

# Bee Diseases - American Foul Brood-Prevention and Control

American Foul Brood (AFB), caused by the spore-forming bacterium *Bacillus larvae*, is the most widespread and destructive of the bee brood diseases. Larvae up to 3 days old become infected by ingesting spores that are present in their food. Spores germinate in the gut of the larva and the vegetative form begins to grow, taking its nourishment from the larva. Spores will not germinate in larvae over 3 days old. Bacterial growth causes the eventual death of the larva. The vegetative form of the bacterium will die but not before it produces many millions of spores. Each dead larva may contain as many as 100 million spores.

## Disease Spread

Disease spreads rapidly throughout the hive as the bees, attempting to remove the spore-laden dead larvae, contaminate brood food. Nectar stored in contaminated cells will contain spores and soon the brood chamber becomes filled with contaminated honey. As this honey is moved up into the supers, the entire hive becomes contaminated with spores. When the colony becomes weak from AFB infection, robber bees may enter and take contaminated honey back to their hives thereby spreading the disease to other colonies and apiaries. Beekeepers also may spread disease by moving equipment (frames or supers) from contaminated hives to healthy ones.

American Foul Brood spores are extremely resistant to desiccation and can remain viable for more than 40 years in honey and beekeeping equipment. Therefore honey from an unknown source should never be used as bee feed, and used beekeeping equipment should be assumed contaminated unless known to be otherwise.

## Management

Terramycin (oxytetracycline) is the only drug approved for use against American Foul Brood. When present in the food given to susceptible larvae this antibiotic is effective in preventing germination of AFB spores. The bees are then able to develop and mature normally. Terramycin will not kill the spores and is not a means for sterilizing either the bees or the equipment. If a colony contains AFB spores and is maintained in a healthy condition through treatment with terramycin, the disease will recur when the drug treatment is discontinued.

When purchasing established bee colonies or nucs it is very important to find out if they had been treated with terramycin. If they were treated the purchaser should definitely continue this practice. It is common for inspectors to find AFB in bees that had recently changed ownership and the new owner either by choice or through ignorance discontinued terramycin treatment.

The bee law in Pennsylvania allows for treatment of diseased colonies at the discretion of the inspector. An inspector who finds AFB will evaluate the situation and explain all the possible alternatives to the beekeeper, who will then decide how to treat the disease. If the colony is weak or heavily infested, the only alternative is to kill the bees and burn the frames and combs. If the disease is diagnosed in its early stages and the colony is strong, it may be treated with terramycin. A diseased colony treated with terramycin should be considered contaminated with spores forever and should be treated preventatively with terramycin indefinitely. A colony is not cleansed of AFB after treating for a year, 2 years or even 5 years. If a colony has had AFB and the terramycin treatment is discontinued the disease will come back.

## Preventative Terramycin Treatment

If your bees are in an area where AFB has been reported, if you have previously-owned beekeeping equipment or if you have purchased bees established on comb, it is a good practice to treat with terramycin on a preventative basis. The terramycin should be mixed with powdered sugar in a ratio which depends on the strength of the drug: 1 part TM-5 with 1 part powder sugar, 1 part TM-10 with 2 parts powder sugar, 1 part TM-25 with 5 parts powder sugar, or 1 part TM-50 with 20 parts powder sugar. The TM rating refers to the number

of grams of oxytetracycline per pound of terramycin. TM-10 contains 10 grams of active ingredient per pound of terramycin, etc. TM-25 is also referred to as animal formula soluble powder. Treatment of a beehive consists of sprinkling 2 tablespoons of the TM and sugar mixture over the tops of the brood frames. Preventative treatment should consist of 2 treatments about 1 week apart in the spring, at least 4 weeks before putting on surplus honey supers and another one or two treatments in the fall after taking off the honey supers.

### **Treating Diseased Colonies**

To treat a diseased colony, apply 3 to 4 treatments of the TM-sugar mixture at about weekly intervals. If these treatments must be done during the summer with the honey supers on, they should be left on the colony over the winter for bee feed because the terramycin will get into the honey supers and therefore contaminate the honey. Diseased colonies that do not respond to 3 or 4 treatments of terramycin should be destroyed.

Diseased colonies that must be destroyed can be killed with resmethrin insecticide that comes in an aerosol can and is available from bee supply dealers. Bees should be killed at a time when there is no flight. The frames and combs should be burned in a pit and the ashes covered. The heavy woodenware (supers, tops and bottoms, etc) may be sterilized by scraping them clean (the scrapings should be burned) and scorching the inside surfaces. The scorching can be done with a propane torch; particular attention must be paid to cracks and corners. If large quantities of supers are to be scorched they may be stacked and painted inside with kerosene and lit. Keep a cover handy to extinguish the flames when the wood is sufficiently scorched. To sterilize large quantities of equipment, it might be worthwhile to set up a barrel with a boiling lye solution of 1 lb. of lye to 10 gallons of water. The woodenware should be immersed in the solution and boiled 5 to 10 minutes or until clean. Frames may also be sterilized in this manner. Lye is a very caustic solution; use extreme care in this process.

Most beekeepers who have had any experience with AFB in their hives will agree that the best approach is to treat with terramycin on a preventative basis and inspect colonies regularly. Colonies that show signs of AFB should be destroyed and the equipment sterilized.

No method of treatment for AFB is completely effective for permanent control. Beekeepers should inspect their colonies regularly and always be alert for possible recurrence.

### **For More Information**

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