees can properly care for. This occurs most often in the springtime when the colonies are rapidly expanding their population.

There are differences in strains of bees in their ability to resist this disease. Those strains that have hygienic behavior (nest cleaning) show less signs of the disease. There may be other resistance mechanisms as well. If you have high levels of chalkbrood it is probably time to requeen with a new stock.

TRACHEAL MITE CONTROL

The only chemical control for this internal mite is the use of menthol crystals. The difficulty with menthol is getting it applied during a period of effective temperatures. Here in the north the only consistent time is in the spring. The ideal is temperatures between 60-80^{o} F. The menthol has to vaporize in sufficient concentration to kill the mites. The bag of crystals should be placed on top of the brood chambers. If the temperatures are expected to be near 90^{o} then place the menthol on the bottom board.

The antibiotic extender patties have been shown to reduce the reproduction of these mites. They need to be present continuously throughout the season to be effective. During the honey flow use patties that have only sugar and the vegetable shortening, and not Terramycin. It seems that the Crisco (vegetable shortening) causes a disruption of host finding by the young mites. That is, they can't locate a newly emerged bee to attached to and enter the trachea.

Considerable genetic resistance has been developed in Europe to this mite. Selections within stocks of the U.S. bees have also been made over the last few years. Such resistance may be the most effective means of control for this pest.

VARROA MITE CONTROL

Apistan® strips are the only registered control for *Varroa jacobsoni*. The strips are a plastic that has been impregnated to a 10% concentration with fluvalinate. The adult bees need to rub against the strip to receive an effective dose. The varroa mites produce new young mites only on the developing pupae within a cell. During the active season 80% of the mites are within the cells, thus the need to keep the strips on the hive for an extended period of time so as to treat the mites after they emerge from a brood cell. The current recommendation is to keep the strips on the colony from 28 to 45 days. This allows for several brood cycles to emerge and potentially be treated by contact with the pesticide strip. The difficulty we are having in the United States is that

the varroa here seems to be reproducing at a higher rate than in other parts of the world. Probably because a greater percentage of the females are reproducing each time they enter a cell. The impact of this fact is that you can treat quite well in the spring and still have too many mites in the fall. When the population is high in the fall, and the colony is no longer producing drones, the varroa develop exclusively on the worker brood. This causes a shortening of the worker's life span. During summer one varroa on a worker reduces her life by about one third. If we can use the same percentage for a winter bee then a heavily infested colony would have most of its workers die before winter is over. Instead of bees living 120-150 days they would live only 90 or 100 days. Little wonder that a colony dies during January or February.

A heavily infested colony during the summer collapses and the bees drift to other colonies. This drift can bring to the colony more mites than they have produced. This often occurs when the colony is beginning to rear its winter bees adding more pressure on this population.

This life history of varroa was presented to underscore the need to treat twice during the year. First, during the springtime to reduce the number of mites. Then again after the honey is removed in August. (If you plan to collect a fall crop of honey remove the strips during the period that nectar is coming into the hive.) It is best to leave the strips on for as long as possible up to the full 45 days.

Any type of genetic resistance to varroa has not been apparent until recently. This may be because the mite is a relatively new parasite on the Western (European) honey bee. We have found some bees with grooming behavior that actively remove mites from each other. It also has been shown that bees with hygienic behavior remove larvae with mites attached. Research has also demonstrated that a shorter development time for workers forces the varroa to stay almost exclusively on the drones. Just as they do on *Apis cerana*, the original host.

TALES FROM THE LONESOME HIVE

The colony is so lonesome it is quite easy to think of it as being isolated from all other colonies. This is almost never the case with honey bees since we have shown how much they can drift between hives. We also know that when colonies are dying from varroa that nearly all of the bees will disperse within a couple of days to other colonies within their flight range. I had not seen evidence of varroa in the LH last year, but just to be safe I treated with Apistan last spring.

Last month when I checked the colony it seemed to be coming along quite well. Still low in the hive with lots of honey above the cluster. When I checked it in late April all was not so good. The cluster was completely to one side of the top hive body and limited to about three frames. Very strange behavior! The bees had moved through two 6.25 in. supers to the new location. It is almost as if they were trying to rid themselves of the mites by moving some distance away. I, like many others, was lulled into a sense of well being last summer and fall by how good the LH appeared. I suspect that the colony was invaded by bees from some dying colony (or colonies) last fall and the large influx of mites took its toll of the colony this spring. Fortunately, the colony was large enough or produced enough workers that didn't have mites that they were able to survive

until now. I don't know if I can nurse them back to health in time for the honey flow or not. I only have about six or seven weeks before then. It will take a good queen and some ideal weather - something that has been less than ideal so far this year.

One of my concerns of having only a single hive in the area was that all of the good genes that I thought this colony had would be diluted during any queen matings. One of the advantages that beekeeper with a large number of colonies can accomplish by having many queens with similar genes. Too bad I couldn't have requeened all of the feral colonies in the nearby woods a few years ago. I don't think that the LH necessarily has genes resistant to varroa, but its vigor might have helped those colonies to survive and not collapse.