

Good judgment comes from experience, and a lot of that comes from bad judgment.

-- Will Rogers

Ever hear of MRSA (methicillin-resistant *Staphylococcus aureus*)? How about MDR-TB (multidrug-resistant tuberculosis) or CRE (carbapenem-resistant *Enterobacteriaceae*)? These are life-threatening bacteria that have become resistant to antibiotic therapies. They are dangerous because our standard cures are no longer effective and it is getting harder and harder to find new antibiotics that actually work. This healthcare crisis should be a huge concern to all of us.

Part of FDA's response to this issue is to prevent the widespread use of antibiotics for nonessential purposes. For example, in the past, certain animal feed has often contained antibiotics not to cure a specific disease but because the animals grow faster and bigger when they are used. Part of the societal cost of this method of growth enhancement is bacteria that are increasingly resistant to the antibiotics.

FDA's effort in this arena has finally caught up with beekeeping. In June, the Agency issued a Rule (which has the same effect as a law) regarding [Veterinary Feed Directive](#) (VFD) drugs. Many antibiotics have previously been available over-the-counter (OTC), meaning that anyone can buy them from their supply store as easily as they buy paint or nails. The antibiotic drugs that the Agency have deemed "medically important" have now been recategorized as VFD drugs, meaning that in future they can only be purchased with a prescription from a veterinarian who has direct familiarity with the animals that the drug is being requested for. I don't know about you, but in my area we have Large Animal vets and Small Animal vets but I've never come across a Really *Really* Small Animal vet around here. So getting a legal prescription for my bees seems unlikely.

The two notable bee-related drugs on the [FDA's hit list](#) are tylosin (Tylan) and tetracycline/oxytetracycline (Terramycin). Conspicuously absent is fumigillan (Fumidil); I



Sunken, perforated cappings are one symptom of American Foulbrood.

assume that FDA does not yet consider it to be "medically important" for humans.

Why are tylosin and tetracycline used?

Beekeepers use tetracycline and its more recent cousin tylosin to treat hives for American Foulbrood (AFB). AFB is caused by a spore-forming bacteria, *Paenibacillus larvae larvae*, that is extremely destructive and extremely contagious in bee hives. The reproductive spores lay in wait for the right conditions and, as best we know, can live "forever". The spores cannot be killed by any conventional antibiotic. Tetracycline and tylosin suppress the disease, preventing an outbreak, but do not kill the spores or eliminate the actual disease.

[Beekeeping for Dummies](#) and other popular sources of information have commonly advised beekeepers to prophylactically treat colonies with tetracycline or tylosin every year to prevent an AFB outbreak. However genuine apicultural experts see this as a very bad practice since it masks the prevalence of the disease. Once treatment stops, an outbreak occurs which can easily spread to other apiaries within flying distance. There is no cure for colonies with active disease; the only practical recourse is to destroy the bees and deal with the spore-contaminated equipment. The greater wisdom is to not suppress the symptoms but rather to identify occurrences and aggressively destroy the disease at its

source.

Say you are in the market for a nuc. Would you prefer to buy from a beekeeper who says, “My colonies don’t currently show the symptoms of American Foulbrood” or from one who can honestly say, “My colonies do not have American Foulbrood”?

What is American Foulbrood?

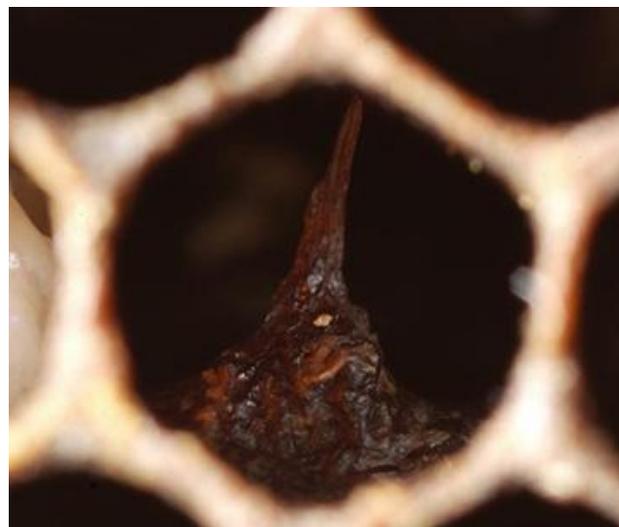
As mentioned above, AFB is caused by bacteria. Worker bees feed spore-contaminated food to young larvae. The spores germinate in the gut of the larvae and the vegetative stage of the bacteria feeds off of the larvae. By the time the cell is capped and the larva pupates, the disease overcomes the larva and it dies. The vegetative bacteria digest the larva, leaving a dark scale on the bottom of the cell. The pupal tongue characteristically sticks up out of the scale, the only recognizable thing left of the poor baby bee. Before the vegetative bacteria dies, it creates as many as 100 million reproductive spores. These get picked up by the housekeeping bees that clean out the cell and are unknowingly spread throughout the hive. The cycle starts over when contaminated nurse bees feed the next batch of larvae.

The colony dwindles and eventually dies. Robber bees remove contaminated honey and carry it back to their own hives. Left unchecked, this process can severely cripple beekeeping in a region. The potential for harm is so severe that North Carolina created its Apiary Inspection Service nearly 100 years ago in order to detect and destroy American Foulbrood. Fortunately for us, in the past two or three years AFB has been found in less than 1% of the colonies that were inspected by the state inspectors, according to Chief Apiary Inspector Don Hopkins. To me, this is a testament to how well they are doing their jobs and how lucky we are to be within their jurisdiction.

What to do if you suspect AFB

There are several signs of AFB that beekeepers should always be on the lookout for:

- Sunken, perforated cell cappings caused by



The tongue of the dead pupa above a dry scale is all that remains of the dead brood.

- the decomposition of the dead brood inside
- Ropy goo inside the cell. Insert a toothpick into a suspect cell. Twirl it around a bit and then slowly remove it. AFB goo will be ropery and elastic, snapping back after an inch or so.
- Extremely foul, distinctive odor.
- Dark scale on the bottom of cells that is hard to remove. Often the pupa’s tongue can be seen sticking up from the middle of the scale.

If you see any of these symptoms, contact one of our state bee inspectors. The list of inspectors and the regions they cover can be found on the NC Department of Agriculture’s website under [Plant Industry/Plant Protection Services/Apiary Inspection Services](#). Don’t hesitate to contact them regardless of whether you have one hive or a thousand – their job is to assist all of NC’s beekeepers, and nearly all of us have only a couple of hives.

If you have a hive with AFB, your apiary inspector will help you eliminate the problem. The standard practice is to depopulate the hive (they are going to die anyway – it’s better to do so before the disease spreads). In other states, the equipment that the bees lived in must be burned to kill the spores. However in North Carolina, we are unique in that the NC Department of Agriculture owns an ethylene



Elastic, ropey goo is another sign of AFB.

oxide fumigation chamber. Our chamber is NASA surplus equipment: since ethylene oxide will kill any form of life in the known universe, its original purpose was to sterilize moon rocks. AFB spores are a piece of cake compared to microscopic moon creatures.

Your apiary inspector will help you get your equipment fumigated so that it doesn't need to be burned. He/she will even pick it up from you and deliver it back when it has been treated. The turn-around time varies by season of the year and demand. Fall is a good time to send equipment for processing because most people don't need it back immediately. There is a small fee for the fumigation service, ranging from 50 cents for an inner cover to \$1.75 for a super and \$3.25 for a deep hive body. If you don't think a piece of equipment is worth the cost of fumigation then it must go into the fire.

Woodenware and empty comb, in fact anything except honey and bees, can be processed in the fumigation chamber. The chamber is large enough to hold 40 deep boxes or 70 shallows.

Consequences of change in tylosin/tetracycline status?

The FDA's new rule gives industry three years to adapt so it may be a little while before tylosin and tetracycline completely and permanently disappear from your favorite supply house. However once they do go away

as an option, what can we expect? One scenario is that beekeepers who have been prophylactically treating to suppress AFB for years will suddenly have outbreaks in their apiaries when treatment is no longer possible. Robber bees will spread disease from their collapsing colonies to the entire area. Those of us who have always had clean hives may start to have AFB issues, inheriting the problems of our neighbors. So we all must be especially vigilant over the next few years. Learn to recognize the symptoms of AFB (NCSU's "[Diseases of the Honey Bee](#)" is a good place to start). Make friends with your bee inspector. Above all, don't be complacent. Take immediate action if you suspect infection— call your inspector for confirmation and advice. Would you rather have the headline in the [NC Bee Buzz](#) read, "{your name} Stops AFB Threat Before It Gets Out of Hand", or "{your name} Causes Death of Countless Colonies in {your county} by Failing to Take Timely Action"?

Not all beekeepers are capable of becoming expert bee doctors, correctly diagnosing and treating every possible honey bee malady. However by regularly inspecting your hives, it is not difficult at all to learn to identify normal, healthy bees and brood. Then when you see something that doesn't look healthy, call on the specialists at the state inspection service. Not only will you increase the chances of saving your own bees, but you may save mine too!

Special thanks to Chief Apiary Inspector Don Hopkins for providing details on the NCDA fumigation chamber.

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