

# American Foulbrood

American foulbrood (AFB) is a disease caused by the spore-forming bacterium *Paenibacillus larvae*. The disease is found throughout the United States and has worldwide distribution. Currently, AFB is the only regulated apiary pathogen in Delaware. Hives with confirmed AFB infection are required to be burned or incinerated, buried at a landfill, or gamma-irradiated. AFB is regulated because the disease is deadly, incurable, and has spores that can survive more than 40 years on beekeeping equipment. While there are antibiotics approved to treat AFB, these antibiotics do not kill long-lived spores. If a beekeeper ceases treatment with antibiotics, the disease can recur. Beekeepers purchasing or using pre-owned beekeeping equipment should exercise extreme caution.



Infected larvae are caramel-colored and ropey. When a toothpick or swab is inserted into a capped cell, stirred, and pulled out, larvae will form a stringy elastic mass that ropes out to about an inch. It may be necessary to probe several cells.

- Larvae at this stage will not display ropiness.
- As the colony dies, there is a diminished population of adult bees.
- A foul odor may be present, similar to a “dirty gym sock.”

## HOW DOES AFB SPREAD?

The biggest risk factor for spreading AFB is when people use contaminated equipment, improperly sanitized tools or do not wash their hands after working with an infected colony, causing AFB to spread into other hives. Robbing behavior, when bees steal honey from other hives, can also spread AFB. When healthy bees rob honey or drift into an infected colony, they can bring back spores to their own hive and pass them to developing brood during feeding.

## DISEASES WITH SIMILAR SIGNS AND SYMPTOMS

AFB is sometimes confused with European foulbrood, sacbrood virus, or even early stages of chalkbrood fungal infection. Scale adhering to the bottom of the cell wall that is not easily scraped off and remnants of the pupal tongue are distinctive to AFB. Vita test kits may be used to confirm infection. In all cases, a lab confirmation of the disease is recommended. Sample submission guidelines for disease diagnosis by the Bee Research Lab at the USDA Beltsville Agricultural Research Center are online at [de.gov/honeybees](https://www.de.gov/honeybees).



Sunken, perforated, and discolored cappings are signs of AFB. Holes can be jagged and off-centered.

## SIGNS OF AFB IN A HIVE

The signs of AFB in a honey bee hive depend on the stage it is in when found.

### Early Stages of AFB

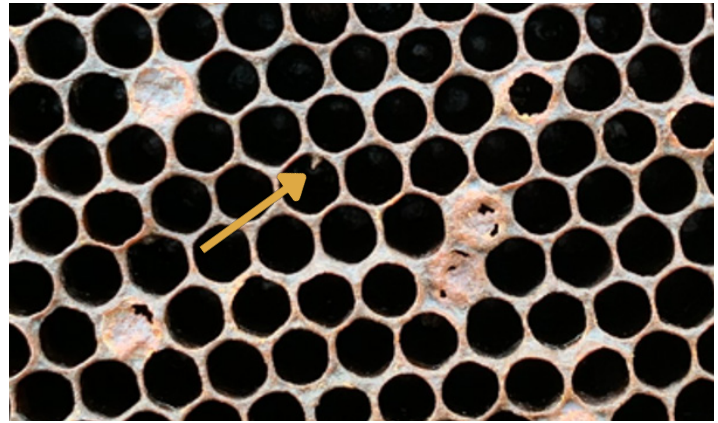
- Brood infected with AFB appears coffee-colored and has a ropy texture and a foul odor similar to “dirty gym socks.”
- Spotty brood pattern with discolored, sunken, and perforated cappings.
- Beige or coffee-colored larvae
- Larvae will rope out to about an inch long
- Pupal tongue visible

### Late Stages of AFB

- Larvae form a thin dark scale along the lower cell wall. The scale is due to the “goo” from the dead larvae drying on the bottom of the cell.



As dead larvae dry in the cells, they eventually form a scale in the lower cell wall. The scale is hard and stuck to the cell wall. Each scale can contain millions of AFB spores. Scale is often the only way to detect AFB in old stored equipment.



Larvae that die as they begin to pupate may leave behind a “pupal tongue,” mouthparts of developing pupae that do not melt along with the rest of the body. This sign is not always present in AFB-infected hives, but it is unique to AFB. If pupal tongue is present, that is a clear sign of an AFB infection.

## WHAT TO DO IF YOU SUSPECT AMERICAN FOULBROOD

Immediately contact your State Apiarist for a hive inspection. During the inspection, the State Apiarist or a state inspector will look for visual signs and symptoms of AFB. If AFB is suspected, samples will be sent to an accredited lab for analysis. Sanitize hive tools by soaking them for 20 minutes in a 10 percent bleach solution before using them on another hive.

## QUARANTINE

If AFB is suspected in an apiary, all hives must have their entrances reduced to prevent robbing behavior. Colonies cannot be moved in or out of the apiary until the quarantine order is lifted by the State Apiarist.

## DESTRUCTION OF AFB-INFECTED HIVES

AFB-infected hives may be destroyed by burning. In the event of a burn ban, alternate disposal methods include certified deep burial at a landfill or incineration. Due to air quality restrictions, do not burn plastic hives. Instead, dispose of plastic hives using a certified deep burial.

## GAMMA IRRADIATION

Irradiation is a sterilization procedure that kills microorganisms using gamma-radiation powered by Cobalt-60. The radiation penetrates cells and breaks down their DNA. This technology is very safe and leaves no residual radiation. The closest

gamma irradiation facility is Sterigenics in Salem, New Jersey. Contact your State Apiarist to learn about sending hive equipment to Sterigenics. Moving AFB-contaminated equipment across state lines is illegal. Therefore, special arrangements must be made for the storage and transport of equipment for sterilization.

## TREATMENT OF APIARY

The State of Delaware does not recommend treating hives with AFB infections with antibiotics. Treating infected hives does not cure them because the dormant spore phase remains viable, and infection can recur. However, antibiotic treatment can prevent infection from spreading to other hives in the apiary. The antibiotics available for the treatment of AFB are oxytetracycline (Terramycin and Pennox 50), tylosin (Tylan and Tylovet), and lincomycin (Lincomix). Effective January 1, 2017, both treatments must be prescribed by a veterinarian before purchasing, according to Rule #213 by the US Food and Drug Administration (FDA). This process of obtaining a prescription via a veterinarian is referred to as a Veterinary Feed Directive (VFD). In Delaware, the Office of the State Veterinarian provides VFDs at no cost to the beekeeper.

## CONTACT US



State Apiarist  
Plant Industries Section  
Ph: 302-698-4585  
<https://de.gov/honeybees>