



European foulbrood (EFB) is a serious bacterial disease caused by *Melissococcus plutonius* which has become more prevalent in apiaries, not only in Ohio but most of the eastern states. Theories for the increase include changes or mutations in the bacteria, the overuse of antibiotics leading to resistance, and/or the recent upsurge in queen and nucleus (nuc) production with many new beekeepers raising bees.

EFB has been known as a spring disease when cold, wet weather inhibits the bees from foraging, limiting the supply of honey available to feed the larvae. Also with spring temperatures and cold nights, bees may not cover all the brood causing chilling. These larvae are more susceptible to stress and diseases. Commercial pollinators often see symptoms after colonies are pulled from blueberry farms. This is usually temporary and fades once they find nectar from other sources.

It often dissipates when warm temperatures return and a nectar flow stimulates foraging. If symptoms don't disappear in a few weeks, the queen would be replaced, leading to increased egg production and hopefully the introduction of hygienic traits to remove dead larvae and clean the cells.

Around 10 years ago, state apiarists started to report an increase that the USDA Honey Bee Lab in Beltsville, Maryland reflected in their annual summary. The trend has continued with complaints that the commonly used antibiotic Terramycin was not controlling it. Several Ohio beekeepers have reported chronic problems despite their efforts to sanitize the apiary and burn and replace comb frames, which normally should not be necessary for EFB.

Symptoms and Life Cycle

Symptoms of EFB are coiled or stretched out brown larvae in the cell. Occasionally they may wither and turn brown and rubbery. The larvae die in patches on the brood comb which may be pulled out by nurse bees leaving an irregular brood pattern. The disease begins when the nurse bees accidentally transfer the bacteria while feeding the larvae. The bacteria could have come from another cell or colony, contaminated honey or sometimes from flowers or other objects in the environment that other bees with the bacteria visited. Once growing in the bee larvae, the bacteria continues to replicate in the gut, consuming the food fed to the larvae. If the larvae are given enough food, they may defecate the bacteria and possibly survive although they will emerge as underweight adults. If they are not fed enough, the bacteria will overtake the larvae and kill it within four days of larval hatch. As the bees clean the cells, they pick up the bacteria which is then fed to more larvae. A discovery was made by the Beeinformed group (beeinformed.org) in 2013 that the cells are often not cleaned well and another egg is laid in the cells with infected cadavers causing a re-infection once the egg hatches.

Symptoms are often confused with American foulbrood (AFB) a deadly and highly contagious bacteria that forms dormant spores that are almost indestructible. The difference is that with American foulbrood, the larvae die after they are capped so that the capped pupae die, shrink and become a dark greasy brown instead of with EFB when the larvae die uncapped. AFB can be diagnosed by swirling a stick in cells with sunken cappings and pulling the brown, goey remains out into a "rope" that can be pulled 4.72" (12 cm) from the cell. With EFB, some stringiness occurs but the residue does not rope more than half an inch. The *M. plutonius* does not form dormant spores however contaminated frames can continue to reinfect newly hatched larvae. Research has shown that in many frame samples, spores of AFB and EFB are present which may account for the yards with chronic EFB. Frames and the entire colony and boxes should be burned if AFB is present.

References:

<https://www.ars.usda.gov/northeast-area/beltsville-md-barc/beltsville-agricultural-research-center/bee-research-laboratory/docs/european-foulbrood-disease/>

<https://beeinformed.org/2013/04/05/european-foulbrood-efb-identification/>

https://honeybeehealthcoalition.org/wp-content/uploads/2022/11/HBHC_VET_revised_112122.pdf

<https://pollinators.msu.edu/resources/beekeepers/diagnosing-and-treating-american-foulbrood-in-honey-bee-colonies/>

<https://www.mass.gov/doc/european-foulbrood-fact-sheet/download>

Causes for EFB

Reasons for the increase in EFB are being investigated. Although several races of *M. plutonius* exist, to date, only *M. plutonius* is known to cause the disease. No mutant strains of the bacteria have been found, but research continues. The annual use of antibiotics is discouraged yet some colonies are still treated, which only hides symptoms.

In the fall of 2015, FDA passed regulation prohibiting the preventive use of all antibiotics in animals and bees and created laws requiring the beekeeper to contact a veterinarian to prescribe a VFD (Veterinary Feed Directive) before an antibiotic could be acquired. Because of the increased cost to obtain the medication, beekeepers may be relying on old stock which had been stored for decades and is less effective so that symptoms are now being expressed.

The other reason for the rise in the incidence of EFB may be tied to the dramatic increase in the number of colonies being used to make queens and nucleus colonies. Making strong queens requires a lot of nurse bees, flowering resources and cooperative weather. If splits are made at times when the weather prevents bees from foraging or plants from producing nectar or pollen, the larvae do not receive sufficient amounts of bee food to develop normally. Also if the colony has too few nurse bees to feed the larvae, the dry, hungry larvae are more susceptible. The dynamics of a strong colony is crucial for small or newly made colonies to develop properly.

EFB symptoms can be easily confused with maladies caused by varroa mites, such as Parasitic Mite Syndrome (PMS). In fact, the EFB bacteria are often found in conjunction with infections from varroa mites. Sick and weakened bee larvae that have been damaged by varroa mites often contract secondary bacterial infections and die in the cell. These larvae usually lose their shape and become an off white to yellowish mass, which are removed by nurse bees, thus spreading the infection to other cells.

Treatment and Prevention

Because often European foulbrood symptoms occur when the bee larvae are not receiving enough nourishment for various reasons, the first step is to feed the colony sugar syrup at a 1:1 ratio. Feeding stimulates the adults to become more active, feed the larvae and for the queen to lay eggs. Hopefully within two weeks the symptoms of EFB will be gone.

It is recommended to remove and destroy infected frames to reduce the amount of contaminant and condense the colony so that each frame is loaded with bees. If after two weeks the symptoms continue it is recommended to test some suspect larvae. Contact the County or State Apiarist or an experienced beekeeper to help with the diagnosis or cutting the comb sample.

Several options are available for testing:

- Send a sample to the USDA Honey bee Lab (no charge at this time). See information on collecting and sending the sample at the [USDA website](#).
- Find an independent lab (costs vary);
- Use the [Vita Bee Health EFB test strips](#). Follow instructions carefully for accurate results.

It is not recommended to use an antibiotic for EFB, but it is an option. Contact a veterinarian who is available to diagnose honey bee diseases and have the vet examine the colonies and possibly cut a sample of comb. If the veterinarian concurs, he/she will write a VFD and submit it to a bee supply store or other source. The medication will be prescribed for a set period of time.

To prevent EFB in colonies, avoid moving brood frames from one yard to another and do not use brood comb from other people's colonies. Never give honey to colonies that came from another yard or beekeeper, nor should bees be fed honey purchased from a store. When purchasing nucs or colonies, request to see a current Certificate of Health to ensure inspection and health.

Replace old comb after 3-5 years and keep apiaries clean. Store empty equipment in a building away from live colonies. Inspect the brood frames once a month or at least several times a season. Ask for help if the brood looks unhealthy. Allowing colonies to dwindle for even a few weeks can harm the overall health of the colony and lead to its decline as well as the fact that if a bacterial infection exists it will continue to spread to other frames and colonies.

Most beekeepers may never encounter EFB, but it is recommended to routinely monitor colonies for vigor and activity. If a colony does not seem as active as other colonies in the yard, inspect the brood to determine the cause. Keep varroa mite levels below the USDA threshold of 3 mites per 100 bees all season and feed if necessary. Early detection is the key to avoid loss and maintain strong healthy colonies.