How the Cause of Diarrhea and Constipation can be Identified in Honeybees

INTRODUCTION

Most honeybee metabolism diseases show symptoms of diarrhea in front of the hive or around 500 feet around the operation. Some defecation may show signs of constipation around the hives (entrance, maximum 100 feet away from the yard). There are many different reasons that cause similar symptoms to constipation and diarrhea. It is therefore important to identify which issue or pathogen is causing the symptoms so that the risk of losing many hives can be avoided. If the correct cause is found, a proper strategy can be set in place and new generations of bees continually produced.

Most metabolism diseases have symptoms of diarrhea. These symptoms can be caused by Nosema apis, Nosema ceranae, amoeba, moisturized honey, an excess of antibiotics, or fermentation on the syrup or honey. These causes can be identified in a laboratory.

Constipation is a metabolism disease caused by a cold climate, a long winter, or a large pollen flow with not enough nectar. The ingredients in most pollen patties is not easy to digest and will also cause constipation.

Amoeba, diarrhea, or constipation, can destroy a colony in a short time by preventing honeybees from consuming pollen. If a colony cannot consume enough pollen, they cannot produce the worker and royal jelly that is necessary for brood production and the population will disappear consequently. In this presentation it is explained how metabolism diseases can be prevented, how a cause can be identified and a solution provided.

MATERIAL

- Lab equipment appropriate for identifying and sampling amoeba and protozoa diseases (sample slides, 40x – 100x objectives microscope)
- Tweezers (or use hands…see methodology)

METHODOLOGY

Note: System from Jaquie Bunse goes here.

There is two different ways to identify diarrhea and constipation symptoms.

a. Use of lab equipment
b. Field work, use of lab equipment not required

Either way is good because beekeepers usually don't have much time to identify the disease and treat it in an appropriate time frame.

b. The beekeeper wants to discover whether most of the losses are due to diarrhea, constipation, or both.

How to identify diarrhea symptoms:

There are a few quick ways of discovering the symptoms of defecation or constipation. One of these ways is by looking around hive entrances. If there are dead bees with swollen abdomens and either dry pollen in their rectum and around the entrance, then there is constipation present. If there is runny, non-digested pollen around the entrance, then there is diarrhea present.

The form of bees' defecation can be seen from looking around on the tops of lids, tarps (for wintering), 100 feet away from the operation, or even on puddles. If over 60% of the defecation is liquidity and have seedy spots in the middle, this means that the bees are dealing with some kind of diarrhea problem (caused by Nosema apis, Nosema ceranae, fermented honey, etc). Most of these symptoms can be seen in early spring or in cold climates. It is normal to see around 60% of the defecation being long, dry and streaky. If around 70% of the defecation is like that though, then early stages of constipation are taking place. Either one of those last two percentages can be problematic in a short time for an operation. Temporary constipation is also possible.

If after a few days of rain the operation is checked and there are no symptoms of diarrhea or constipation outside of the colonies, it is suggested to feed 10% of the operation with the following formula:

Per 20 hives, 10 frames population each…

- 1 kg honey
- 4 kg sugar
- 10 L warm water
- 0.5 L lemon juice

Mix the above ingredients and portion less than a liter to each hive.

Put three white sheets of some sort (1 m by 2 m) twenty feet, forty feet, and sixty feet away from the operation. Next, feed the bees - but be sure to do this method in above 14 degrees Celsius temperature. If it is a very cold winter, however, and there is no choice, do not go any lower than 8 degrees Celsius. Wait three to six hours after feeding to begin counting the amount of defecation on the white sheets. If there is a lot of constipation in the hives, defecation will be seen in a very short time.

[Add video of flying bees mid February 2010]

How to identify the problem by looking inside a colony:

For both constipation and diarrhea, bees show swollen abdomens. When a

bee’s stinger and rectum is taken out, either the rectum contains liquidity, watery, non-digested pollen, or dry pollen. A rectum containing dry pollen mostly occurs in cold climates, and that is the reason for most winter losses in countries such as Canada, Ukraine and Russia. Diarrhea mostly occurs in climates that have a lot of rain and moisture in the winter. Either way, if it can be seen that the bees have watery pollen, their metabolisms can be checked. If the bees’ stomachs are fat and white, that usually means there is a case of Nosema apis, Nosema ceranea, or amoeba occurring. The colony needs immediate treatment if that is the case for more than 30% of the bees. If it can be seen that the bees have liquidity diarrhea symptoms on top of that, the colony should be tested for the number of spores and a treatment plan set in place.

Constipation signs can also occur when bees consume a large quantity of pollen, or consume pollen patties in a cold climate. At winter’s end a colony will begin regenerating population even if there is no pollen source or natural flow because their bodies get 10-13% excess weight from consuming honey

containing pollen or pollen consumed from comb. Royal jelly production commences automatically and the queen begins to lay eggs. The hive will lose lots of population before being able to regenerate, though, because the bees cannot defecate the pollen residue. Sometimes, by consuming patty substitutes that are mixed with pollen or containing other proteins, the bees have trouble digesting and cannot fly. These bees walk across the front of their hive, cluster together and die soon after. They are also very sensitive to any ground moisture. Naturally, constipation and diarrhea are reduced by over 75% by the first honey flow. However, most colonies do not have a chance to survive that long and a treatment plan is necessary.

TREATMENT

Most amoeba and protozoa diseases prevent bees from digesting protein. Instead, the pathogen digests the protein itself so that it can multiply. Nosema ceranea and many other amoeba and protozoa diseases are difficult to recognize because bees display no symptoms in front of the hive. These

bees simply leave the hive and die somewhere in the field. Therefore, the symptoms must be looked for within the field.

Methodology:

The treatment for constipation is very simple. Per use of half a liter a hive, mix together 60% warm water, 2% lemon juice (or any acidic fruit juice), 5% honey and 33% sugar. It is best to drizzle the solution on the bee population. Repeat the feeding in 5-7 days. The total result is that constipation is reduced by 90%. The first feeding reduces 60% and the second feeding reduces another 30%.

For amoeba and protozoa problems, the best methodology is to germinate the pathogen to become active by use of liquid Caspian Solution. After that, one third of the regular dose of Fumagilin-b or similar products can be effective on the amoeba and protozoa. Using a product such as Fumagilin-b in the syrup is not very effective against amoeba and protozoa in itself. The syrup will be stored mostly instead of being consumed. By using the liquid protein Caspian Solution formula, though, bees consume proteins and

activate amoeba spores in their metabolisms so that only a low dosage of medication is effective. Caspian Solution also contains a pheromone stimulating bees to consume more protein, and help germinate amoeba and protozoa further.

Compare the treatment with fumagilin with Caspian solution, and then fumagilin with sugar syrup or sugar powder. On AFB, (discussion) put information on AFB…make fun of how antibiotics are to be used in bee industry.

[add video of rob feeding]

RESULT & DISCUSSION

The result of this investigation is in providing enough information so that a proper strategy can be followed to prevent honeybee diseases before they destroy an operation or become epidemic.

Most operations with amoeba become epidemic quickly because the bees consume water closest to the operation that is contaminated with protozoa and amoeba from bees' defecation. Many

amoeba and protozoa can survive nearly five to seven years and temporarily cause serious problems in bee metabolisms and even destroy a whole operation. Many of these problems are not even caused by honeybee pathogens such as Nosema apis and Nosema ceranae. Therefore it is very important to have a clean source of water. On top of that, if Fumagilin-b is fed with Caspian Solution before pollen consumption or brood production begins, the chance of losing the first generation after winter is prevented.

The experiment shows that feeding Caspian Solution with Fumagilin-b before wintering the bees, and feeding again at the beginning of the next season gives healthy bees. Basically, all honeybee diseases begin when pollen consumption starts. It is necessary to be cautious in warm climates where brood production does not stop, and preventative in cold climates.

CASPIAN APIARIES, YARD NUMBER ONE

- Year 2006: 250 hives, 30% winter loss and 20% weak with diarrhea symptoms
- Year 2007: 2000 hives, 30% loss from diarrhea

- Year 2008: 2000 hives, 15% loss from diarrhea
- Year 2009: 2000 hives, 5% loss from diarrhea
- Year 2010: 2000 hives, 1% loss from diarrhea

GOLDEN EAGLE APIARIES

- Year 2009, January-February: 100% loss from previous beekeeper. Amoeba and protozoa symptoms present with diarrhea. All of the equipment was reused and cured without any radiation through use of Caspian Solution.
- Year 2010: 2600 hives, 3% winter loss, less than 1% of that loss with diarrhea symptoms.
- Year 2011: 50% loss due to protein deficiency and a long winter