

VERMONT AGENCY OF AGRICULTURE

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PLANT INDUSTRY DIVISION

AMERICAN FOULBROOD DISEASE

CAUSE

Paenibacillus larvae, a microscopic spore-forming organism.

EFFECT

American foulbrood (AFB) is the most widespread and most destructive of the brood diseases. At first, the strength of an infected colony is not noticeably decreased and only a few dead larvae or pupae may be present. The disease may not develop to the critical stage, when it seriously weakens the colony, until the following year, or it may advance rapidly, and seriously weaken or kill the colony the first season.

SYMPTOMS

Death of an infected larva takes place after the cell has been sealed and the cocoon has been spun. First, the capping of the diseased cell becomes moist and darkens in color. Then, as the larva shrinks, the capping is drawn down into the opening of the cell so the "puffy" capping becomes sunken. Worker bees may puncture this sunken capping and may eventually remove it altogether. At death, the diseased larva changes from a normal pearly white color to a creamy brown, then gradually darkens. These larval remains can be drawn out with a toothpick into a brown thread or "rope". As the larvae dries up, it becomes dark brown. The final state is a very dark brown, or black, rather rough scale that lies uniformly on the lower side of the cell and extends from just below the opening of the cell close to the base. These scales stick very tightly to the cell wall and can be removed only with great difficulty. (If death occurs at the pupal stage, the tongue of the pupa sticks up from the scale.) The overall appearance of a comb infected with American foulbrood is patchy because of the intermixed diseased and healthy cells and also because the remains vary from the ropy moist larvae in cells with dark, sunken or perforated cappings, to the dry scales lying in open cells whose cappings have been chewed away completely by the bees.

TRANSMISSION

The spores are fed to young larvae by the nurse bees. They then germinate in the gut of the larva and multiply rapidly, causing the larva to die soon after it has been sealed in its cell. By the time of death of the larva, the new spores have formed. When the house bees clean out the cell containing the dead larva, these spores are distributed throughout the hive, and more and more larvae become infected. Eventually, the honey in an infected colony becomes contaminated with spores and can be a source of infection for any bee that gains access to it. For example, as a colony becomes weak, it cannot defend itself from attacks by robber bees from strong nearby colonies. These robbers take back the contaminated honey to their own colony and start again the cycle of infection and robbing.

The most common causes of AFB spread are: the movement of extracted supers between hives,

(often the next season); transfer of brood combs between colonies; and using old comb with AFB scale. Also, drifting bees or swarms issuing from an infected colony may spread the disease.

TREATMENT: Oxytetracycline, known commercially as Terramycin, or TM, is one of the two antibiotics approved for use against AFB in the United States. TM does not kill the bacterium of AFB, but prevents its spores from germinating or resuming growth in susceptible larvae up to 3 days old. When TM is present in the colony and included in larval food, it prevents the spread of infection and protects the colony from becoming diseased. AFB spores remain capable of causing disease for many years, which is why purchasing used equipment, especially combs, is risky.

Tylan is a newly approved antibiotic for the treatment of AFB in honey bees. Used only as a dust, it should be mixed at a rate of 200mg of tylosin to 20 grams of confectioner's powder sugar. The 100g bottle when mixed with 22 pounds of powdered sugar will make 500 doses. Due to the precise measurements needed to prepare a small dose, it is not recommended that beekeepers with only a few colonies use this medication. Also, since Tylan has a very long period of activity, great care must be used in regards to the treatment period to avoid contamination of surplus honey in hives. Tylan should only be used where TM resistant AFB has been determined.

Treatments of TM can be made in the spring, (discontinue 45 days before honey flows), and/or in the fall, after the honey crop has been removed. If TM is used during the honey flow, the honey must not be used for human consumption.

Terramycin is best used as a dust, mixed with powdered sugar. TM loses activity quite rapidly when in a solution, especially when exposed to high temperatures and/or sun. The recommended formula is sold as "Terramycin Soluble Powder", and sold in a 6.4 ounce package. You can get this material from most bee supply companies, and some farm stores. Pre-mixed formulations are also available from several bee supply companies; follow instructions on label. **Caution:** Terramycin is a powerful anti-biotic, affecting humans as well as bees. Avoid breathing dust when mixing, and wear latex or rubber gloves to avoid exposure to skin surfaces.

Mix: One level teaspoon of TM with 2 level tablespoons of powdered sugar, (1 dose for 1 colony); or one 6.4 oz. packet of TM with 2 lbs., 12 oz. of powdered sugar, (1 dose for 50 colonies.) One good way to mix small quantities of TM and powdered sugar is to place the recommended amount of both into a container with a tight fitting lid and shake vigorously. Allow a few minutes for the mix to settle before opening, to avoid releasing dust.

Apply: Place 2 slightly rounded tablespoons of the dust on the tops of the frames in the brood nest around the edges of the brood area. Do not overdose or get the dust on open brood, as it will kill the larvae. Three applications at 4 to 5 day intervals are recommended. Reduce the dose for small colonies or nucs.

Extender patties made with TM are no longer recommended due to the possibility of TM resistant AFB. Several instances of resistance have been reported from around the country. These cases have been isolated and found in commercial operations. For best results, AFB must be detected and treated in the early stages of the disease. It is strongly recommended that all brood combs showing signs of AFB be removed and burned. Colonies showing high levels of infection and reduced populations are best handled by burning. Contact the bee inspector whenever AFB is suspected for advice on how to proceed.

A good reference about AFB is Elimination Of American Foulbrood Without The Use Of Drugs, A Practical Manual for Beekeepers, by Mark Goodwin and Cliff Van Eaton, published by the National Beekeepers Association of New Zealand, Inc. The book is available from Betterbee

Inc., 8 Meader Road, Greenwich, NY 12834.

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