Control of American foulbrood

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3-1-1950

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Control of American Foulbrood

By F. B. Paddock

Of all the diseases that attack the honeybee, the most destructive is American foulbrood. This disease attacks the developing bee—the "brood."

American foulbrood has been known for centuries. But even so, it continues to kill bees. Many beekeepers don’t recognize the disease or know how to fight it.

Complete eradication of American foulbrood is impossible, but proper control measures can keep it at a minimum. Every beekeeper, therefore, should know its signs and its control so that he can attack the disease in its early stages.

Foulbrood starts in a small way in a colony. If not checked, it continues until it destroys the entire colony.

The colony dies because few young bees are produced to maintain the adult population. Even with the death of a colony a beekeeper may not learn the cause is foulbrood. These colony deaths are often blamed on winterkilling and wax moth.

WHAT CAUSES FOULBROOD?

American foulbrood is caused by a germ. This germ lives only on the developing bees—the larvae. The germ attacks mostly the worker bee larvae. It seldom attacks drone larvae, and very rarely queen larvae.

Foulbrood germs produce "spores." (Spores are germ seeds.) The disease is spread mostly by spores which are very hard to kill. They can withstand sunshine, chemicals and high temperatures. They can even cause American foulbrood after it has been inactive for many years.

HOW FOULBROOD IS SPREAD

New infections are usually carried in honey robbed from infected hives. Nurse bees will use this honey and convert it into food for larvae, and so infect the larvae with foulbrood. Once they get into larvae, foulbrood germs can multiply rapidly. In most cases larvae do not die right away but live through
Fig. 1. Hives abandoned after colonies are killed by American foulbrood are a common source of disease spread.

the feeding stage. The germs kill the larvae while still in the cells before emergence as adults.

Foulbrood isn’t noticed in larvae until after the cells of brood are sealed. Then it can be determined by the presence of dead larvae in sealed cells, and in cells which the bees have partially or wholly uncapped.

Many diseased colonies die during the winter because of damage caused in the fall. During the fall brood-rearing period, foulbrood keeps young bees from being produced. Therefore, the colony dies because the old bees do not have enough energy to carry them through the winter.

Even if a colony manages to struggle through the winter, it will likely die in the spring.

In such a case, the disease would appear late in April. Diseased colonies which have not been able to stand the winter are one of the most common causes of disease spread.

**USE PRECAUTIONS**

Examine colonies frequently during the brood-rearing season. Bees should be kept in hives with movable frames to make this job easy. Any other type of hive is just an aid to disease. Always use good combs. Check colonies every 8 days during the build-up period in spring and just ahead of swarming time. Also check for the disease when examining the colony for any other reason, such as condition of brood, room or stores.
Fig. 2. This comb shows various stages of American foulbrood.

**HOW TO IDENTIFY FOULBROOD**

Look for sunken, discolored, perforated caps in the sealed brood areas. Caps of healthy larvae are slightly dome-shaped and light colored—a definite contrast to cells containing diseased larvae.

To test for foulbrood, stick a toothpick or a match into a cell containing a dead larva. If the body contents "rope out" a half inch or more and then snap back, American foulbrood is indicated. When disease is found, burn the stick immediately.

Larvae eventually become dark brown and have an offensive "gluepot" odor. In the final stages, they dry down to scales on the lower sides of the cells where they stick tightly. These scales contain millions of germ spores, only a
few of which are needed to cause a foulbrood outbreak in a healthy colony.

**HOW TO PREVENT FOULBROOD**

Prevention covers the year-round activities of the beekeeper.

This means avoiding infection from outside sources and preventing the disease from spreading from one colony to another.

Be careful when buying colonies offered for sale at other farms. Have them inspected for foulbrood first.

Contaminated equipment must be destroyed or thoroughly cleaned.

Honeybees living in trees and buildings are not as dangerous a source of infection as they are assumed to be. Honey containers may be a source of contaminated honey. But their importance in the spread of American foulbrood also has been overplayed.

**CONTROL BY KILLING BEES AND USING CLEAN EQUIPMENT**

At the present time the one reasonably certain method of wiping out foulbrood is killing the bees and either burning the equipment or thoroughly disinfecting it by boiling in lye water.

All the disease-carrying honey combs, frames and dead bees must be burned. Other hive parts including bottom boards, hive bodies, inner covers, outer covers, queen excluders and honey supers **must** be disinfected if they are to be used again.

This is a severe program. It often shocks beekeepers because it is so harsh. Yet, even this method won't work unless it is carried out in the right way.

To be done properly, bee killing and equipment burning or sterilization needs to be completed in one operation.

**KILL INFECTED BEES**

Killing should be done in the evening when most of the bees are in the hive. Preparations for a fire should be made
before killing the bees to permit immediate burning. If equipment is to be sterilized, arrangements also should be made prior to killing.

Cyanogas is recommended for killing the bees. This can be bought at most drug, feed, seed or garden supply stores.

Put a rounded tablespoonful of Cyanogas on a piece of cardboard or shingle. Push this into the entrance of the hive. Do it quietly so the bees won’t fly out. Close the entrance to the hive as soon as the poison is inside.

Be careful not to inhale the fumes when handling Cyanogas. Be sure to store it in a place where people and animals will not come in contact with it accidentally.

After the poison has been in the hive 15 minutes, raise the cover and check to see if all the bees are dead. If they aren’t, sprinkle a little Cyanogas in at the top and wait a few more minutes.

Stray bees at the entrance can be killed in two ways. Either sprinkle a little Cyanogas at the entrance, or take away the blockade so that these strays can go inside where they will be killed.
In preparing to burn infected bees and material, first dig a hole at least 3 feet deep. Dig this hole in a place that won’t be plowed or disturbed in any way.

Two methods of burning are recommended. A steel wheel from an old hayrake or a similar wheel may be placed over the hole as a grate. Material to be burned is placed on top. As it burns the ashes will fall between the spokes and into the pit. This method is best as it insures complete burning.

The second method of burning is the use of a wood fire. First, fill up most of the pit with dry wood. Then put heavy boards across the top of the hole. Then set the wood on fire and place the material to be burned on the boards crossing the pit. Maintain ample draft into the pit to insure complete burning.
Fig. 5. Fill pit with dry wood. Put an iron wheel on top to serve as a grate for material to be burned.

Fig. 6. This grate with dry wood produces a quick fire to burn infected material.
Whichever method is used, hives should be burned as rapidly as possible.

After killing the bees, carry the hive close to the pit. Put the hive on a piece of heavy paper or burlap. Also put down a carpet of paper or burlap between the hive and the fire. This carpet will catch debris that might fall from hive parts being carried to the fire. As the final step this carpet can be rolled up and burned.

Be careful not to drop infected debris on the ground. Other bees will be attracted to it, and it will be the source of a new infection. Also make sure that no dead bees are left lying around. When bees die, a little drop of infected honey may be forced out on their tongues. Other bees will gather this honey.

Finally, rake the surface soil into the pit. This will get rid of any infected debris not on the burlap. Cover the debris in the pit with at least a foot of soil because honey is not sterilized by the burning and robber bees might be attracted to it.
Pack the dirt after the pit is filled to discourage animals from digging into the pit and exposing the infected material.

**DISINFECT HIVES**

Disinfect hive parts by boiling in lye water for at least 15 minutes. After boiling, rinse these parts in warm water and stack crisscrossed to dry evenly without warping.

Make the lye solution by adding a can of lye to 10 gallons of water. Add another can of lye after 12 hive bodies have been disinfected. Add more water as fast as it evaporates.

An iron barrel makes a satisfactory container for boiling hive bodies. Put it on stones or iron so that the fire can be built underneath.

Remove the scum that collects. This will make rinsing easier and assure better drying.
DO NOT USE SHAKING TREATMENT

The shaking treatment consists of separating bees from contaminated combs and equipment. Shaking has been used for years in an effort to control American foulbrood, but generally has not been satisfactory. In the first place, ideal conditions must be present before it will work at all.

Some producers believe that shaking is dangerous and may actually spread the disease. Other producers say it doesn’t pay, especially since package bees can be purchased so easily and at reasonable prices.

Shaking is not recommended. Inspection service records show that many producers fail to succeed with this method and turn to other control methods.

WHAT ABOUT CHEMICAL TREATMENT?

No chemical has been found that will cure American foulbrood. However, sulfathiazole has shown promise of checking the disease in certain stages. Sulfathiazole doesn’t destroy the spore of American foulbrood. Just what the chemical does isn’t known. When it is added to a sugar sirup, it does something that seems to enable the bees in a colony to clean up the disease.

Feeding sulfathiazole to a colony often enables it to live through one season. But do not assume that a colony fed sulfa will remain free from disease. Be sure to inspect every colony shortly before the end of brood rearing. A colony weakened by disease may die during the winter. Then again, the colony may get through the winter but die during the following spring.

Many states claim the chemical is dangerous because it masks the presence of the disease and creates a false sense of security. Because of this unsatisfactory performance of sulfathiazole, the Inspection Service has been forced to disregard the use of it.

USE RESISTANT STOCK

A strain of bees having high resistance to American foulbrood has been developed under the supervision of the Iowa Agricultural Experiment Station.
Resistant stock cannot be considered a cure-all for the disease. Rather, it is a tool which enables the producer to fight American foulbrood more effectively.

Understanding the capabilities of resistant stock, then using the stock properly are necessary. The disease cannot be eradicated merely by putting a resistant queen in a colony.

Disease-resistant stock should be used in all colonies located in a possible pick-up location. Keep close watch for disease outbreaks. Never tolerate infected material in or around the apiary at any time. Clean up immediately.

Beneficial effects of using resistant stock will increase through its continued and general use in the apiary and in the community.

IOWA FOULBROOD LAW PROVIDES PROTECTION

The primary purpose of the Iowa Foulbrood Law is to provide education on beekeeping and the control of the disease. However, the law also has “teeth” that permit the use of force in applying control measures if necessary. Every beekeeper should know the provisions of the law.

The position of State Apiarist is created by the Iowa law. The State Apiarist works in connection with the Iowa State College Extension Service. His duties are to give lectures and demonstrations on honey production and related subjects. He also uses radio, booklets, direct mail, and press releases to carry beekeeping information on a statewide basis.

It is the State Apiarist who enforces foulbrood control measures.

The Iowa Foulbrood Law provides that the State Apiarist, or his assistants, may inspect beekeeping equipment anywhere in Iowa.

Anyone wishing to have bees inspected that belong to someone else should submit a written request to the State Apiarist. If the bees inspected are found to be diseased, the apiarist will provide the owner with written information on the nature of American foulbrood and how to treat it.

He will instruct the owner in writing that the bees and bee supplies having foulbrood must be treated or destroyed within 10 days.
If the owner fails to do this, the State Apiarist will take charge of the work and bill the owner for the cost. If the owner does not pay the cost in 60 days it will be reported to the county auditor. Then the owner will pay it as tax.

**HAVE IMPORTED BEES INSPECTED**

All bees, combs, used hives and other used bee equipment being brought into Iowa must be certified as free from American foulbrood, and be accompanied by a permit or certification of inspection. This certificate can be obtained in the states from which the bees are shipped. In place of such a certificate the Iowa State Apiarist can issue a “Permit to Enter.”

**CHECK HIVE REQUIREMENTS**

In counties where an area cleanup inspection is in progress the State Apiarist may order that all bees must be kept in hives with movable frames. This kind of hive makes frequent and complete examination possible.

**WHAT IS INSPECTION SERVICE?**

The Inspection Service is a cooperative organization. The state provides the salary of the inspector, and local funds defray his expenses while he operates in the county. This service can be set up in any Iowa county. The Inspection Service conducts two kinds of inspections—general cleanup and area cleanup.

General inspection is used only in an emergency. Such a case would arise if the beekeeper was moving his colonies from one state to another, and an inspection was required by law, or if an inspection was required to sell his honey.

Area cleanup is the most important job of the Inspection Service. Inspections are made of all colonies in a county under this system.

This plan has been in operation in Iowa for more than 20 years.

Records show that the areas with this inspection service remain almost completely free of disease. However, the
records also show that when the service has been discontinued, foulbrood has reappeared.

Education on the other phases of beekeeping is part of the Inspection Service program.

SUGGESTIONS FOR FOULBROOD CONTROL

1. Don’t delay treating infected material. Do it now.
2. Never feed bees honey from an unknown source.
3. Do not, under any circumstances, buy bees only because they are priced low. Good bees are so inexpensive that it doesn’t pay to take a chance with cheap ones. Do not buy bees without an inspection certificate.
4. Never use material taken from a diseased colony in a healthy colony. Remember, it’s cheaper to prevent disease than to cure it.
5. Question all used equipment. Even if it has been out of use for many years it may harbor foulbrood spores.
6. Examine colonies frequently, especially during the buildup period in the spring. Most operators examine colonies for disease before they remove the crop. A further check should be made in the fall just prior to the end of brood rearing.
7. Use only hives that have removable frames. Box hives actually help spread the disease. The law requires use of removable frame hives when an area cleanup is in progress. Use them all the time.

HAVE SAMPLES DIAGNOSED

Don’t take any chances with American foulbrood. A free diagnosis will be given by the State Apiarist.

Handle samples for inspection as follows:

Cut off a piece of the brood or comb where the brood was last reared. Make sure no honey is contained in the sample.

Wrap the sample comb in a piece of waxed paper and put it in a cigar box. Nail down the cover. Wrap the box with strong wrapping paper and tie it with a stout cord. Make sure no honey is smeared on the paper. Mail this sample by parcel post to the State Apiarist, Ames, Iowa. A letter may be attached to the box but it must carry its own postage.
WATCH FOR OTHER BROOD DISEASES

Besides American foulbrood there are two other brood diseases—European foulbrood and sacbrood. They may do serious damage and may be confused with American foulbrood.

For the purpose of helping make the correct diagnosis of the disease present, the accompanying chart lists the characteristics of all three diseases.

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Agricultural Experiment Station, Iowa State College of Agriculture and Mechanic Arts, Floyd Andre, director, Ames, Iowa.