HONEY BEE VETERINARY MEDICINE

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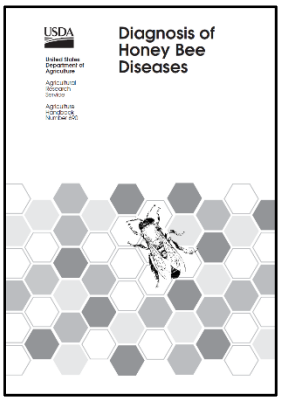
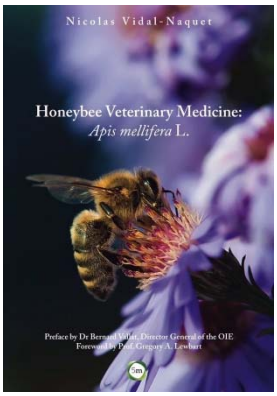
RESOURCES



Diagnosis of Honey Bee Diseases

by Hachiro Shimanuki & David A. Knox USDA ARS Agriculture Handbook Number 690
Free download:
www.ars.usda.gov/is/np/honeybeediseases/honeybeediseases.pdf



Honeybee Veterinary Medicine: *Apis mellifera* L.

by Nicolas Vidal-Naquet
ISBN: 978-1910455043

uaex.edu/bees

plantboard.arkansas.gov/plantindustry/apiary

beeinformed.org

www.drugs.com

Search: veterinary drugs for bees

USDA Agricultural Research Service

USDA Honey Bee Disease Diagnostics Lab

- Beekeepers, bee businesses, and regulatory officials may submit samples.
- Samples are accepted from the United States and its territories; samples are NOT accepted from other countries.
- Include a short description of the problem along with your name, address, phone number or e-mail address.
- There is no charge for this service.
- For additional information, contact Sam Abban by phone at (301) 504-8821 or e-mail: samuel.abban@ars.usda.gov

How to Send Adult Honey Bees

- Send at least 100 bees and if possible, select bees that are dying or that died recently. Decayed bees are not satisfactory for examination.
- Bees should be placed in and soaked with 70% ethyl, methyl, or isopropyl alcohol as soon as possible after collection and packed in leak-proof containers.
- USPS, UPS, and FedEx do no accept shipments containing alcohol. Just prior to mailing samples, pour off all excess alcohol to meet shipping requirements.
- Do NOT send bees dry (without alcohol).

How to send brood samples

- A comb sample should be at least 2 x 2 inches and contain as much of the dead or discolored brood as possible. NO HONEY SHOULD BE PRESENT IN THE SAMPLE.
- The comb can be sent in a paper bag or loosely wrapped in a paper towel, newspaper, etc. and sent in a heavy cardboard box. AVOID wrappings such as plastic, aluminum foil, waxed paper, tin, glass, etc. which promote decomposition and the growth of mold.
- If a comb cannot be sent, the probe used to examine a diseased larva in the cell may contain enough material for tests. The probe can be wrapped in paper and sent to the laboratory in an envelope.

Send samples to:

Bee Disease Diagnosis
Bee Research Laboratory
10300 Baltimore Ave. BARC-East
Bldg. 306 Room 316
Beltsville Agricultural Research Center – East
Beltsville, MD 20705

www.ars.usda.gov/northeast-area/beltsville-md/beltsville-agricultural-research-center/bee-research-laboratory (*or just search for "**usda bee lab**"*)

Honey Bees & VFD

Why beekeepers need access to veterinarians and veterinary antibiotics

F. Dustan Clark, **D.V.M., Ph.D.**
Extension Poultry Health Veterinarian
Associate Center Director-Extension

Animal Domestication

- Typically with domestication there is a genotypic, phenotypic, and behavioral change.
- Taming has only a behavioral change.

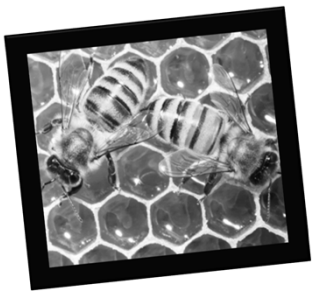
Domestication Timeline ?
Plus or minus a few years

- Dog — 10-13,000+ years ago
- Sheep/Goats — 9,000+
- Cattle — 7,000+
- Horse — 5,000+
- Poultry — 4,000+
- **Honeybees — 8500+? Anatolia**

Domestication

- A few physical changes
- Behavioral changes

- By definitions bees are somewhere in between "domesticated" and "tamed"



Getting Buzzed

- December 2013
- US Food and Drug Administration (FDA) started phasing out the use of over-the-counter antibiotics for food producing animals
- Part of Food Modernization Act
- Slow antimicrobial resistance in drugs fed to animals and of importance in human medicine
- Reduce the amount of antibiotics used in instances where disease is not present

  Growth promotion, feed efficiency
- Only therapeutic use
- Prescription/VFD for antibiotics for livestock
- Honey bee colonies (minor species of food-producing animal) are in the changeS
  - Bees produce honey a food

January 1, 2017

- OTC antibiotics used by beekeepers no longer available
- FDA in addressing concerns with antibiotic resistance, ruled that antibiotics for treating common bee diseases will need to be ordered by a veterinarian via a **prescription** or **Veterinary Feed Directive (VFD).**
- Beekeepers are no longer able to diagnose/treat problems using antibiotics **without** a licensed veterinarian.

Honeybees are classified as livestock by US Government (FDA-VFD rule)

"Veterinarians will need to be involved"

"This is a major policy shift."

"Training and education are going to be key to a smooth transition into the new policy".

"This is an opportunity for our profession,"

- Dr. Don Hoenig, former Maine state veterinarian, beekeeper, and co-owner of One Health Veterinary Consulting.

Honey Bees & VFD

AVMA fully supports veterinarian involvement

Veterinarians are trained in disease treatment for many animal species

Our education allows us to help beekeepers understand disease pathogenesis

Licensed by the state

Most obvious choice as new regulators of antibiotics for food-producing animals

Why Should Veterinarians Learn About Honeybees, Diseases, Problems, etc.

It is Part of Our Veterinary Oath

- Being admitted to the profession of veterinary medicine, I solemnly swear to use my scientific knowledge and skills for the benefit of society through the protection of animal health and welfare, the prevention and relief of animal suffering, the conservation of animal resources, the promotion of public health, and the advancement of medical knowledge.
  I will practice my profession conscientiously, with dignity, and in keeping with the principles of veterinary medical ethics. I accept as a lifelong obligation the continual improvement of my professional knowledge and competence.

Veterinary Involvement in Public Health

- Contributions in pathogenesis of diseases
  - yellow fever, plague, smallpox.
- Oncology
  - Gross isolated a virus in 1951 lymphomas in mice
  - Jarrett discovered in 1964 that retroviruses involved with leukemia in cats
- Slemons and Easterday 1974 wild ducks were reservoir of avian influenza viruses
- 75% of emerging diseases are zoonotic
- 1997-2009 Cost of zoonotic diseases approximately 80 billion worldwide
- Annually 2.5 billion cases of zoonoses and 2.7 million deaths
- 1999, Tracey McNamara, chief veterinary pathologist at Bronx Zoo
  - West Nile case cracked
  - Concept "One Health" Veterinary Medicine and Human Medicine connection

Why Do Beekeepers Need Veterinarians

- It is the "law" since January 1, 2017
- Antibiotics via Prescription and/or Veterinary Feed Directive (VFD order)
- Valid Veterinarian Client Patient Relationship (VCPR).
- Veterinarian must have first-hand knowledge of owner, bees, and conditions.
- ***Physically visit apiary and examine hive and bees***

National Honey Board

- 125,000 beekeepers in USA
  - 2.5+ million hives
  - Most are hobbyists with 25 or less hives
- Domestic honey production 157 million pounds
- Industry valued by USDA at 327 million in 2015
- A typical managed hive can produce 400 pounds of honey
- Pollination contracts $165-220 per hive (frame number)
- 2 hives per acre for almonds. 2/3 of US bee colonies
- Increased almond production (almond everything-milk, yogurt, ice cream, oil, etc)
- Apiculture employment grew faster last 10 years than almost any other industry

Honeybee Products/value

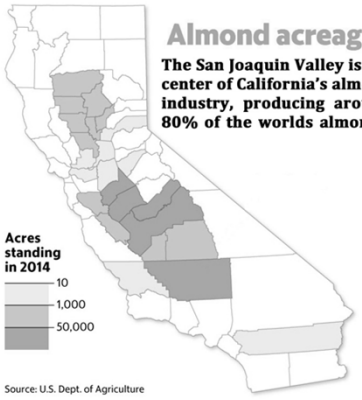
- Honey
  - Millions of US dollars (327 in 2015)
- Pollination
  - Billions in US dollars (about 15+ in crop value)
- Pollen
- Wax
- Royal Jelly
- Propolis
- California Almond industry
- Venom?

Honey Bees are Important

- Large mobile pollination industry
  - necessary for farmers due to loss of wild bees
  - necessary for beekeepers to make ends meet
  - required for large scale modern agriculture
  - cyclic movements compound the problems

Honey Bees in California

- California almonds require ~1.5 million bee hives
  - ~ 1/2 managed colonies in U.S.



- "*Cesspools of Disease*"
  - cannot be avoided
  - economic necessity for beekeepers and growers

What Might Happen…

- With antibiotics less easily available, bee industry may see increase in disease incidence

Commercial beekeeping operations may have tens of thousands of hives. Here, hives wait in a "holding yard" for transport to the almond orchards for pollination. Photograph: USDA-ARS, Bart Smith.

Economic Impact

- Value of bee colony = $500+
  - cost of hive equipment & honey bees
  - pollination fees
  - honey production
  - takes 2 years to reach full production strength
- Destruction of hives makes beekeepers wary
  - prefer self-diagnosis, treatment, no reporting

Current Trends in Antibiotic Use

- Self reporting survey of ~5000 beekeepers (2015)
  - 7% reported using antibiotics (357 respondents)
  - average operation size: 900 colonies
- Most antibiotics used by commercial bee operations
- Far less use by hobbyists (as with most medications)

Which Antibiotics?

- Antibiotics with labels for honey bees:
  - Oxytetracycline (Terramycin)
    - most commonly used by beekeepers
  - Tylosin (Tylan)
    - only recommended for oxy-resistant strains of bacteria
  - Lincomycin
    - rarely used in beekeeping

When and How to Treat

- Commercial beekeepers feed antibiotics mixed with sugar or syrup to prevent disease
  - Historically available over-the-counter
    - contributed to over-use, resistant strains
  - Treatments most important early in the spring
    - EFB common, slows population growth
      - high demand for bees (split colonies to replace winter losses)
    - bees highly concentrated in small areas for pollination
      - California almonds, Maine blueberries

What Are We Treating?

- Antibiotics labeled for control of
  - American Foulbrood Disease
  - European Foulbrood Disease
- Nationally: ~3% hives infected annually
- Arkansas: ~1%

Honey Bees & AFB

- AFB extremely contagious to colonies within 3 miles
- Positive identification of AFB
  - state-mandated burning of affected hives
  - quarantine of apiary
  - antibiotic treatment
  - re-inspection in 30 days

Honey Bees Regulations

- Prior to transportation, beekeepers must obtain health inspections certificate for bee colonies
  - Issued by state apiary inspectors
    - visit hives, visually inspect percentage of colonies
      - brood diseases, contagions
      - exotic pests (fire ants)

Honey Bees & Colony Collapse

- U.S. beekeeping industry hard hit for last 30 years
  - parasitic mites
  - viruses vectored by mites
  - Nosema disease
  - pesticide exposure
  - habitat/forage destruction
  - low honey prices

Bee Problems

- Historically very few
- Africanized bees
- 1987 Varroa mite in USA-seen in SE Asia since 1904
- Tracheal mite since 1984 in Texas seen since 1921
- Small Hive Beetle in USA in 1998
- Colony Collapse Disease in USA since 2006

Knowledge about Bees

- Variable none to extensive
- Many veterinarians keep bees
  - 1978 bee courses 1980 DVM
  - No course in veterinary curricula in US and Canada (yet)
  - European veterinary colleges teach bee husbandry and diseases
  - Few veterinarians have a practice involving bee health
- Commercial beekeepers
- State Bee Inspectors
- Hobby Beekeepers

Honeybee Veterinary Examination

- Develop a form to use as for any animal
- Honeybees are social insects (Beeyard/Hive/Individual)
- Food Producing Livestock
- Food is uncontrolled by owner
- Examine in Heat of Day (High Noon)
- Efficient, Methodical, Coordinated
- Beekeeper manipulates hive, Veterinarian Observes

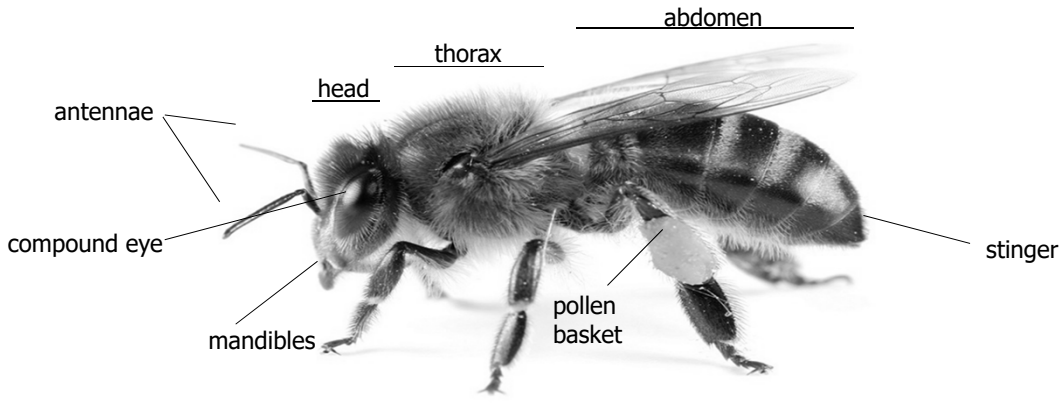
Examination Points

- Medical History
- External Examination
  - Apiary
  - Hive
  - Overall Sanitation/Husbandry
- Internal Examination of Colony
  - Initial Observations when Opening
  - Adults
  - Brood and Frames
  - All Sections
  - Bottom

Animals?

Animalia
▼
Arthropoda
▼
Insecta
▼
Hymenoptra
▼
Apidae
▼
Apis →

Honey Bee Anatomy



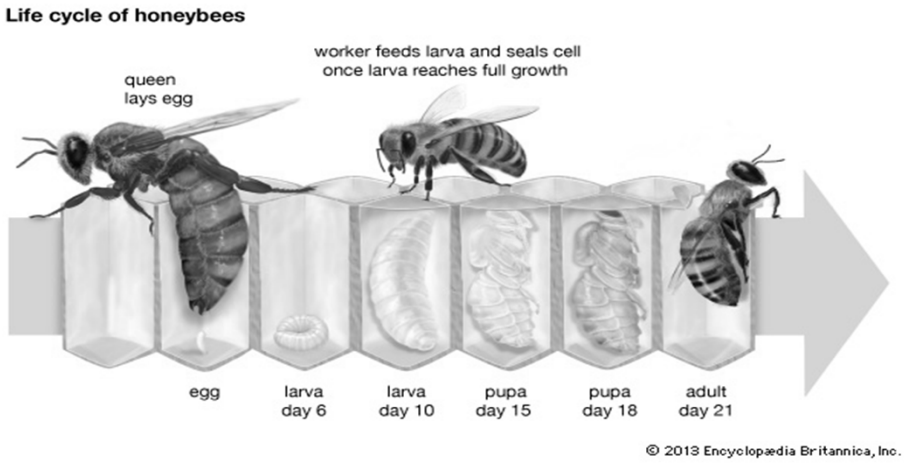
Honeybee Characteristics

- **Social behavior**
  - **Bees construct perennial, colonial nests from wax**
  - **Honey and pollen are stored in the nest**
  - **Immature bees are called the brood**
  - **Brood are reared in hexagonal wax cells**

The Colony

- ***A. mellifera* colonies can contain 40,000 bees**
  - **The queen is the only fertile female**
  - **Drones are males responsible for fertilizing the queen**
  - **Workers are sterile females who do everything else!**

Honeybee Development



Discussion Forum
Things Are Buzzing

Last year, AFB was found in 1/10th of 1% of inspected hives in …….

People will stock up ahead of the ban.
The drugs keep ……storage.

I still have some ……around and it was banned decades ago

will beekeepers start burning AFB hives, or trying other techniques ….. to control AFB?
will US beekeepers order ……..from ……., and use it illegally?

….stocking up is the most important thing now. second most finding sources of antibiotics from ……..

……wager that the majority of vets know little or nothing about honey bees, diseases, or how to identify them.

How are vets with no experience and knowledge of …….. supposed to ……determine if disease is present?

Are vets going to be required to take courses?

Beehives cannot be easily taken to the vet's office. How much will it cost?

Will the vet be required to provide own safety gear?

What if there are no local vets available?
….who will be able to provide this service?

Beekeeper Attitudes Toward Veterinarians

- Beekeepers are like other farmers/ranchers
  - frugal & self-reliant
  - expect value for money spent
- What do veterinarians sell?
  - knowledge & advice for disease control
    - need to know as much/more than your clien
    - signature on antibiotic order previously not needed
- Must offer value for service!
    - JAVMA article explains this very well…

Resources

"Honey Bees and Beekeeping"
University of Georgia Center for Continuing Education
1-800-359-4040

www.uaex.edu

20 beekeeping associations/clubs in Arkansas

https://www.youtube.com/watch?v=UjrdwXXEtLo&list=PLF3090CE32602616C

American Association of Bee Veterinarians
In Progress

Bee Disease Diagnosis
Bee Research Laboratory
10300 Baltimore Ave. BARC-East
Bldg. 306 Room 316
Beltsville, MD 20705

Why the Need?

- Veterinary curricula in many countries include honey bees
  - USA & Canada – *rarely offered, you didn't miss it in the catalog!*
- New FDA regulations requires veterinarian to write an order for any antibiotic fed to animals
- Honey bees are the only insects listed as food-producing animals that are fed antibiotics

Pairing Beekeepers with Veterinarians

- Website hopes to serve as a directory for beekeepers seeking qualified veterinarians with honey bee experience

Dr. Chris Cripps, DVM

owner, Betterbee LLC

betterbee.com

Two of the Fastest Growing Hobbies in USA

Questions?

Federal directive brings veterinarians and beekeepers together

Drugs for honeybee disease will require veterinary prescription in 2017

Story and photos by R. Scott Nolen

Jim Belli of Old Mill Creek, Illinois, inspects one of his hives. The FDA rule concerning antimicrobial use in food-producing animals, taking effect in 2017, will require U.S. beekeepers to get veterinary approval to purchase these drugs for their honeybee colonies.

Come Jan. 1, 2017, hobbyist and commercial beekeepers alike will no longer be able to purchase antimicrobials over the counter, but instead, will need a veterinary feed directive or prescription for the drugs they administer to their honeybees.

The federal mandate requiring veterinary oversight of medically important antimicrobials in food-producing animals, including honeybees, is part of a Food and Drug Administration strategy to reform the way these drugs are legally used in food animals.

For millennia, humans have relied on *Apis mellifera* for food, to create candles and cosmetics, and, most importantly, to pollinate crops, earning them the name "the angels of agriculture." Veterinary medicine in the United States has, however, traditionally paid little attention to honeybees, the only insect listed as a food-producing animal.

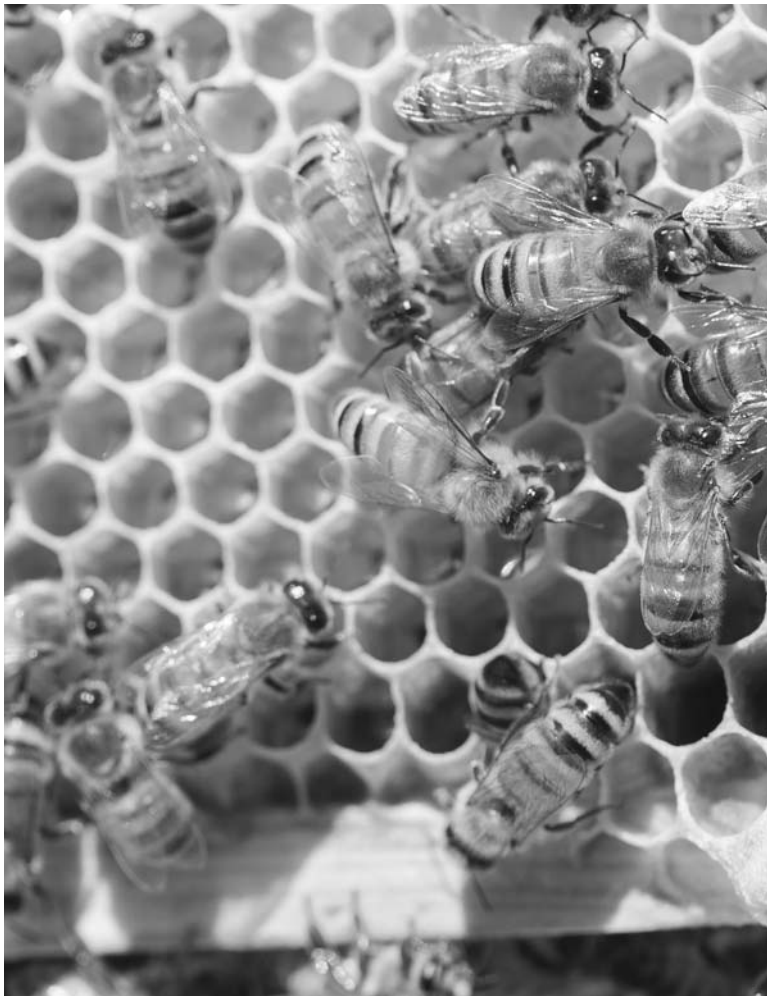
Dr. Christopher Cripps is a rarity as one of a handful of U.S. veterinarians knowledgeable about honeybee health and apiculture. Co-owner of honeybee supply business in Greenwich, New York, Dr. Cripps considers the FDA action an opportunity for veterinarians to access a relatively untouched animal industry valued by the Department of Agriculture at just over $327 million in 2015.

"The FDA has said veterinarians and beekeepers have to get together," he said. "It's new to us, and it's new to beekeepers, who are used to having no one looking over their shoulder."

This past August, Dr. Cripps spoke at AVMA Convention 2016 about honeybee diseases, approved medications in apiculture, and what the new Veterinary Feed Directive means for veterinarians. Additionally, Dr. Cripps is part of a working group formed by the AVMA Food Safety Advisory Committee to help veterinarians understand the legal requirements of writing a VFD or prescription for honeybees.

"As a strong proponent of responsible antibiotic use, the AVMA has been involved in the changing regulations from the very start," said Dr. Christine Hoang, an assistant director of the AVMA Animal and Public Health Division and staff adviser for the food safety committee.

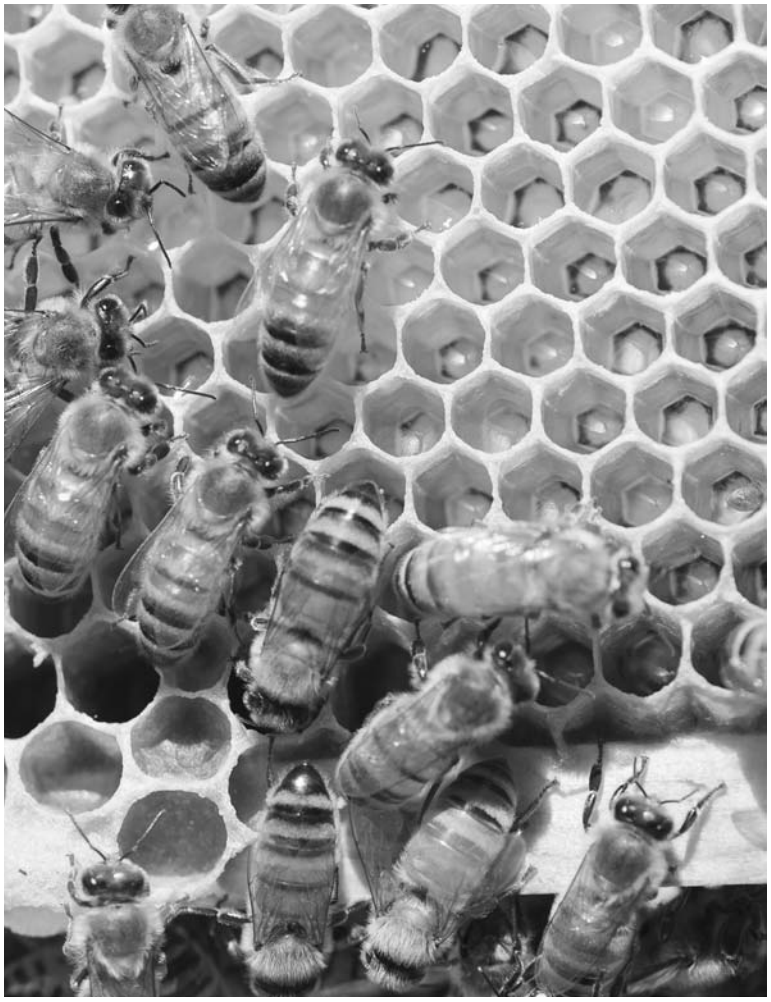
"We've also recognized that minor species, including honeybees, have unique circumstances and needs that must be addressed. It will be a steep learning curve, but we are currently developing educational materials for our member veterinarians and are dedicated to collaborative solutions for the beekeeping industry," Dr. Hoang said.



Honeybees are prone to 18 infectious diseases; the FDA has approved three antimicrobials for American and European foulbrood disease.

The National Honey Board puts the number of U.S. beekeepers at around 125,000, most of them hobbyists with fewer than 25 hives. Last year, domestic honey production totaled 157 million pounds, according to the USDA, which says managed honeybee colonies contribute roughly $15 billion to the value of U.S. agriculture each year through increased yields and superior harvests.

Some 18 diseases attributable to bacteria, viruses, and parasites have been identified in honeybees. Arguably the greatest disease threat is the *Varroa destructor* mite, which drains the blood of adult bees and is a vector for various viruses that easily kill off weakened insects. *Varroa* mites are suspected to



"The FDA is not looking for us to exchange our signature for money, which is basically how the beekeepers feel the veterinarians are going to be. The FDA wants us to know what's going on."

Dr. Christopher Cripps, co-owner of a honeybee supply business in Greenwich, New York

play an important role in colony collapse disorder, a mysterious occurrence in which most of the worker bees abandon a colony, leaving few nurse bees to care for the remaining immature bees and queen.

American foulbrood disease is the most serious of the honeybee bacterial pathologies. The disease is caused by the spore-forming *Paenibacillus larvae*, which infects one- to two-day-old bee larvae and kills them during the pupal stage. Beekeepers have three FDA-approved antimicrobials to control foulbrood outbreaks—oxytetracycline, tylosin, and lincomycin—which are typically mixed with sugar and dusted over the frames inside a bee hive.

In his presentation at the AVMA convention, Dr. Cripps cited a 2015 survey by the Bee Informed Partnership in which 357 of approximately 5,000 beekeepers admitted using antimicrobials in their bee colonies. Commercial beekeepers, who, on average, own approximately 900 hives, are the primary users of antimicrobials, he added.

Within the beekeeping community, there is little understanding of bacteriology or how antimicrobial resistance is spread, Dr. Cripps observed. "Basically, the beekeepers know that if oxytetracycline doesn't work, I should use tylosin," he explained.

Dr. Cripps described beekeepers as a lot like food animal producers, saying they are frugal yet willing to pay for services that promote the health of their colonies and result in increased honey production. "They're OK with spending money so long as they're getting something for the money they spend," he explained.

Veterinarians can demonstrate their value to beekeepers, Dr. Cripps said, by delivering the same services they provide to owners of avian and mammalian livestock, such as preventive care,

Humans have managed honeybees for centuries, and yet, veterinarians, particularly in the United States, have had little to do with these food-producing animals.

disease diagnosis and treatment, parasite control, and education in good husbandry practices. "I think the FDA is not looking for us to exchange our signature for money, which is basically how the beekeepers feel the veterinarians are going to be," he said. "The FDA wants us to know what's going on. We have a great education that puts us in a great position to help beekeepers understand the diseases their bees get and how to control and prevent them."

Dr. Nicolas Vidal-Naquet, a lecturer of honeybee biology and diseases at the Veterinary School of Alfort in France, views the new federal Veterinary Feed Directive as "a very positive decision." In an email to *JAVMA* News, Dr. Vidal-Naquet wrote, "This will lead veterinarians to get involved in apiculture, and this will lead beekeepers and other apiculture professionals to apply good practices in using veterinary medicines."

Treating honeybees with antimicrobials is illegal in Europe, where miticides to control the *Varroa* mite are the only approved medications, according to Dr. Vidal-Naquet, author of "Honeybee Veterinary Medicine: *Apis mellifera* L.," published in 2015.

"I think that antibiotic resistance is a real problem in the U.S. because of a misuse and overuse of antibiotics," he said, adding he advocates for good husbandry practices as the ideal way of preventing and controlling honeybee diseases.

Dr. Vidal-Naquet explained how European veterinarians, like their American counterparts, overlooked honeybees as a sector of animal agriculture until 2005, when the Nantes Atlantic College of Veterinary Medicine, Food Science, and Engineering in France established the first veterinary postgraduate degree in apiculture and honeybee diseases. At least 200 veterinarians have graduated from the Nantes program so far, Dr. Vidal-Naquet said, while veterinary schools in Germany, Spain, Italy, and Austria now devote some courses to honeybee health and husbandry.

The catalyst for the novel veterinary degree was the desire of a small number of veterinarians who, Dr. Vidal-Naquet said, wanted their profession to do more to safeguard an increasingly threatened animal species whose importance to humans and the environment cannot be overstated.

Within a decade, that message had caught on, with the World Organisation for Animal Health (OIE) devoting an entire issue of its 2014 "bulletin" to honeybees. Dr. Bernard Vallat, OIE director general at the time, called the potential loss of honeybees a "biological, agricultural, environmental, and economic disaster. Maintaining healthy populations of these key pollinating insects … is a critical health challenge deserving the full attention of the global community."

Honeybee facts

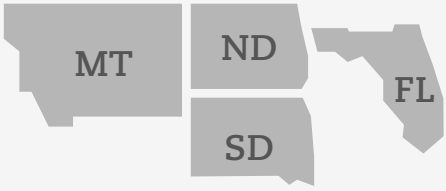
Honeybees are the **only** insect that produces food for humans.

Cave paintings in Spain dating back to **7,000 BC** depict people harvesting honey from wild beehives.

Honeybees were introduced to the Americas by European colonists in the **17th century**.

***Apis mellifera* Linnaeus** is the most common domesticated species of honeybee.

The Department of Agriculture estimates pollination by managed honeybee colonies adds at least **$15 billion** to the value of U.S. agriculture annually.



Montana, North Dakota, South Dakota, and Florida were the top honey-producing states in **2015.**

The U.S. honey industry was valued at just over **$327 million** in 2015.

A honeybee colony may contain **40,000** to **60,000 bees** during the late spring or early summer.

A typical beehive can make up to **400 pounds** of honey per year.

To make a pound of honey, the bees in the colony must visit **2 million flowers** and fly **over 55,000 miles**. It will be the lifetime work of approximately **768 bees**.

Colony collapse disorder

has caused alarming declines in managed honeybee colonies since 2006. Researchers suspect a complex web of factors is behind CCD, including pesticide use and mites.

honey bee diseases and pests

Jon Zawislak
Apiculture Specialist
UA Division of Agiculture
Cooperative Extension

jzawislak@uaex.edu
uaex.edu / bees

DIVISION OF AGRICULTURE
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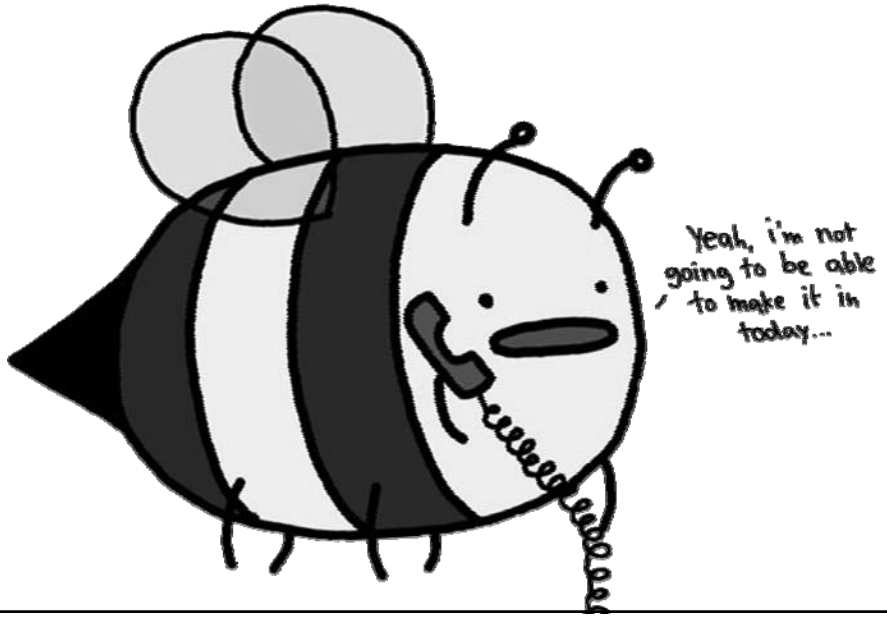
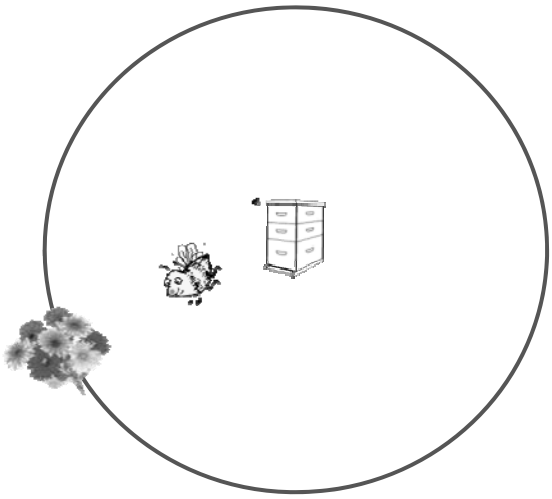
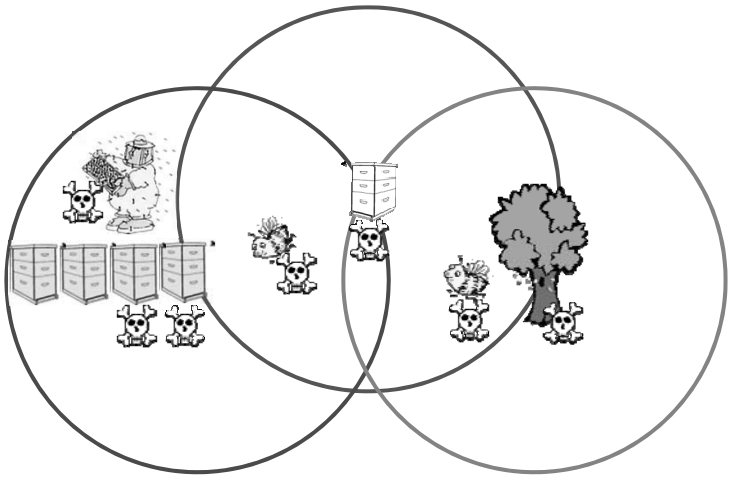
Honey bees can get sick just like other creatures.





πr^2

- bees may forage up to 3 miles from the hive
  - > 26 square miles
  - > 18,000 acres



- bee diseases and pests can spread rapidly
  - robbing, drifting, or spread by beekeepers

state apiary inspectors

Arkansas State Plant Board

Apiary Section

501-225-1598

plantboard.arkansas.gov

Apiary Registration: It's free! It's the law!

Honey bee colonies must have a current health inspection certificate from the Arkansas State Plant Board to be legally transported!

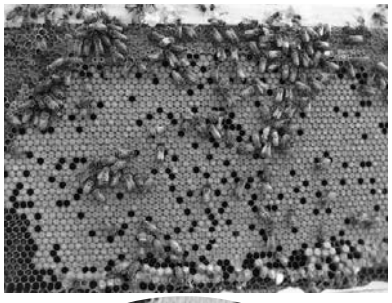
apiary inspection

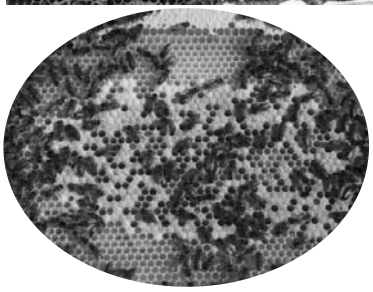
- ***beekeepers*** **are your first bee inspector*!***
- **learn what a healthy hive looks like to better recognize any problems that occur**

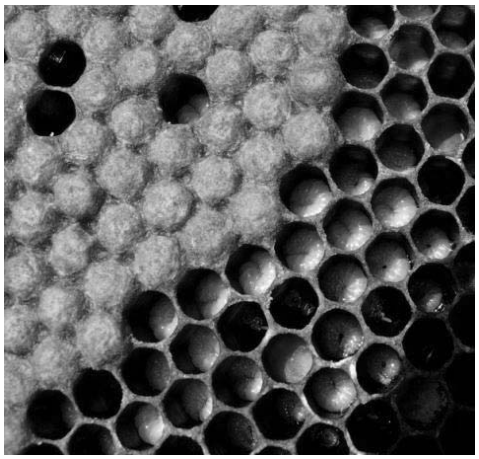
bee diseases

- many pathogens of bees
- often without distinct symptoms
  - weaken bees
  - shorten individual life span
  - whole colony less productive
  - may eventually collapse
- some are very lethal & highly contagious
  - relatively rare in Arkansas

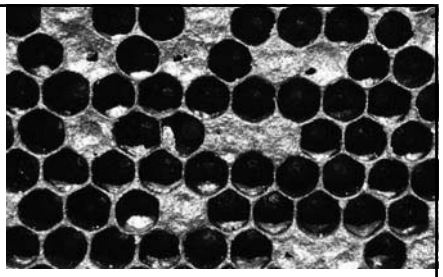
what does a healthy colony look like?







bee diseases



American foulbrood

Paenibacillus larvae

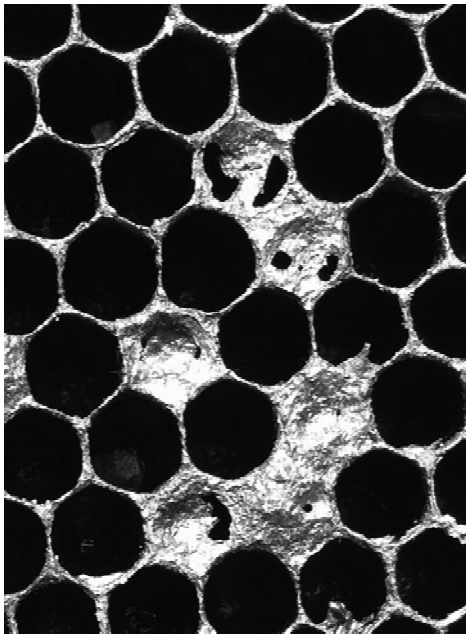
- **caused by a bacterial spore**
  - **highly resistant – difficult to kill**
  - **can remain on combs & woodenware**
- **bee larva ingest spores in contaminated food**
- **larva dies soon *after* cell is capped**
- ***extremely lethal and contagious!!!***
  - **only dangerous to honey bees**
  - **spores are found in lots of store-bought honeys**

bee diseases

American foulbrood

detection

- **sunken, perforated caps**
- **sulphurous decay odor**



bee diseases

American foulbrood

detection

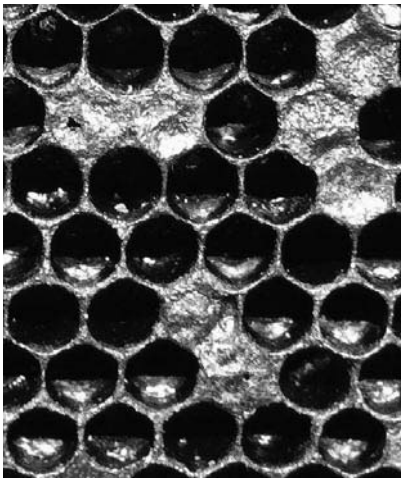
- **“ropiness” test**

bee diseases

American foulbrood

detection

- **dead larvae form a tough scale, which is difficult to remove**
- **inadvertently spread by housecleaning bees**



- **dying colonies robbed out by other bees**

bee diseases

Law requires destruction of colony by burning, bury ashes 12” deep

American foulbrood

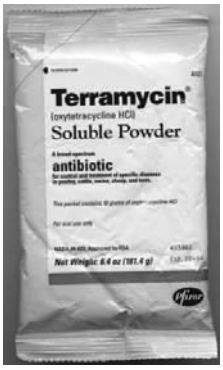
treatment

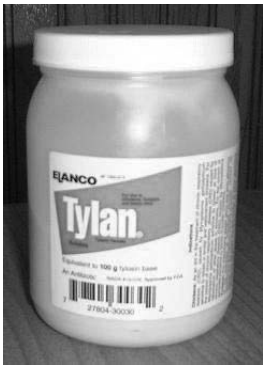
bee diseases

American foulbrood

treatment

hygienic genetic stock

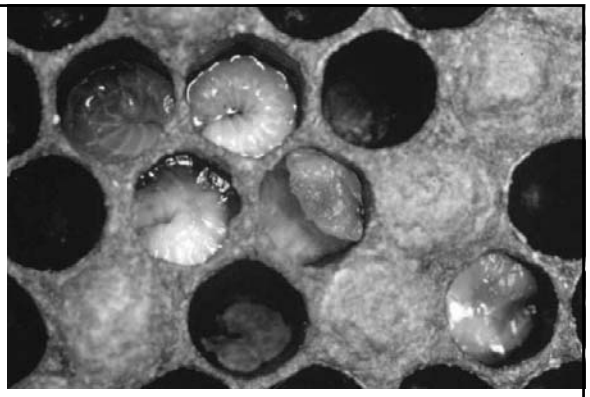




Antibiotics do not cure AFB…

they merely hide the symptoms!

bee diseases

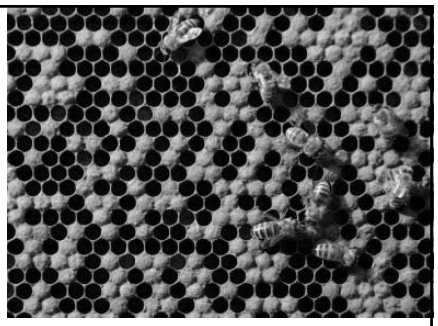


European foulbrood

Melissococcus plutonius

- **larvae consumes spores in contaminated food**
- **larva dies *before* cell is capped**
- **bacteria does *not* form long lived spores**
- **a colony *can* recover from mild infection**

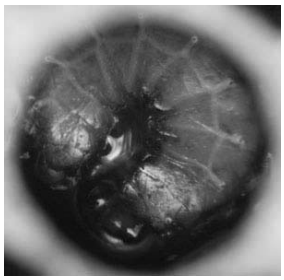
bee diseases

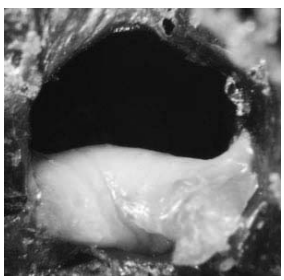


European foulbrood

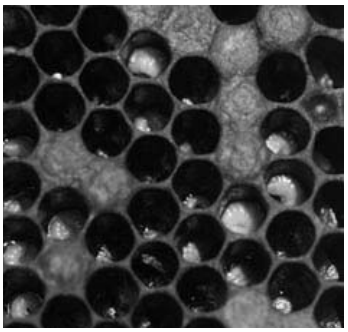
detection

- **spotty brood pattern**
- **discolored, melting larvae**





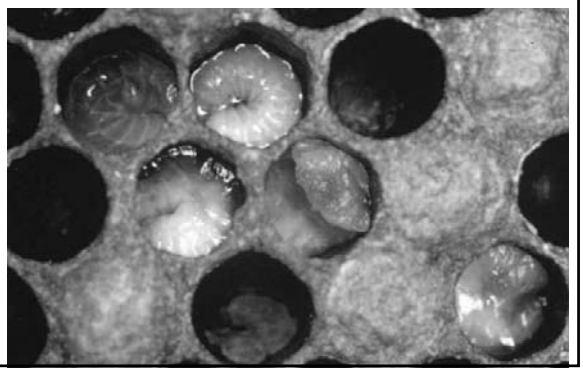
bee diseases



European foulbrood

detection

- **larvae die *before* capping**
- **light-colored, rubbery scale**

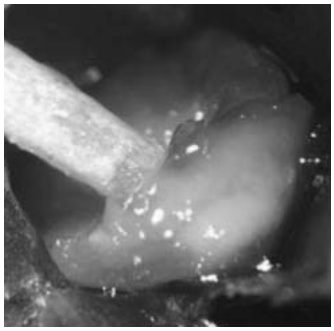


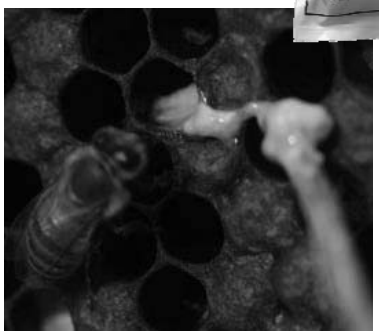
bee diseases

European foulbrood

detection

- **no "ropiness"**





bee diseases

European foulbrood

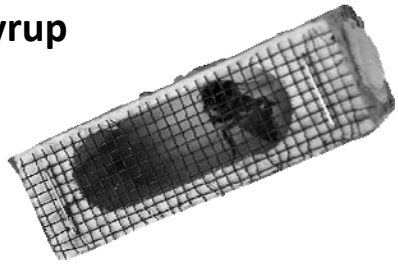
treatment with antibiotic

bee diseases

European foulbrood

treatment w/o antibiotics

- **cage or remove the queen bee**
- **shake all adult bees onto new foundation**
- **feed heavily with sugar syrup**
- **release queen in 2 weeks**
  - **breaking the brood cycle interrupts transmission**

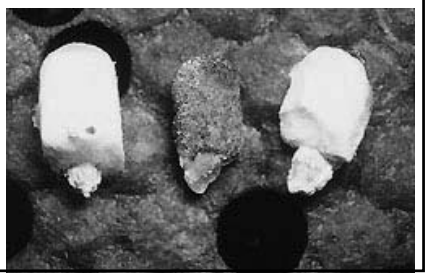


bee diseases

Chalkbrood

Ascosphaera apis

- **fungal infection**
  - **contact or ingestion**
- **when larva dies, fungus invades entire host**
  - **forms sporulating bodies**
  - **"chalky" mummy**
- **worker bees remove infected larvae**

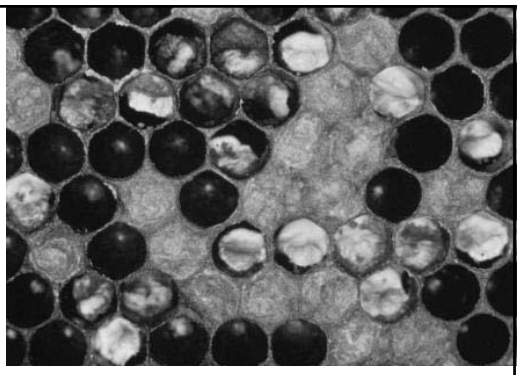


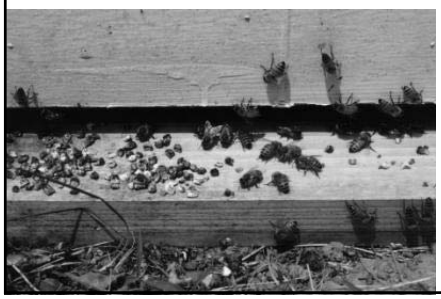
bee diseases

Chalkbrood

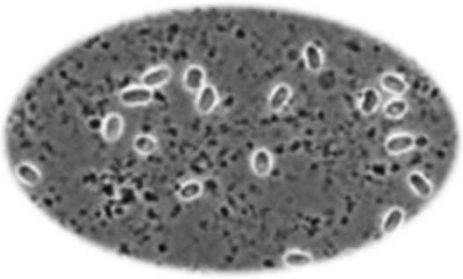
treatment

- **elevate, ventilate**
- **clears up with good foraging weather**





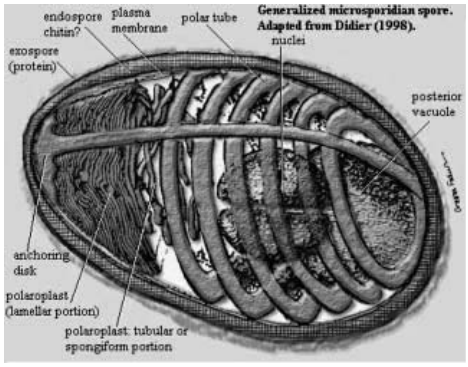
bee diseases

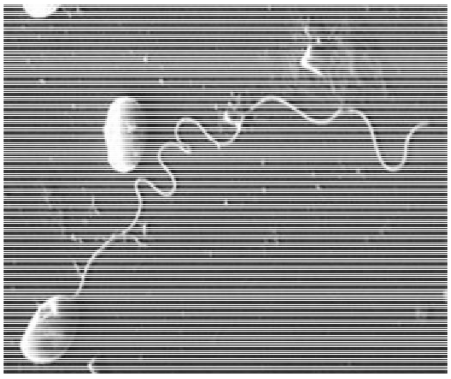


Nosema

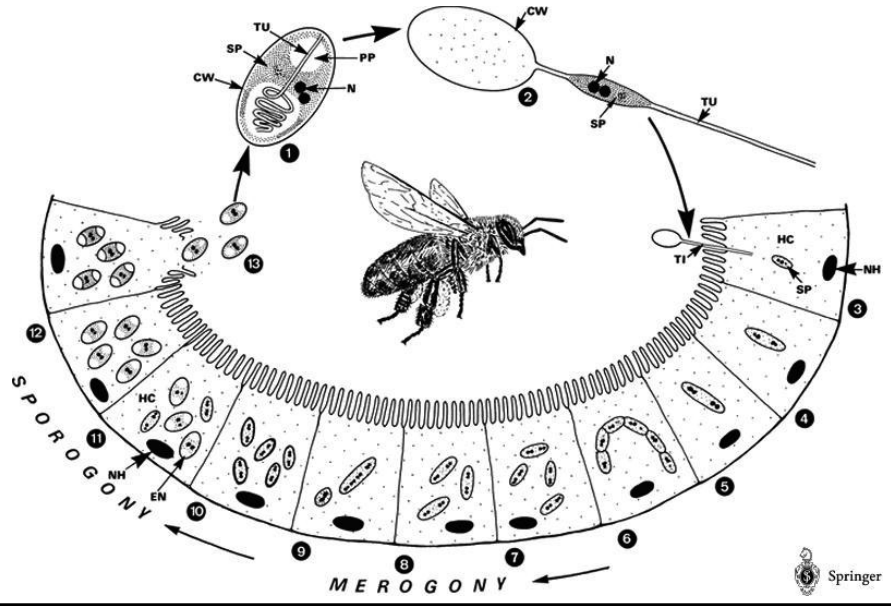
N. apis

N. cerana

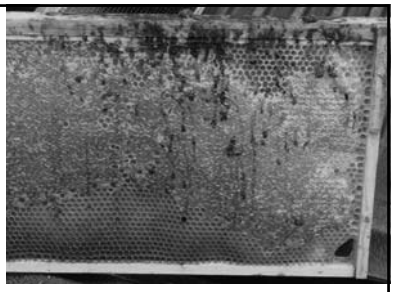


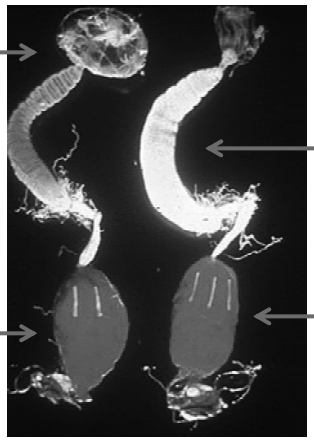


Nosema infection cycle



Nosema





normal infected

Nosema

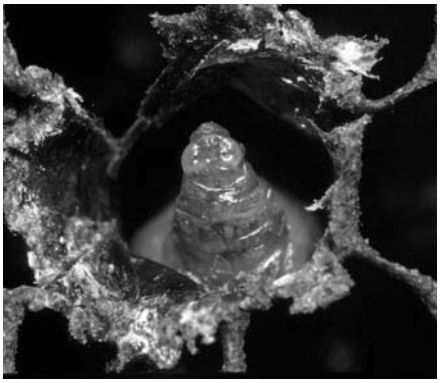
Treatment

- mix into syrup
- feed to colony in fall
- bees consume during winter months
  - no longer effective against *N. ceranae* in winter
  - can be used as early spring treatment
- *don't use during the honey flow!*
  - bees must consume all syrup 4 weeks before honey flow

bee diseases

bee viruses

- **Sacbrood Virus**



Re-queening the colony usually clears up the infection

bee diseases

bee viruses

- **Deformed Wing Virus**

bee diseases

Usually only seen in queen rearing operations; clears up with antibiotic treatment!

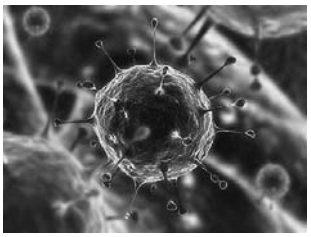
bee viruses

- **Black Queen Cell Virus**

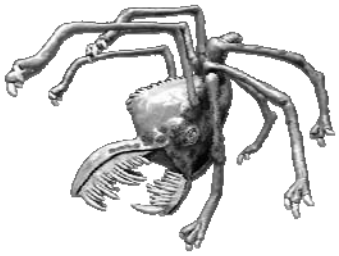
bee diseases

bee viruses

- **More than 25 known**
  - **no effective medical cure** *(RNAi)*
  - **hygienic genetic stocks can help**
  - **most often vectored by parasitic mites**



honey bee parasites

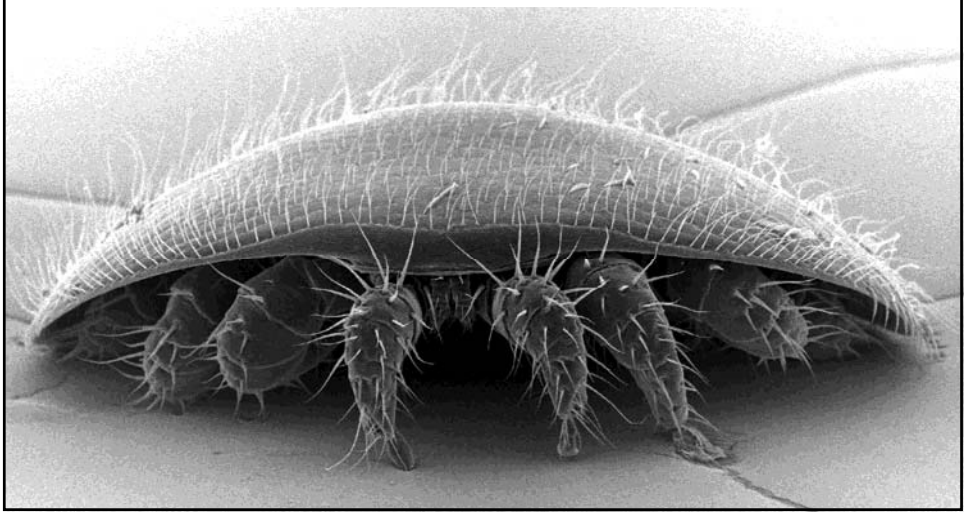


parasitic mites

- two kinds
  - varroa mite
  - tracheal mite
- accidently imported from Asia in late 1980s
- spread across the country rapidly
  - package bees
  - mobile pollinators
- decimated feral bee populations
- increased costs of managing bees
- resulted in fewer beekeepers
- increased need for mobile pollinators

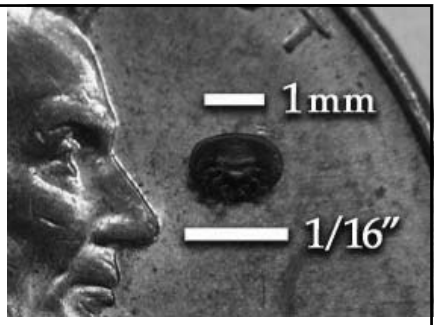
Varroa destructor

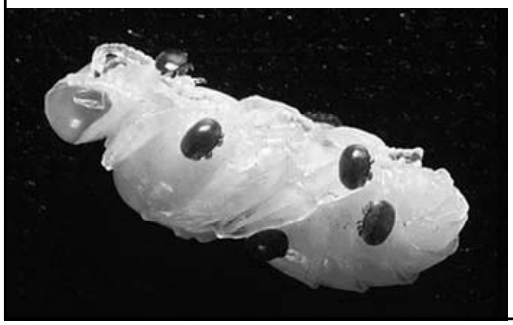
- the worldwide #1 enemy of honey bees!



Varroa Mite Biology

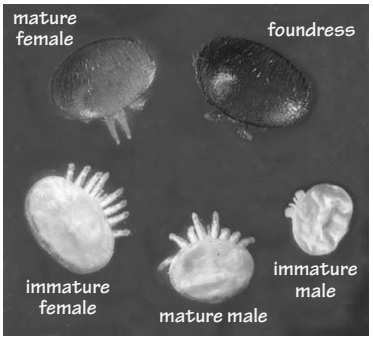
- external parasite
- feeds on bee blood
  - damage developing pupae
  - weakens bee
  - transmits viruses





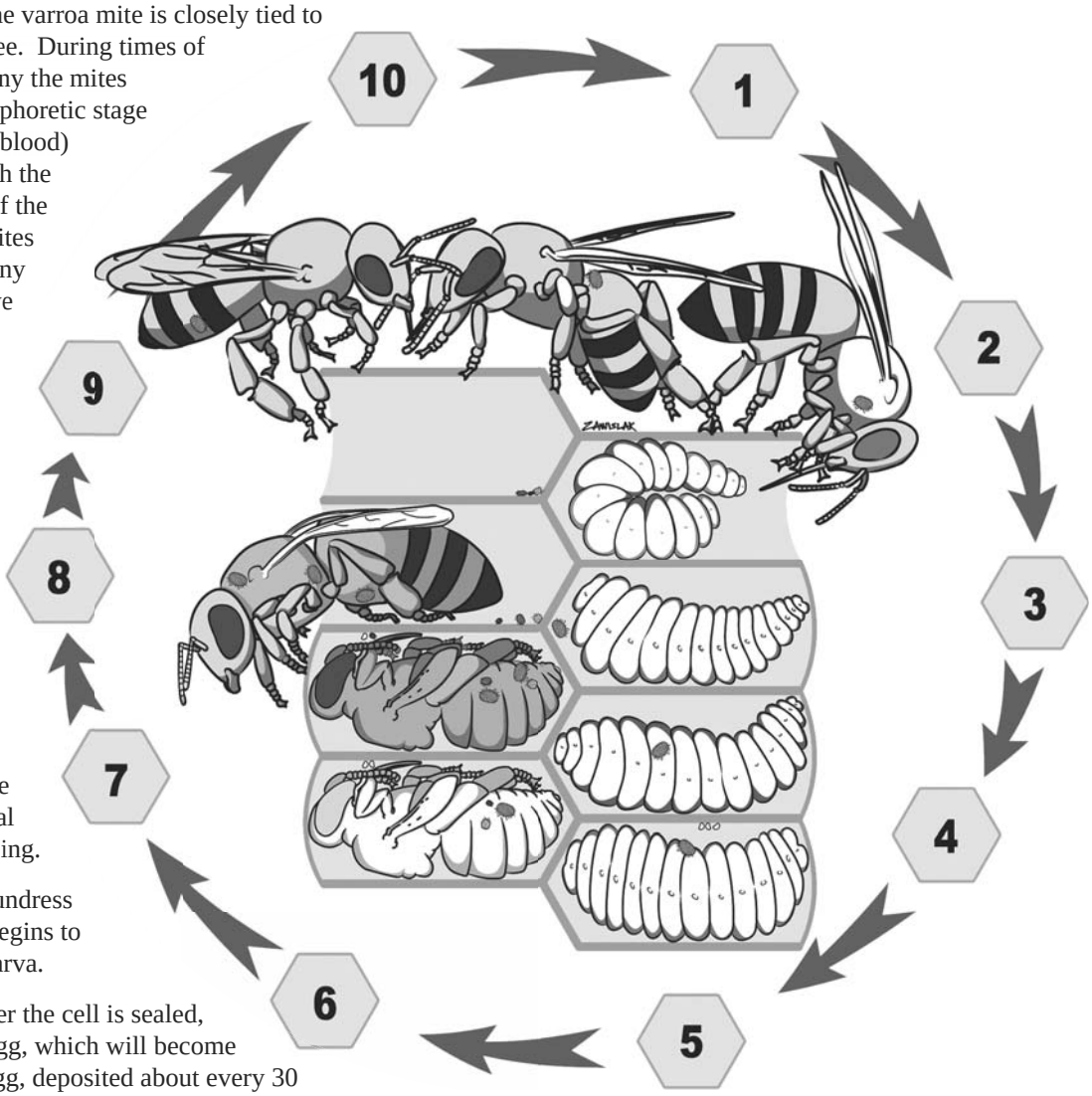
Varroa Mite Biology

- mite's life cycle is tied to the development of the honey bees
- understanding of mite life cycle is key to controlling them



Life Cycle of the Honey Bee Parasite *Varroa destructor*

[1] The reproductive cycle of the varroa mite is closely tied to the development of the honey bee. During times of no brood rearing in the bee colony the mites cannot reproduce. While in the phoretic stage varroa feed on the hemolymph (blood) of the adult bees, usually through the soft intersegmental membrane of the abdomen. During the winter, mites can remain on adult bees for many months. While mites can survive on adult bees of any age, they prefer young nurse bees.



[2] A pheromone signal tells nurse bees that a honey bee larva is ready for pupation, generally about six days old. Varroa mites also detect this signal and use it to locate suitable hosts as infested workers move from cell to cell, tending the brood.

[3] The foundress (a mated reproductive female mite) will hide in the food provisions in the brood cell while worker bees seal the larva inside with a wax capping.

[4] Inside the pupal cell, the foundress mite emerges from hiding and begins to feed on the hemolymph of the larva.

[5] Approximately 60 hours after the cell is sealed, the foundress will lay her first egg, which will become a male mite. Each successive egg, deposited about every 30 hours, will develop into a female mite.

[6] As varroa mite nymphs emerge, they will feed on the bee pupa, grow and molt over several days. Male varroa mature in 5-6 days; females in 7-8 days.

[7] The male mite is fully developed by the time the first female reaches maturity. The pair will alternate between periods of feeding and mating. As each successive female mite matures, the male will mate with her as often as possible until another female mite matures, or the adult bee emerges from its cell.

[8] When the bee reaches maturity, it chews a hole in the capping and exits the pupal cell, releaseing the foundress mite and her mature female offspring. The number of mature offspring is limited by the duration of the bee's pupal time. Mites reproducing in drone cells have greater reproductive potential, and are preferentially attracted to drone cells over worker cells when seeking a host.

[9] The male varroa mite, along with all immature female mites, will remain the cell after the bee emerges These mites quickly die and will be removed by the housecleaning bees, which are preparing the cells for the queen to deposit a new eggs.

[10] As mites exit a cell with the newly emerged bee, they usually move onto new hosts, where they will remain and feed for several days, occasionally changing hosts again. Soon the mites will seek a suitable host on which to comlete their reproductive stage. By remaining on nurse bees, varroa have easy access to suitable larvae. During times of brood rearing, mites will spend most of their time inside the pupal cells. Therefore the phoretic stage is the most vulnerable part of the mites' life cycle.

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Jon Zawislak • Instructor, Apiculture
University of Arkansas Cooperative Extensnion Service
jzawislak@uaex.edu • www.uaex.edu

Powdered Sugar Shake Technique for Sampling Varroa Mites on Honey Bees

Gary S. Reuter & Dr. Marla Spivak,
Department of Entomology
University of Minnesota
from *Instructional Poster #155*

(1) The first step is to make a container with a cover made of hardware cloth. Use a wide-mouth canning jar with a ring-type cover, cut a circle of 8x8 hardware cloth the size of the cover that fits in the ring and use it instead of the cover.

(2) You will also need something to shake the mites and powdered sugar into. You can just shake them onto a piece of paper if it is not windy. A white container works best, but any light color (such as yellow) would work as well.

(3) Shake about 200-400 bees from brood combs into the container. You can see we shake the bees from a frame into a bent piece of sheet metal (flashing) to help pour them into the container.

(4) 1 fluid ounce = approximately 100 bees. ¼ cup = approximately 200 bees. Shake the bees in, then tap the bottom of the container to get all the bees to the bottom to measure them, then place the screen top on the jar.

(5) Put about 2 tablespoons of powdered sugar into the container. Gently roll or shake the bees with the powdered sugar until they are well coated. Let the container sit for about 1-2 minutes.

(6) Tip the container upside down over the white container and gently shake the powdered sugar and mites out through the screen.

(7) Continue to shake for at least one minute to be sure you have dislodged all the mites.

(8) Count the number of mites in the sugar. If you have trouble seeing them, you can add a small amount of water to dissolve the sugar, making the mites easier to see.

(9) Return the bees to their colony. The bees will survive. Once they are cleaned up they can go back to work.

If you know how many bees were in your sample, you can estimate the number of mites per 100 bees. If there is brood in the colony when you sample, you should double this number to factor in the number of mites in worker brood. For example, if there are 5 mites per 100 bees, the total infestation is probably 10 mites per 100 bees. If your colony has too many mites, you should consider treatment.

Integrated Pest Management for Healthy Honey Bees

[handout]

Integrated Pest Management is an effective & environmentally sensitive approach to pest control. It is *not* pest eradication. Eradication of most pests is not possible, nor practical. If it were, it would have already been done. IPM is *not* the same as organic pest control. IPM seeks to *integrate* all the tools at the beekeeper's disposal. This includes chemical pesticides, but seeks to reserve these for a last resort. IPM strategy relies on a combination of tactics to control, reduce or delay the build-up of pest populations so that the reliance on chemical treatments can be reduced or eliminated.

In beekeeping, varroa mite control provides an excellent example for understanding and implementing the principles of IPM. While the total eradication of varroa mites is impossible, an otherwise healthy honey bee colony can tolerate a low level of mite infestation without noticeable damage. Our goal is to improve or maintain colony health by reducing or limiting a colony's mite population, or by slowing the rate of mite population growth.

Knowledge of the pest

Key to managing varroa mites is an understanding of their biology and life cycle, and the ability to recognize damage to the host. Knowledge of the treatment tactics and their effectiveness is also important. Without this understanding, a beekeeper cannot be expected to make the best management decisions.

Cultural practices

Beekeepers can do numerous things to minimize the impact of mites without the use of chemicals. These cultural practices include modifications to the hive itself, such as screen bottom boards, which passively eliminate a portion of mites all season long. Other mechanical solutions include drone brood trapping and colony sugar dusting, both of which can eliminate a portion of mites. Using varroa-resistant queen stocks such as Russian strains or SMR hybrids can also reduce the impact of varroa mites without chemicals.

Routine pest monitoring

A vital component of IPM is regular monitoring of the pest population. Varroa mite infestations can be measured using any of a number of methods: sticky boards, powdered sugar shake, ether roll, alcohol wash, or drone infestation. Routine sampling can indicate if a pest population is increasing, and alerts the beekeeper to potential problems. It is important that chemical treatments should not be applied on a calendar schedule, but only **if** they are needed, only **when** they are needed and only **where** they are needed. Treatments should begin with the least invasive, most highly targeted chemicals first. Resort to harsher treatments only if necessary.

"Soft" chemicals

Treatments for varroa have been developed which specifically target mites, but have little impact on the bees and leave little or no residue in the beeswax. These include essential plant oils such as thymol, and organic acids such as formic acid. Both types of treatments vaporize in the hive, causing mites to die, yet are generally safe for bees when used within a specific daytime temperature range. However, when used below this range they may volatilize too slowly to be effective. Above this range, they can volatilize too rapidly and cause bee mortality. Some treatments are also hazardous to the beekeeper if not handled properly. *Read and follow all product labels and instructions.* Many of these varroa treatments are also effective against tracheal mites.

"Hard" Chemicals

The original tool for fighting varroa was the pyrethroid chemical fluvalinate (sold as Apistan®). It worked very well at first, but overuse by beekeepers soon led to resistant mite populations. An organophosphate pesticide, coumaphos (sold as Checkmite®), was introduced to combat this resistance. Within a few years, mites were also found to be resistant to this product. Both products can still be effective tools in combating varroa mites, but their use should be reserved for situations when other methods have not been successful.

Remember that a pesticide label is a law. Read and follow all product labels and instructions.

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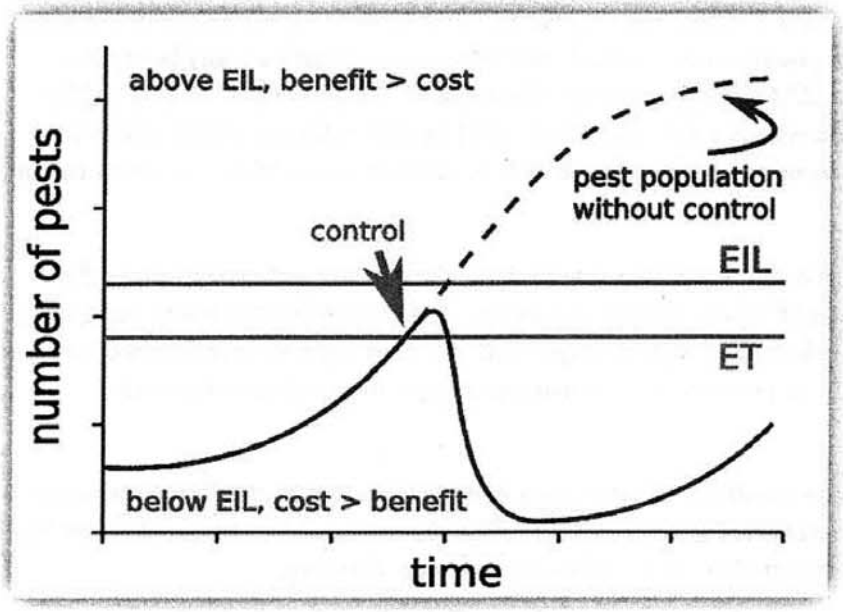
Jon Zawislak, Program Associate – Apiculture
jzawislak@uaex.edu
www.uaex.edu

Determining if Varroa Mite Treatment is Necessary

[handout]



EIL = Economic Injury Level
This is the point at which the pest population level is high enough to cause economic damage to the colony.

ET = Economic Threshold
This is the pest level at which we apply treatment, in order to prevent the pest population level from reaching EIL.

As long as the pest population remains below the economic threshold, it does not cause significant damage, and the cost of treatment will be greater than any benefit it may provide.

Determining the "economic threshold" for a bee colony can be tricky, and depends on several considerations. What is the value you place on your bees? Are you keeping bees for honey or wax production, for pollination or purely for enjoyment? What is the replacement cost for a colony that dies? How much honey is gained by treating for mites? How much is potentially lost by not treating? The number of varroa mites that a bee colony can tolerate without damage depends on the time of year, the population of bees in the hive, and the overall health of the bee colony. A small early spring colony cannot tolerate a heavy mite infestation without becoming stressed. A strong colony in mid-summer can tolerate many more mites. However, in the early fall, high numbers of varroa mites can have significant negative effects on the health and lifespan of the bees that will overwinter.

A mite sample from 200-400 bees, using the powdered sugar shake method, can fairly accurately reveal the level of varroa infestation in a hive. The percentage of infestation, or number of mites per 100 bees, is calculated like this:

% infestation = # mites ÷ # bees x 100

Suggested Economic Thresholds for Varroa Mites in the Southeastern U.S.		
time of year	***spring***	***fall***
powdered sugar (300 bee sample)	1-3	9-12
sticky board	3-10	50-75

In general, treatment should be considered if the mite infestation level is greater than 1% in the spring, or greater than 3% in the fall. For sticky boards, count the total number of mites that fall over three days, and divide by 3 to get the average daily mite-fall. If this number is more than 5-10 in the spring, or more than 60-120 in the fall, a beekeeper should consider treatment, taking into account the overall health and size of the colony. These guidelines vary widely by geographical region, time of year, the amount of capped brood present, and the overall honey bee population. Routine sampling of pest populations will help a beekeeper recognize increasing pest levels before they become problematic.

The broad goal of Integrated Pest Management is long-term sustainability of healthy bees, rather than a short-term quick fix for an isolated problem. By reducing dependence on chemical pesticides, beekeepers can maintain a healthier environment for their honey bees, reduce the risk of contaminating honey, and save money. When a pesticide must be used, alternating treatment chemicals will reduce the chances of resistance evolving in the pest populations, thus extending the useful lifespan of the tools at the beekeeper's disposal.

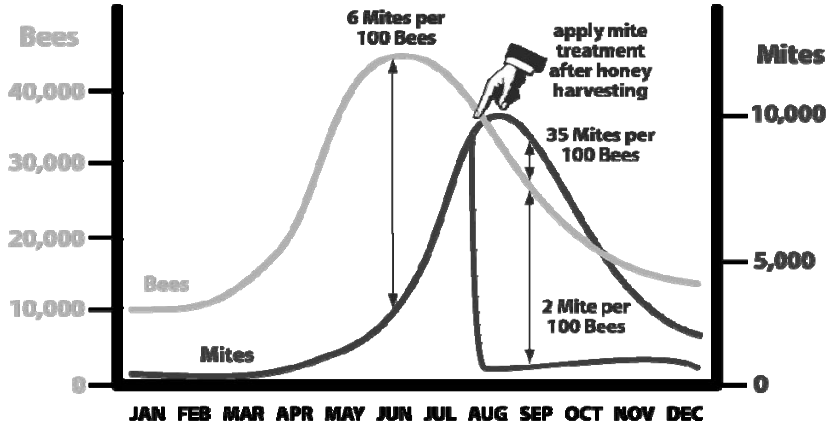
Jon Zawislak
jzawislak@uaex.edu
uaex.ed/bees

U of A DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

Are Mite Treatments Really Necessary ?

- varroa mites are bad
  - honey bee viruses are bad
    - *Mite-Virus Complex* is worse than both

Hive Population Dynamics



Varroa Mite Treatments

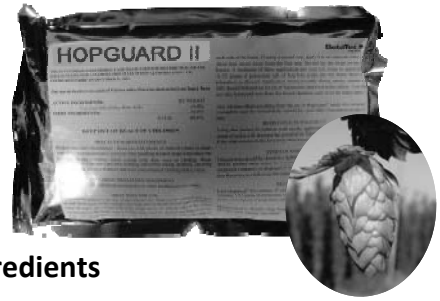
"hard" chemicals

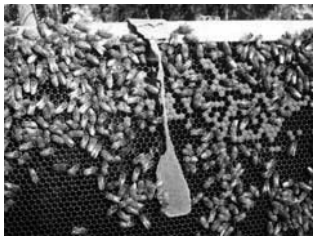
- miticides
  - lipophilic
  - mites developed resistance quickly
  - chronic exposure to a low dose over time affects bee health
  - cannot be used during honey flow

Varroa Mite Treatments

"soft" chemicals

- organic acids
- HopGuard
  - safe to use during the honey flow
    - all food-grade ingredients
    - Not effective when brood is present





Varroa Mite Treatments

"soft" chemicals

- organic acids
- formic acid (*MAQS*)
  - vaporizes in the hive
  - temperature dependent
    - daily high: 50-79°F
  - vapors penetrate caps
  - safe to use during the honey flow

Varroa Mite Treatments

"soft" chemicals

- organic acids
- formic acid (*MAQS*)

from the MAQS product label:

PHYSICAL OR CHEMICAL HAZARDS

Corrosive – Do not allow product to contact metal surfaces. Do not place, even briefly, on metallic hive covers. Store unused product in original container.

Handler Personal Protective Equipment (PPE): Applicators and other handlers must wear coveralls over a long-sleeved shirt, long pants, socks and shoes, acid resistant gloves (PVC, neoprene, or nitrile), and protective eyewear. Wear a respirator with an organic-vapor removing cartridge with a prefilter approved for pesticides …

Varroa Mite Treatments

"soft" chemicals

- organic acids
- oxalic acid
  - trickle in sugar syrup
  - vaporize with heat

Varroa Mite Treatments

oxalic acid

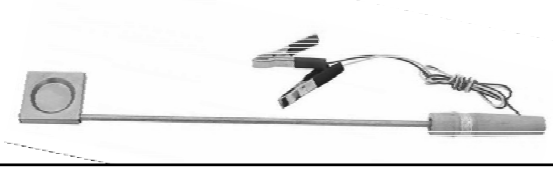
- trickle in sugar syrup
- 35 g oxalic acid crystals
- 1 liter warm 1:1 sugar syrup
- apply 5 ml (1 tsp) onto bees in each occupied bee space between brood combs
- do ***not*** use on same colony more than once per year
- only effective when colony is ***broodless***!

- treats up to 15 colonies
- difficult to mix smaller batches accurately
- unstable as liquid, do not store for long periods.

Varroa Mite Treatments

oxalic acid

- vaporize with heat
- remove honey supers
- seal screen floor
- smoke bees up from bottom
- heat 2 grams oxalic acid until completely evaporated
- always follow the directions from the vaporizer manufacturer



Varroa Mite Treatments

oxalic acid

- *use caution!*
  - always use chemical resistant gloves and eye protection when handling acid crystals
    - skin burns
    - eye damage
  - use a respirator to avoid severe respiratory burns

Varroa Mite Treatments

"soft" chemicals

- essential oils
  - must volatilize
    - temperature dependent (55-85 °F)
  - don't use during honey flow
    - affects quality of honey

- *thymol*
- *eucalyptus*
- *camphor*
- *menthol*

Apiguard

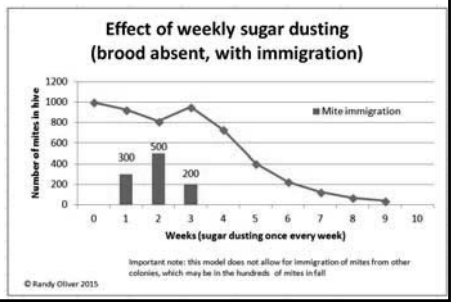
Thymovar

ApilifeVar

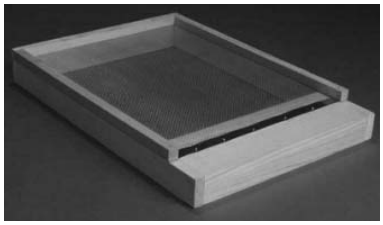
Varroa Mite Treatments

non-chemical

- powdered sugar dusting
  - knocks down <u>some</u> phoretic mites
  - labor intensive!
  - Use screen bottom board
  - repeat treatment weekly for 5-7 weeks
  - count mites before and after to evaluate success of treatment



Varroa Mite Treatments



non-chemical

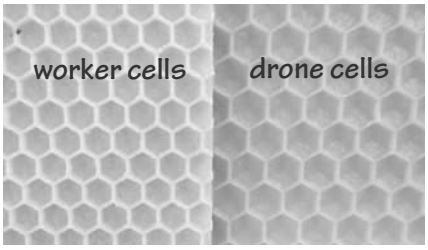
- cultural control
  - screen bottom board
  - mite-resistant stock
    - Varroa Sensitive Hygienic
    - Russian stock
    - others?

there is no 100% mite resistant bee available!

Varroa Mite Treatments

non-chemical

- cultural control
  - screen bottom board
  - mite-resistant stock
  - drone brood trapping



Varroa Mite Treatments

non-chemical

- **cultural control**
  - **"small" cell beekeeping ?**

that no evidence was found to support anecdotal claims that small cell foundation will reduce *Varroa* mites and without further data cannot recommend it as a method for controlling *Varroa* mites.

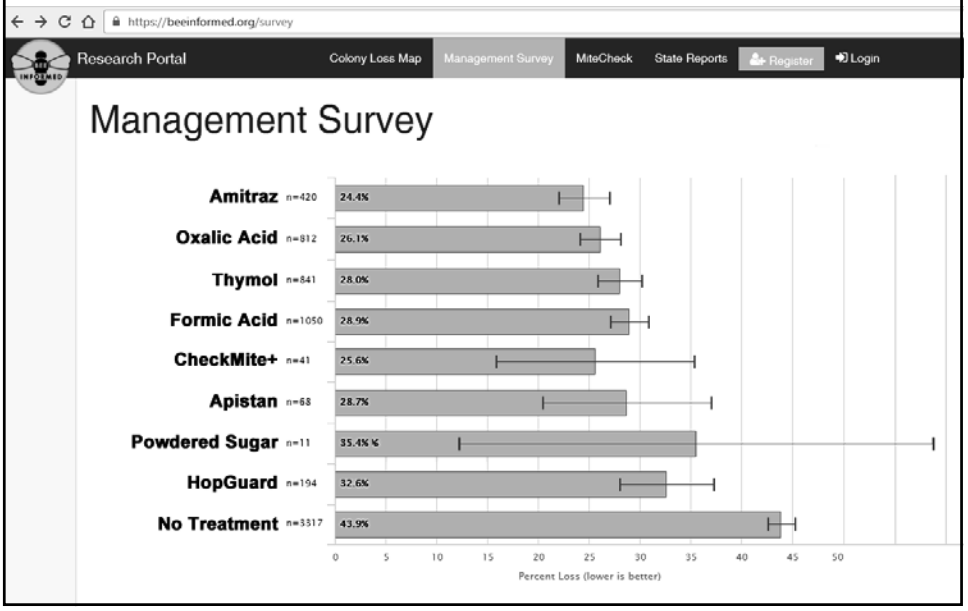
We conclude that small-cell comb technology does not impede *Varroa* population growth. This null conclusion is reinforced by the facts that: (1) the experiment was replicated independently three times with start dates varying between spring and fall

SmallCellFoundation And Varroa Mites

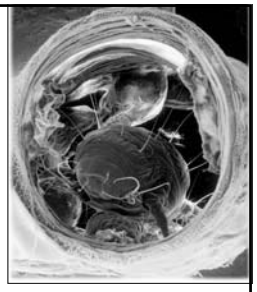
In three independent experimental replicates, we compared biometrics of *Varroa* mite and honey bee populations in bee colonies housed on one of two brood cell types: small-cell or conventional-cell.

Jennifer Berry

What works best ?



honey bee parasites



tracheal mites – *Acarapis woodi*

- internal parasite
- lives in tracheal tubes
- feeds on bee's blood
- breeds in trachea
- diminishes oxygen supply
- spreads pathogens
- symptom: K-wing
  - need microscopic diagnosis for positive identification

honey bee parasites

tracheal mites

- treatments?
  - menthol crystals
  - thymol treatments
- grease patties
  - 1:2 (grease:sugar)
- genetic resistance
  - Buckfast Bee

Apiguard

ApilifeVar

Thymovar

bee hive pests

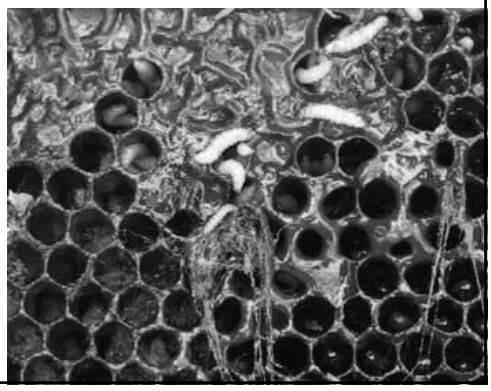
small hive beetles – *Aethina tumida*

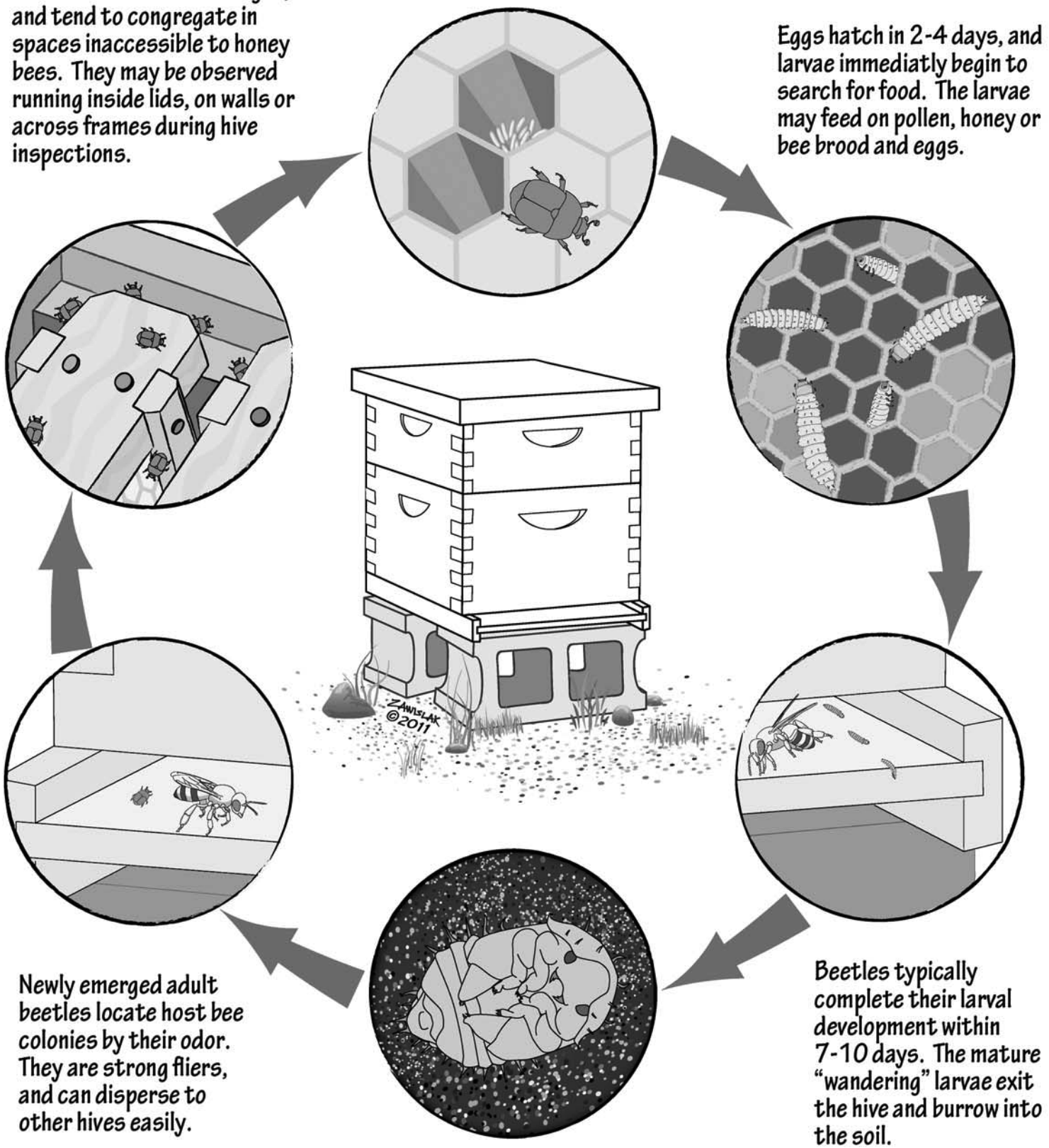
- opportunistic hive pest
- from South Africa
- first found in Florida
  - spread in packages
  - migratory beekeepers
  - can fly several miles

bee hive pests

small hive beetles

- life cycle
  - adults invade hive
  - hide from bees
  - lay eggs
  - larvae feed
  - ruin honey
  - exit hive
  - pupate in soil
  - emerge as adults

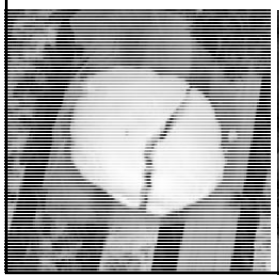


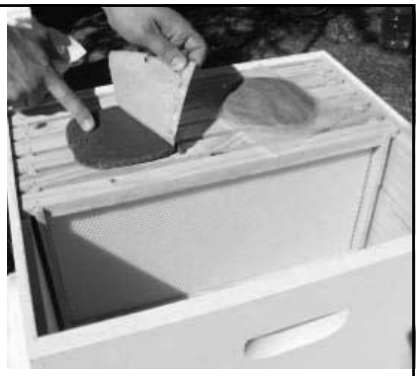

Female beetles deposit masses of eggs in crevices around the hive, or directly on pollen or brood combs. Beetles may puncture the wall or capping of a sealed cell and deposit eggs inside.
Eggs hatch in 2-4 days, and larvae immediatly begin to search for food. The larvae may feed on pollen, honey or bee brood and eggs.
Beetles typically complete their larval development within 7-10 days. The mature "wandering" larvae exit the hive and burrow into the soil.
Beetle larvae pupate in the top 4" of soil, on average. Pupation takes 3-6 weeks to complete, depending on temperature and soil moisture.
Newly emerged adult beetles locate host bee colonies by their odor. They are strong fliers, and can disperse to other hives easily.
Adult beetles avoid the light, and tend to congregate in spaces inaccessible to honey bees. They may be observed running inside lids, on walls or across frames during hive inspections.
ZAWISLAK ©2011

bee hive pests

small hive beetles

- ***small hive beetles can survive and reproduce on grease patties & protein/pollen patties and rotten fruit***





bee hive pests

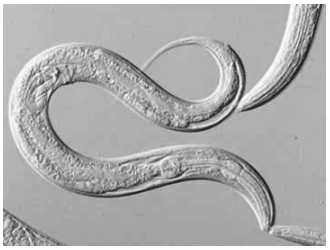
small hive beetles

- **treatments?**
- **Strong, crowded colonies**
  - **don't over-super**
- **Chemicals**
  - **Checkmite+ (coumaphos)**
  - **limited use**

bee hive pests

small hive beetles

- treatments?
- soil drench

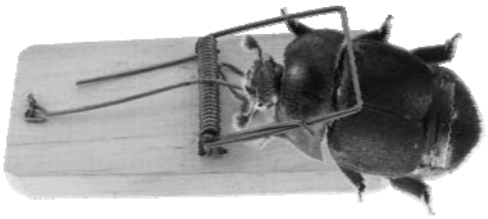


southeasterninsectaries.com

bee hive pests

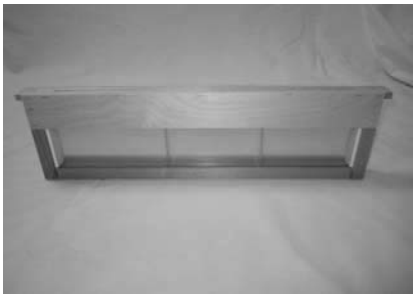
small hive beetles

- treatments?
  - ***control adult beetle population to prevent damage from larval infestation!***



mechanical beetle traps

small hive beetle traps



Beetle Jail Frame

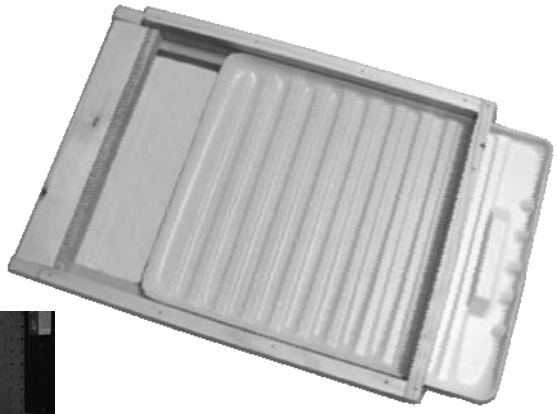
Hood trap

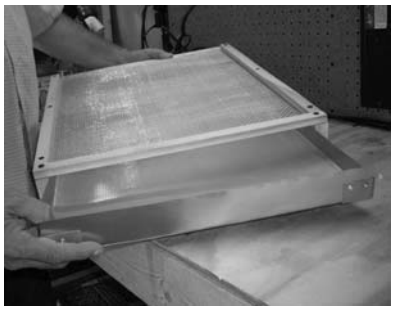
lots of empty space

vegetable oil

apple cider vinegar

small hive beetle traps





Freeman Beetle Trap

small hive beetle traps

Beetle Bait

combine:

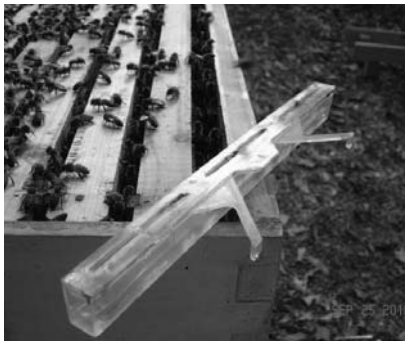
- **1 cup water**
- **½ cup apple cider vinegar**
- **¼ cup sugar**
- **chopped peel of 1 ripe banana**

allow to ferment 1-2 days

Sonny-Mel Trap

small hive beetle traps

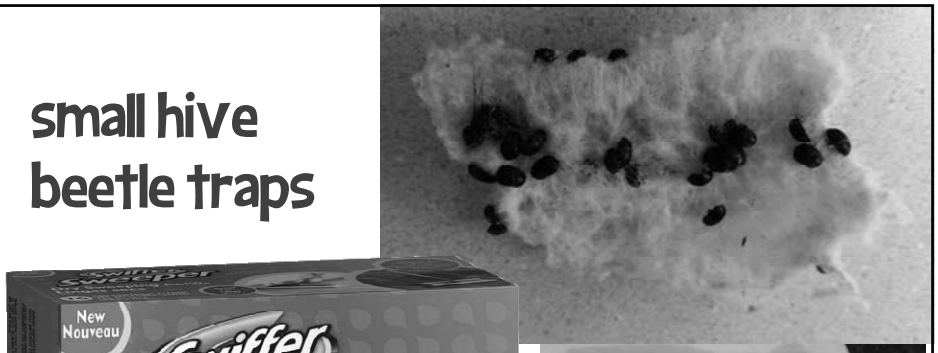
Beetle Blasters

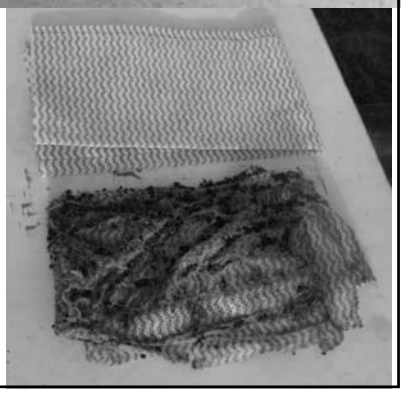


Baitable Beetle Jail Jr.

AJ's Beetle Eater

small hive beetle traps





Extension Fact Sheet FSA-7075

UA UNIVERSITY OF ARKANSAS DIVISION OF AGRICULTURE

Agriculture and Natural Resources

FSA7075

Managing Small Hive Beetles

Jon Zawislak
Program Associate - Apiculture

The small hive beetle *Aethina tumida* (SHB) is an invasive pest of bee hives, originally from sub-Saharan Africa. These beetles inhabit almost all honey bee colonies in their native range, but they do little damage there and are rarely considered a serious hive pest.

How this pest found its way into the U.S. is unknown, but it was first discovered to be damaging honey bee colonies in Florida in 1998. It has since spread to more than 30 states, being particularly prevalent in the Southeast. The beetles have likely been transported with package bees and by migratory beekeepers, but the adult beetles are strong fliers and are capable of traveling several miles at a time on their own.

In Arkansas the beetles are usually considered to be a secondary or opportunistic pest, only causing excessive damage after bee colonies have already become stressed or weakened by other factors. Infestations of beetles can put significant stress on bee colonies, which can be compounded by the stress of varroa mites and other conditions. If large populations of beetles are allowed to build up, even strong colonies can be overwhelmed in a short time.

Honey bee colonies appear able to contend with fairly large populations of adult beetles with little effect. However, large beetle populations are able to lay enormous numbers of eggs. These eggs develop quickly and result in rapid destruction of unprotected combs in a short time. There is no established threshold number for small hive beetles, as their ability to devastate a bee colony is related to many factors of colony strength and overall health. By maintaining strong bee colonies and keeping adult beetle populations low, beekeepers can suppress the beetles' reproductive potential.

Description

Adult SHB are 5-7 mm (¼") in length, oblong or oval in shape, tan to reddish-brown, dark brown or black in color and covered in fine hairs, but their size and appearance can be highly variable within a population.

FIG. 1. Adult small hive beetles are often observed in the hive with their head and antennae tucked down beneath the thorax. They are oblong in shape, around 6 mm long, with variable coloration that ranges from tan to reddish-brown, dark brown or black.

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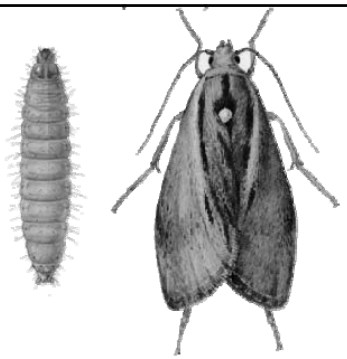
www.uaex.edu/Other_Areas/publications/PDF/FSA-7075.pdf

bee hive pests

greater wax moth

Galleria mellonella

- **opportunistic pest**
- **found in weak colonies or on stored combs**
- **can destroy drawn combs rapidly**



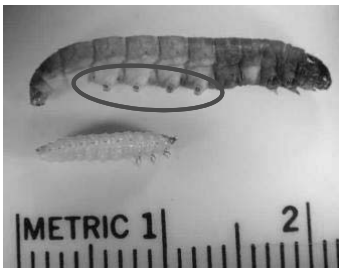
bee hive pests

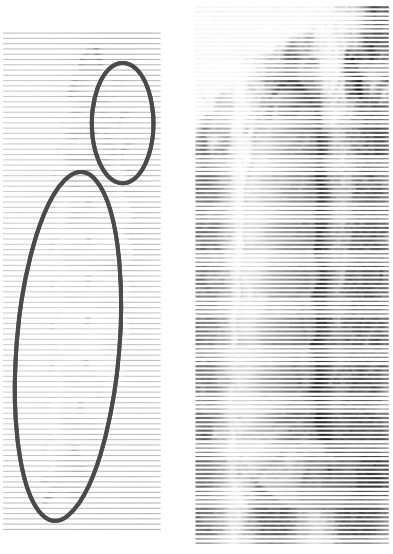
greater wax moth

- **don't confuse with small hive beetle**
  - **Both can be found in the same weak hives**

GWM

SHB

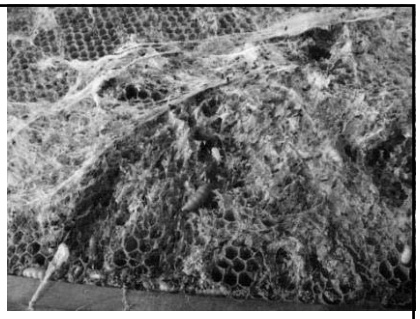




bee hive pests

greater wax moth larva

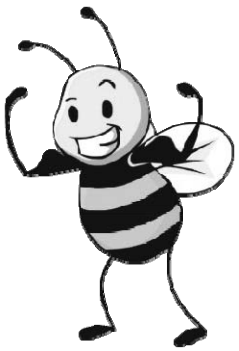
- tunnels through combs
- eats honey and wax
- spins webbing
- leaves frass
- chews up wood



bee hive pests

greater wax moth

- treatments
  - strong colonies
  - store combs in safe place
  - lots of light and air circulation
  - fumigate
    - Para-moth® crystals
    - *not mothballs!*
    - 80% (glacial) acetic aci
- freeze combs for 72 hours

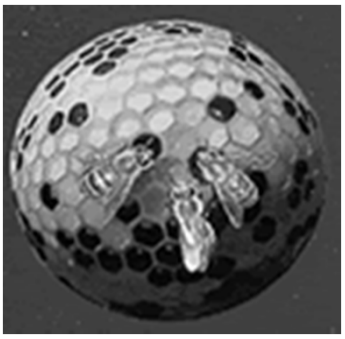


INSPECTIONS: COLONY ASSESSMENT

Mark Stoll, Daniel Plyler, & Danny Brewer
Arkansas State Plant Board

OUTLINE

- ASPB Laws & Regulations
- Equipment
- Inspection Process/Steps
- Sterilization



CIRCULAR 5

THE ARKANSAS APIARY LAW AND REGULATIONS

APIARY LAWS

- Section 2. Definitions.
  - E. "Bee Disease"; American and European foulbrood, sacbrood, bee paralysis, or any other disease or abnormal condition of the egg, larval, pupal, or adult stages of bees;
- Section 4. Inspection.
  - B. Immediately upon detection of disease, anyone keeping bees shall treat and disinfect, or burn and bury in places where they shall remain undisturbed, combs and frames taken from diseased colonies or, until salvaged, combs and frames shall be placed in tight receptacles so constructed that it shall be impossible for bees to gain access to combs, or for honey or any other liquid to leak out where bees can gain access to it.
  - C. Anyone exposing comb, honey, frames, empty hives, covers or bottom board, or tools or other appliances contaminated by infected material from diseased colonies, shall upon conviction thereof, be punished as provided in this Act.

APIARY LAWS

- Section 4. Inspection.
  - **E.** Should upon inspection or laboratory analysis, any of the diseases described in Sub- Section L be determined to exist in an apiary it shall be the duty of the Board to cause to be treated or disinfected or to destroy or cause to be destroyed by fire the colony, including the hives, frames, honey, wax, and brood.
  - **H**. All apiaries, bees, bee equipment, bee products, buildings, premises and appliances wherein or on which American and/or European foulbrood is known to exist are hereby declared to be under quarantine. The removal of any and all bees, queen bees, bee products, colonies, nuclei, combs and apiary appliances and bee fixtures is prohibited except under such cases as the Board may permit or approve. Such quarantines shall exist until the Board shall determine and declare the premises or material are apparently free from American and/or European foulbrood. The imposed quarantine shall cease to be in effect if the Board has not verified the existence of American or European foulbrood within thirty days after appeal by the beekeeper.

APIARY REGULATIONS

- **Notice of Disease; Quarantine; Appeal.** If a bee disease is found to exist in any degree in an apiary the inspector will notify the owner or person responsible for the apiary in writing at the conclusion of the inspection. The notice will state which disease(s) is present, the number of colonies infected, how the diseased colonies are marked, the manner in which the disease(s) shall be eradicated and the length of time in which eradication shall be accomplished. The written notice shall also be considered a notice of quarantine if American foulbrood or European foulbrood is found in an apiary. The owner or person responsible for a quarantined apiary may appeal the findings of the inspector to the Head of the Apiary Section or the State Apiarist within 3 days. At the owner's option, confirmation or denial of the inspector's findings may be based upon reinspection of the apiary by the Head of the Apiary Section or the State Apiarist, or upon the findings of the USDA Bee Disease Investigative Laboratory. If the latter option is chosen the apiary inspector will, in the presence of the beekeeper, collect and identify samples to be sent to the laboratory. Based upon reinspection or laboratory findings, the determination of the Plant Board shall be final unless otherwise determined by a court of proper jurisdiction. The quarantine shall cease to be in effect if the Board has not verified the existence of American or European foulbrood within thirty days after appeal by the beekeeper.

APIARY REGULATIONS

- **Disease Eradication:**
- American Foulbrood. If American foulbrood disease is found to exist in any degree in an apiary, after written notice to the owner or person responsible for the apiary and after a final determination is made, the inspector shall destroy or cause to be destroyed the diseased colonies and contaminated equipment in the following manner:
- **(a)** By killing the bees in infected hives and burning the bees, combs, frames and honey in a pit and burying the ashes at least 1 foot below the surface of the ground.
- **(b)** By scorching with fire or boiling in lye solution (one pound lye per 10 gallons of water) for not less than 30 minutes the hive bodies, bottom boards, covers, supers, or other equipment associated with the infected colonies.
- The quarantine which is placed on an apiary when American foulbrood disease is found shall not be lifted until these eradication measures have been carried out to the satisfaction of the inspector and subsequent inspections reveal no American foulbrood disease in the apiary.

APIARY REGULATIONS

- **Disease Eradication:**
- European Foulbrood. If European foulbrood disease is found to exist in any degree in an apiary, written notice and opportunity for appeal as described previously herein will be given to the owner or person responsible for the apiary. The written notice shall require that in each infected colony:
- **(a)** The queen shall be killed immediately,
- **(b)** An approved antibiotic shall be fed immediately and once per week for at least 3 weeks thereafter, and
- **(c)** After 10 days a new queen shall be introduced into the colony. If the owner or person responsible for the apiary refuses or fails to carry out the prescribed eradication procedures the infected colonies shall be destroyed by the inspector in the manner described for American foulbrood disease.
- The quarantine which is placed on an apiary when European foulbrood disease is found shall not be lifted until these eradication measures have been carried out to the satisfaction of the inspector and subsequent inspections reveal no European foulbrood disease in the apiary.

EQUIPMENT

APIARY EQUIPMENT

EQUIPMENT

- Bee Suit
- Bee Jacket
- Gloves
- Boots
- Hive tool
- Smoker
- Bee brush
- Etc…

BEE SUITS

- Different types
- Find one you are comfortable with.
- Price range:
- $40-$200

BEE JACKETS

- $40-$100

GLOVES

$8-$30

$2-$15

BRUSHES

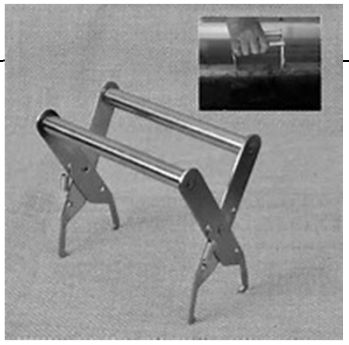
$5 - $30

HIVE TOOL

$12 - $50

SMOKER

MISCELLANEOUS



BEE SUPPLY COMPANIES

- Dadant
  217-847-3324
  www.dadant.com
- Mann Lake
  800-880-7694
  www.mannlakeltd.com
- Brushy Mountain
  1-800-233-7929
  www.brushymountainbeefarm.com
- Kelley
  800-233-2899
  www.kelleybees.com
- Pigeon Mountain
  706-638-1491
  www.pigeonmountaintrading.com
- Blue Sky
  877-529-9233
  www.blueskybeesupply.com
- Glory Bee
  800-456-7923
  www.glorybee.com
- Blythewood
  803-754-7577
  www.blythewoodbeecompany.com

LOCAL SUPPLIERS

- Apiary Beekeeping Supplies
  870-305-1125
  www.apiarybeekeepingsupplies.com
- Bemis Honey Bee Farm
  501-897-2337
  www.bemistreefarm.com/honey-bee-supplies
- Central Beekeepers Supply
  479-968-4044
  www.centralbeekeeperssupply.com
- Prepper Bee Supply
  479-426-7172
  www.prepperbeesupply.com
- Southwest Arkansas Beekeeping Supplies
  870-896-2200
  www.swarbeesupplies.com

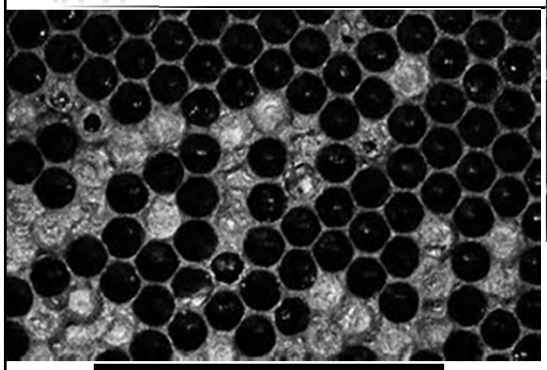
INSPECTIONS

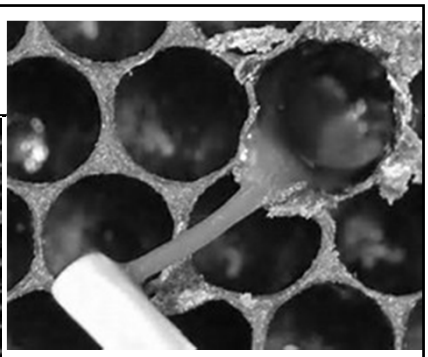
INSPECTIONS

- Disease Laws
- Main ones:
- American foulbrood
- European foulbrood
- Drugs Transitioning from OTC to VFD status that will initially effect Honey bees:

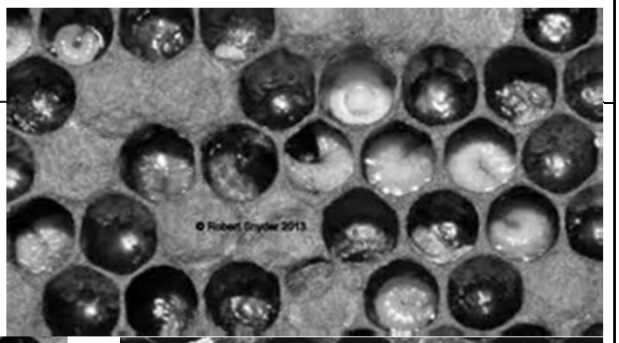
Established Drug Name	Examples
Lincomycin	Lincomix
Oxytetracycline (OTC)	TM, OXTC, Oxytetracycline, Pennox, Terramycin
Tylosin	Tylan, Tylosin, Tylovet

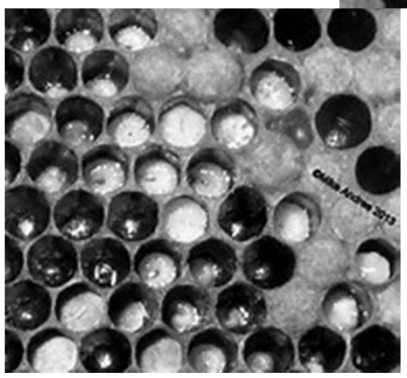
AFB

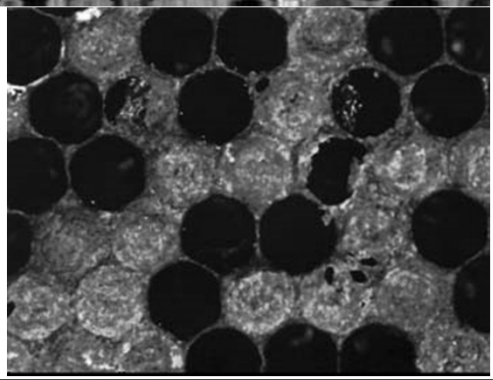




EFB







TEST KITS

COMPARATIVE SYMPTOMS OF AFB & EFB

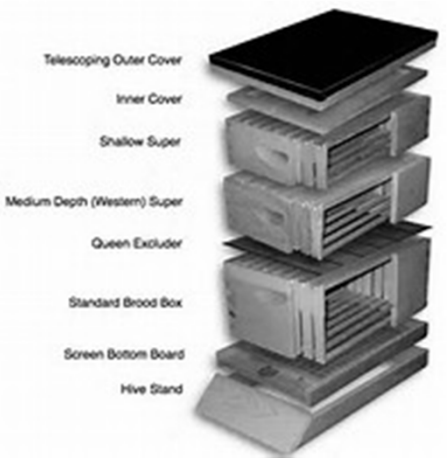
SYMPTOM	AFB	EFB
Appearance of brood comb	Sealed brood. Discolored, sunken or punctured cappings.	Unsealed brood. Some sealed brood in advanced cases with discolored, sunken or punctured cappings.
Age of Dead brood	Usually older sealed larvae or young pupae	Usually young unsealed larvae; occasionally older sealed larvae. Typically in coiled stage.
Color of dead brood	Dull white, becoming light brown, coffee brown to dark brown, or almost black.	Dull white, becoming yellowish white to brown, dark brown, or almost black

COMPARATIVE SYMPTOMS OF AFB & EFB

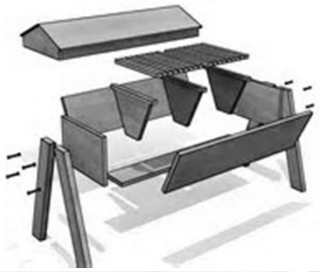
SYMPTOM	AFB	EFB
Consistency of dead brood	Soft, becoming sticky to ropy.	Watery; rarely sticky or ropy. Granular.
Odor of dead brood	Slight to pronounced odor.	Slightly sour to penetratingly sour.
Scale characteristics	Uniformly lies flat on lower side of cell. Adheres tightly to cell wall. Fine, threadlike tongue of dead pupae maybe present. Head lies flat. Brittle. Black	Usually twisted in cell. Does not adhere tightly to cell wall. Rubbery. Black.

THE BEE HIVE

Langstroth Hive

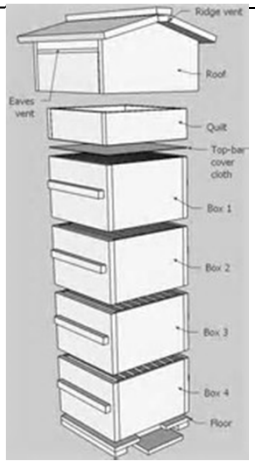


THE BEE HIVE



Top Bar Hive

THE BEE HIVE



Warre Hive

INSPECTION

- Section 4. Inspections
- A. It shall be the duty of all persons engaged in beekeeping to provide movable frames in all hives used by them to contain bees, and to cause the bees in such hives to construct brood combs in such frames so that any of said frames may be removed from the hive without injuring other combs in such hive….

- Have smoker ready and be suited up.
- Start with puff of smoke in the entrance then-
- Remove lid and inner cover.
- Work your way down to Brood
- May have to remove supers, queen excluder…

INSPECTION

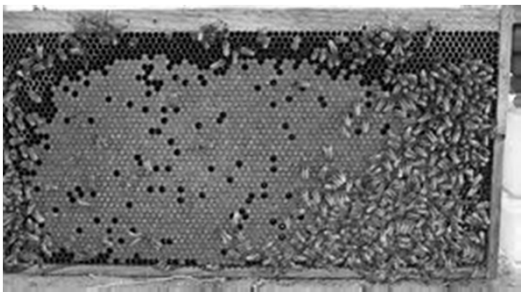
- Start with outer frame
- Work your way in.
- Hold Frames Vertically over hive.
- Don't "roll" bees as you replace frames.

INSPECTION

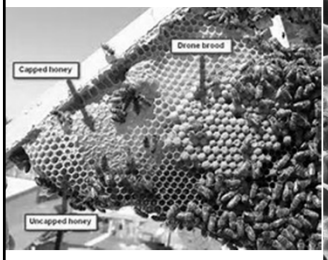
- Find a brood frame
- May need to brush or gentle shake bees off of frame.
- Hold frame vertically over hive to examine.

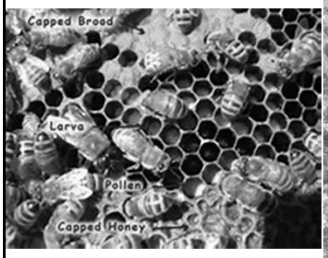
INSPECTION

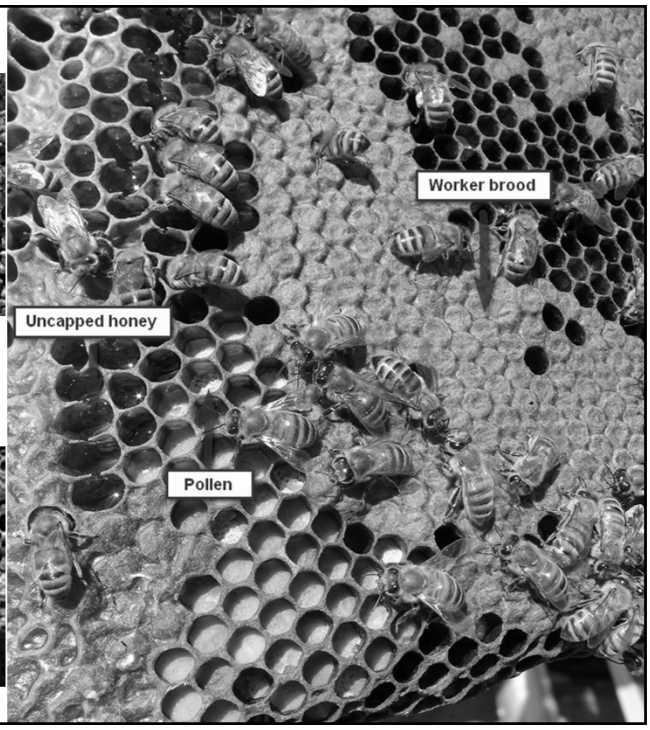
- Scan frames for disease symptoms.
- Will probably need to examine a few frames.
- Continue to examine each adjacent frame until objective has been met.



INSPECTION







INSPECTION

AFB & EFB STATS

YEAR	11-12	12-13	13-14	14-15	15-16
AFB	36	4	0	1	1
EFB	23	134	39	96	75

INSPECTION

- If disease is found:
- You will need to know what to do.
- AFB- positive hives will need to be destroyed.
- Negative hives in yard- treated.

- If disease is found:
- EFB- positive hives will need to be Treated.
- Along with other hives in yard.
- Options- Consider destroying colony if population already reduced.

INSPECTION

- Hive spacing to minimize drifting.
- Minimize moving frames between colonies.
- Keep apiary clean. Don't leave burr comb, woodware, tools, etc. where bees can access.
- Reduce stress factors- Bee pests, robbing, etc.

PREVENTING OUTBREAKS

STERILIZATION

STERILIZATION

- **G.** After inspection of infected bees or fixtures or handling diseased bees, the Apiary Inspector shall, before leaving the premises or proceeding to any other apiary, take such measures as shall prevent the spread of the disease by infected material adhering to his person or clothing or to any tools or appliances used by him, which have come in contact with infected materials.

STERILIZATION

- After coming in contact with diseased hive.
- You do not want to become a vector.
- Must sterilize equipment.
- Torch hive tool.
- Wash or dispose of gloves – AFB dispose.
- Dispose of brush.

HELPFUL LINKS

- -USDA APHIS for pest and disease
- https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/pests-and-diseases/non-regulated/honey-bees/outreach-videos
- -Here is a good article that has good picture for EFB and AFB.
- http://articles.extension.org/pages/23693/european-foulbrood:-a-bacterial-disease-affecting-honey-bee-brood

HELPFUL LINKS

- -Here is a link to 8 videos about AFB on youtube
- https://youtu.be/ViQp92kPr6YDanny
- -Here is a video on how to use the test kits
- https://youtu.be/N9wIT6xq_zY
- Symptom checker
- http://www.thebeemd.com/
- -Here is the site for sending off a sample
- https://www.ars.usda.gov/northeast-area/beltsville-md/beltsville-agricultural-research-center/bee-research-laboratory/docs/how-to-submit-samples/

CIRCULAR 5

THE ARKANSAS APIARY LAW AND REGULATIONS

A handbook for Apiarists issued October 1, 1979 under Act 161 of 1977 by the **State Plant Board,** Box 1069, Little Rock, Arkansas 72203, **Mark Stoll,** Head, Apiary Section.

ARKANSAS APIARY LAW

(Act 161 of 1977 as Amended by Act 149 of 1979)

Section 1. **Enforcement, Administration, and Personnel.** The State Plant Board, hereinafter referred to as the Board, is hereby vested with the authority to carry out provisions of this Act through the Director, State Apiarist, Section Head, and Deputies. The State Apiary Board created by Act 59 of 1945, as amended, is hereby abolished and all records, supplies, equipment, and personnel existing under the authority of Act 59 of 1945, as amended, are hereby transferred to the Board for use in carrying out the provisions of this Act. Hereafter, the State Apiary program shall be continued in accordance with the provisions of this Act.

Section 2. **Definitions.** The terms used in this Act, unless the context otherwise requires, shall mean:

A. "Abandoned apiary"; an apiary to which the owner or operator fails to provide such reasonable and adequate attention to each hive during the year as to jeopardize the welfare of neighboring colonies;

B. "Apiary"; any place where one or more colonies of bees are kept;

C. "Appliance"; any apparatus, tools, machines or other devices, used in the handling and manipulation of bees, honey, wax and hives. The term includes containers of honey and wax which may be used in an apiary or in transporting bees and their products and apiary supplies;

D. "Bees"; any stage of the common honeybee **(Apis mellifera);**

E. "Bee disease"; American and European foulbrood, sacbrood, bee paralysis, or any other disease or abnormal condition of the egg, larval, pupal or adult stages of bees;

F. "Apiary equipment"; hives. supers, frames, veils, gloves, or any other equipment used in the handling and manipulation of bees, honey, wax, and hives;

G. "Colony"; the bees in any hive including queens, workers, and drones;

H. "Hive"; a frame hive, box hive, box, barrel, logs, gum skep or any other receptacle or container, natural or artificial, or any part thereof which may be used as a domicile for bees;

I. "Nucleus"; any division or portion of a hive that contains comb;

J. "Package"; an indefinite number of bees in a bee-tight container, with or without a queen, without comb;

K. "Pollination"; the use of bees for the transfer of pollen in the production of agricultural crops;

L. "Director"; the Director of the Arkansas State Plant Board;

M. "State Apiarist"; the Director of the Division of Plant Industries of the State Plant Board;

N. "Section Head"; the Head of the Apiary Section of the Division of Plant Industries.

Section 3. **Registration.** A. Every person owning, leasing or possessing bees shall, before July 1, of 1979, or thereafter within ten (10) days after coming into ownership or possession of bees, or before moving bees from outside the State of Arkansas, file with the Board an application for registration. The application shall set forth the exact location by legal description of the premises, together with the name of owner or possessor or such apiary, the number of colonies of bees in each apiary owned by him or in his possession or under his control, together with such other information as may be required by the Board. The beekeeper may register one location for each ten (10) colonies for the first one thousand (1,000) colonies and may register one location for each twenty (20) colonies thereafter. A new registration is required when any significant change occurs in the location or operation of the beekeeper. All applications for registration shall be approved or rejected by the Board so as to effectuate compliance with the Act or rules and regulations promulgated pursuant hereto.

B. No person can place bees on property other than his own within three miles of a previously registered area without the written permission of the registrant; PROVIDED, however, that upon written complaint made to the Board by any beekeeper or any land owner whose land is in the registered area, that the registrant or any other person claiming prior bee pasturage rights is not properly covering the area so registered, then the Apiary Board shall be authorized to permit the placing in such area other bees or bee yards as in its judgment shall be sufficient.

C. Nonresidents of this State who desire to locate their colonies of bees in Arkansas shall register

their bees and the locations they desire as required in subsection A above, provided that such registration shall be required annually. If such nonresident beekeeper fails to place his bees in an area registered by him during the registration period, such beekeeper shall forfeit his rights to such area and shall not be allowed to apply for such area until one year after the forfeiture.

Section 4. **Inspection.** The Board shall establish minimum competency standards for persons to be employed as inspectors. These requirements are to include demonstrated ability to properly handle hives and bees in addition to proficient performance on a written test measuring knowledge pertinent to the job of inspector.

A. It shall be the duty of all persons engaged in beekeeping to provide movable frames in all hives used by them to contain bees, and to cause the bees in such hives to construct brood combs in such frames so that any of said frames may be removed from the hive without injuring other combs in such hive. Beekeepers shall change newly acquired bees from their natural habitat to hives as soon as possible, but in no case shall a period of more than twelve (12) months elapse between date of acquiring new bees and transferring the same to hives.

B. Immediately upon detection of disease, anyone keeping bees shall treat and disinfect, or burn and bury in places where they shall remain undisturbed, combs and frames taken from diseased colonies or, until salvaged, combs and frames shall be placed in tight receptacles so constructed that it shall be impossible for bees to gain access to combs, or for honey or any other liquid to leak out where bees can gain access to it.

C. Anyone exposing comb, honey, frames, empty hives, covers or bottomboard, or tools or other appliances contaminated by infected material from diseased colonies, shall upon conviction thereof, be punished as provided in this Act.

D. Whenever an apiary has been inspected and found apparently free from American foulbrood or other dangerous, contagious or infectious bee diseases, and all other provisions of this Act have been complied with, a certificate of inspection shall be issued. The certificate of inspection shall be valid for a period of one year following the date of its issuance. A valid certificate of inspection shall be deemed as a blanket permit to move the hives from place to place within the State.

E. Should upon inspection or laboratory analysis, any of the diseases described in Sub-Section L be determined to exist in an apiary it shall be the duty of the Board to cause to be treated or disinfected or to destroy or cause to be destroyed by fire the colony, including the hives, frames, honey, wax, and brood.

F. If an abandoned apiary is found, upon inspection, to be diseased, the Board shall cause it to be immediately destroyed by burning. An apiary may be considered abandoned only after reasonable attempts have been made to determine ownership. Such attempts are to at least include the questioning of the owner, lessee or renter of the land on which the apiary is discovered.

G. After inspection of infected bees or fixtures or handling diseased bees, the Apiary Inspector

shall, before leaving the premises or proceeding to any other apiary, take such measures as shall prevent the spread of the disease by infected material adhering to his person or clothing or to any tools or appliances used by him, which have come in contact with infected materials.

H. All apiaries, bees, bee equipment, bee products, buildings, premises and appliances wherein or on which American and/or European foulbrood is known to exist are hereby declared to be under quarantine. The removal of any and all bees, queen bees, bee products, colonies, nuclei, combs and apiary appliances and bee fixtures is prohibited except under such cases as the Board may permit or approve. Such quarantines shall exist until the Board shall determine and declare the premises or material are apparently free from American and/or European foulbrood. The imposed quarantine shall cease to be in effect if the Board has not verified the existence of American or European foulbrood within thirty days after appeal by the beekeeper.

I. No person shall sell, offer for sale, give away or otherwise transfer ownership of any colony of bees, bees, or queen bees without first receiving from the Board a certificate of health issued not more than six (6) months prior to the disposition. A copy of the certificate shall be issued by the seller or given to the purchaser or person receiving the colony at the time of delivery.

J. Upon request, additional inspections shall be made, by the Apiary Inspector, of colonies of bees, bees, queen bees and their attendants or hives, supers, or other equipment used in bee culture.

K. It shall be unlawful for any person to give false information or incomplete information in any matter pertaining to this Act, or to resist, impede, or hinder the Apiary Inspector in the discharge of his duties.

L. For the enforcement of this Act, the Apiary Inspector shall have, where any apiary is located or any bees, combs or apiary appliances are kept, the authority to enter upon any private or public premises with right of access, ingress and egress for the purpose of ascertaining the existence of the disease known as American foulbrood or European foulbrood or any other disease which is infectious or contagious and injurious to bees in their egg, larval, pupal or adult stages. However, prior to exercising that authority, the Apiary Inspector must afford the beekeeper the opportunity to be present during the inspection by serving notice of the date and time of inspection at least five (5) days prior to the inspection. The five-day period may be abbreviated upon the mutual consent of the Apiary Inspector and the beekeeper.

M. Beekeepers aggrieved by the actions of an Apiary Inspector may appeal the Inspector's action to the Board at the Board's next meeting.

Section 5. **Transportation.** A. All bees in used hives or other apiary equipment which may be brought into the State from other states or other countries must be accompanied by a certificate of health issued by the official inspector of the state or country from whence they came. The transportation of bees in used hives or other apiary equipment into this State without said certificate of health by any person or persons or by common carriers is expressly prohibited.

B. The certificate of health shall certify to the apparent freedom from foulbrood or any other contagious or infectious bee disease, and shall be based on actual inspection of bees and material within ninety (90) days of the date of shipment.

C. A person transporting bees within the State to a location not previously approved shall notify the Apiary Board of the Action at least twenty (20) days before the move, however, under emergency conditions, such as fires, crop dusting and natural disasters, the bees may be moved without prior notice provided that the Apiary Board is notified within five (5) days of the move and informed of the circumstances necessitating the emergency move. No notification shall be required for the movement of disease-free bees between previously registered locations.

Section 6. **Rules and Regulations.** The Board may promulgate such rules and regulations, not inconsistent herewith, as it shall deem necessary for the proper enforcement of this Act. Such rules and regulations shall be promulgated, issued, and enforced in accordance with the Administrative Procedures Law of the State, Act 434 of 1967, as amended. Any person violating the provisions of this Act shall be guilty of a class 'C' misdemeanor and shall be punished accordingly.

Section 7. **Severability.** The provisions of this Act are severable. If any section or other part thereof is declared unconstitutional or invalid, such declaration shall not affect the part that remains.

Section 8. **Repeal of Conflicting Laws.** All laws and parts of laws in conflict with this Act are hereby repealed, specifically Act 59 of 1945, as amended, and that part of Section 16 of Act 38 of 1971, as amended, that pertains to the State Apiary Board.

APIARY REGULATIONS OF THE STATE PLANT BOARD

The following regulations have been promulgated and adopted under authority of Act 161 of 1977 as amended by Act 149 of 1979 and in conformance with Act 434 of 1967 as amended, the Administrative Procedures Act.

The State Plant Board recognizes the importance of the honeybee to Arkansas agriculture through its pollination of crops and the value of the honey it produces. The Board will, therefore, strive to preserve the honeybee, promote beekeeping and strengthen apiary functions in Arkansas through the considerate and judicious application of Act 161 of 1977, as amended by Act 149 of 1979, and these regulations.

Regulation I. **Registration**

Registering Apiaries. Each apiary in the state shall be registered. Apiaries may be registered at permanent or temporary locations. Temporary locations shall be occupied by active colonies of bees during the honey producing season, subject to pasturage rights specified in Section 3B of Act 161, or registration will be canceled. Registration shall be on forms provided by the Board and shall include the following information: 1. Name and complete mailing address of the owner, 2. Legal description of each location by Quarter section, Section, Township and Range, 3. A notation whether each location is permanent or temporary, 4. The name of the owner of the land where each apiary is located, and 5. The number of colonies at each location. Registration may be amended anytime as new colonies are added to an apiary by purchase, division or the capture of swarms, or when any significant change occurs in the location or operation of a beekeeper. Any person who purchases colonies of bees from a beekeeper with registered apiary locations (bee yards) shall have the first option to register said locations in his own name, provided such action is agreeable to the owner of the land whereon the apiaries are located.

Apiary Identification. Each apiary location, whether permanent or temporary, shall be identified by prominently displaying the owner's Registration Number at the site. This number may be displayed on one or more hives or on a readily visible sign placed within 10 feet of the hives.

Regulation II. **Inspection.**

Minimum Competency Standards For Inspector, Education and Experience.
Two years college with at least one course in beekeeping, or high school diploma with two years experience as a beekeeper or equivalent.

Training.

A minimum of one week on-the-job training with the Head of the Apiary Section or the Chief Inspector or the Apiary Specialist where the beginning inspector shall demonstrate ability to properly handle hives and bees, to identify bee diseases and to execute required forms and paperwork.

Examination.

The prospective inspector shall make a passing grade of 70% on a written examination designed to measure his knowledge pertinent to the job before entering into the required training.

Hives With Movable Frames Required. A person may not keep bees in a hive which does not have movable frames. Movable frames permit thorough examination of every brood comb in a hive to determine the presence of disease. If a hive without movable frames is found the inspector will notify the owner or persons responsible for the hive of the condition in writing. The written notice shall require that the bees be moved into a hive with movable frames as soon as possible, but in no case more than 12 months from the date of the notice. If the owner or person responsible for the hive wishes to do so he may, after it is inspected, sell or give it to a second party who will house the bees properly. If he refuses or fails to provide proper housing himself or by a second party the hive or receptacle shall be condemned and destroyed. Hives condemned for destruction will be destroyed in the manner described for American foulbrood disease.

Inspection Frequency. The frequency of inspection of each apiary will be determined by the Board. Inspections may be made annually or at more frequent or less frequent intervals depending upon the disease history of the apiary and the surrounding area.

Owner Participation Weather Conditions. Owner participation during inspection is helpful to the owner as well as to the inspector and is encouraged. The apiary inspector will afford the beekeeper the opportunity to be present during the inspection by serving notice of the date and time at least five days prior to the inspection. The five-day period may be abbreviated upon the mutual consent of the apiary inspector and the beekeeper. Inspections will not be made when weather conditions are such that inspections may be seriously detrimental to the bees. Weather determinations will be made by mutual agreement between the owner or the person in charge and the inspector.

Notice **of Disease; Quarantine; Appeal.** If a bee disease is found to exist in any deqree in an apiary the inspector will notify the owner or person responsible for the apiary in writing at the conclusion of the inspection. The notice will state which disease(s) is present, the number of colonies infected, how the diseased colonies are marked, the manner in which the disease(s) shall be eradicated and the length of time in which eradication shall be accomplished. The written notice shall also be considered a notice of quarantine if American foulbrood or European foulbrood is found in an apiary. The owner or person responsible for a quarantined apiary may appeal the findings of the inspector to the Head of the Apiary Section or the State Apiarist within 3 days. At the owner's option, confirmation or denial of the inspector's findings may be based upon reinspection of the apiary by the Head of the Apiary Section or the State Apiarist, or upon the findings of the USDA Bee Disease Investigative Laboratory. If the latter option is chosen the apiary inspector will, in the presence of the beekeeper, collect and identify samples to be sent to the laboratory. Based upon reinspection or laboratory findings, the determination of the Plant Board shall be final unless otherwise determined by a court of proper jurisdiction. The quarantine shall cease to be in effect if the Board has not verified the existence of American or European foulbrood within thirty days

after appeal by the beekeeper.

Disease Eradication:

American Foulbrood. If American foulbrood disease is found to exist in any degree in an apiary, after written notice to the owner or person responsible for the apiary and after a final determination is made, the inspector shall destroy or cause to be destroyed the diseased colonies and contaminated equipment in the following manner:

(a) By killing the bees in infected hives and burning the bees, combs, frames and honey in a pit and burying the ashes at least 1 foot below the surface of the ground.

(b) By scorching with fire or boiling in lye solution (one pound lye per 10 gallons of water) for not less than 30 minutes the hive bodies, bottom boards, covers, supers, or other equipment associated with the infected colonies.

The quarantine which is placed on an apiary when American foulbrood disease is found shall not be lifted until these eradication measures have been carried out to the satisfaction of the inspector and subsequent inspections reveal no American foulbrood disease in the apiary.

European Foulbrood. If European foulbrood disease is found to exist in any degree in an apiary, written notice and opportunity for appeal as described previously herein will be given to the owner or person responsible for the apiary. The written notice shall require that in each infected colony: (a) The queen shall be killed immediately, (b) An approved antibiotic shall be fed immediately and once per week for at least 3 weeks thereafter, and (c) After 10 days a new queen shall be introduced into the colony. If the owner or person responsible for the apiary refuses or fails to carry out the prescribed eradication procedures the infected colonies shall be destroyed by the inspector in the manner described for American foulbrood disease.

The quarantine which is placed on an apiary when European foulbrood disease is found shall not be lifted until these eradication measures have been carried out to the satisfaction of the inspector and subsequent inspections reveal no European foulbrood disease in the apiary.

Other Bee Diseases. If sacbrood, chalkbrood, bee paralysis or other bee disease are found to exist in any degree in an apiary the inspector will require such treatment as may be specified by the State Apiarist.

Regulation III. **Transporting.**

Transporting Bees, Apiary Equipment; Emergencies. A person may not transport or cause to be transported into or within this state bees on combs, used hives or other used apiary equipment or appliances without a current certificate of inspection covering the bees and equipment to be moved. With such a certificate bees may be moved between registered locations at will without

prior notice to the Plant Board. A person who does not possess a current certificate of inspection who wishes to move bees, or a person who wishes to move to a location which he has not registered, shall notify the Plant Board at least 20 days prior to the anticipated moving date. Within this 20-day period the Apiary Section shall inspect the apiary(ies) to be moved, conduct necessary investigations, determine prior pasturage rights and approve or reject the move.

Emergency moves made necessary by such things as fires, crop dusting and natural disasters may be made without prior notice provided that the Plant Board is notified within five days of the move and informed of the circumstances necessitating the emergency move.

The Veterinary Feed Directive

A Lesson in Paperwork

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What are VFD Drugs?

- Category of drugs created in 1996 by the Animal Drug Availability Act concerning medications used in or on animal feed
- Category was created with the intention of veterinary oversight
- Statements on the label for "increase feed efficiency" allowed for OTC use
- Many livestock producers used VFD feed for non-medical use

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Why are regulations changing?

- The National Antimicrobial Resistance Monitoring System (NARMS) has been monitoring disease caused by resistant bacteria since 1996
- Over 2 million illnesses and 23,000 deaths are caused annually by resistant bacteria (CDC, 2013 Report)
- FDA CVM sent a guidance document to all 26 animal pharmaceutical companies (Guidance document #213) requesting volunteer action
- All 26 companies agreed to comply in writing

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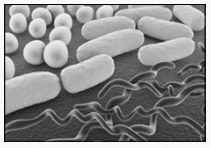
NARMS National Antimicrobial Resistance Monitoring System FDA CDC USDA

What does this have to do with agriculture?

- 400,000 of the 2 million human illnesses in the CDC report came from food-borne *Campylobacter* and *Salmonella* infections
- Current theories: chronic antibiotic exposure to food animals contributes to superbugs in the animals' digestive tracts and introduction of antibiotics in soil and water by manure and urine contributes to superbugs in the environment



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VFD Changes

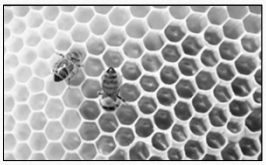
- Label claims for growth promotion are now removed from feed containing medically important antibiotics
- In order to feed medically important antibiotics in feed to animals, one must have a current VFD order written by a veterinarian
- In order to feed medically important antibiotics in water to animals, one must have a current prescription written by a veterinarian

Who regulates what?

- The FDA wants to ensure that these antibiotics are only used for a medical purpose and at the right dose and duration as to not encourage resistance
- Prescriptions are regulated by state pharmacy boards
- VFD orders are regulated by the FDA and the state veterinary boards
- Bee diseases in Arkansas are monitored by the Arkansas Plant Board

How are honey bees involved?

- FDA classifies honey bees as food animals
- Antibiotics mixed in powdered sugar are considered VFD feed
- Drugs marketed for honey bees are also used for poultry (mixed in water)
- Beekeepers must now partner with a veterinarian to obtain antibiotics



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The VCPR

- Veterinarian takes responsibility for health of bees
- Beekeeper follows the veterinarians' instructions
- Veterinarian knows the premises and the bees
- Veterinarian provides follow-up and continued care
- Veterinarian provides oversight for compliance
- Veterinarian keeps medical records for 3 years

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Veterinarian Responsibilities

- Licensed and in good standing in the state where bees reside
- Must fill out VFD/Prescription orders completely and legibly
- Must know the labeled use of VFD drugs (no extra-label use)
- Keep the original copy of VFD/Prescription order for 3 years
- Provide copy to FDA if requested

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Honey Bee VFD Resources

- beeinformed.org
- usda.aphis.gov
- uaex.edu/bees
- drugs.com
- plantboard.arkansas.gov
- arvetboard.com

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Summary

- Know the honey bee diseases
- Know how to examine honey bee colonies
- Know how to establish a VCPR
- Know how to keep records concerning the VFD and prescriptions

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