



World Organisation
for Animal Health

Integrating Antimicrobial Resistance Mitigation into Beekeeping Practices in Eastern Africa

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Antimicrobial use in beekeeping

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Definition and purpose of antimicrobial usage in beekeeping

- ❖ Antimicrobials are agents that kill microorganisms or stop their growth

WOAH-listed condition	Agent	Type	Antibiotic relevance
American foulbrood (AFB)	<i>Paenibacillus larvae</i>	Spore-forming bacterium	YES – historically used
European foulbrood (EFB)	<i>Melissococcus plutonius</i>	Bacterium	YES – historically used
Varroosis	<i>Varroa spp.</i>	Ectoparasitic mite	NO – not an antibiotic target
Acarapisosis	<i>Acarapis woodi</i>	Tracheal mite	NO
Tropilaelaps infestation	<i>Tropilaelaps spp.</i>	Ectoparasitic mite	NO
Small hive beetle infestation	<i>Aethina tumida</i>	Beetle	NO

Key message: AFB and EFB are the principal current WOAH-listed conditions for which antibacterial/antimicrobial treatment has historically been relevant.



Antimicrobials used against AFB and EFB and mode of application

Target pathogen / disease	Active substance / class	Indication / purpose	DOI
<i>Paenibacillus larvae</i> (American foulbrood, AFB)	Oxytetracycline	Suppression of vegetativestage of <i>P. larvae</i>	10.1016/j.vetmic.2007.05.018
<i>Paenibacillus larvae</i> (AFB)	Tylosin	It is particularly considered where oxytetracycline resistance occurs	10.3390/antibiotics14040359
<i>Paenibacillus larvae</i> (AFB)	Lincomycin	Alternative to oxytetracyclines in some settings	10.3390/antibiotics14040359
<i>Melissococcus plutonius</i> (European foulbrood, EFB)	Oxytetracycline	Inhibition/suppression of <i>M. plutonius</i> and control of larval infection	10.1016/j.jip.2009.06.016
<i>Melissococcus plutonius</i> (EFB)	Tylosin, lincomycin	Evaluation of antimicrobial efficacy against clinical EFB	10.1093/jisesa/ieag082

Mode of application of antimicrobials

1. Application Methods:

- Direct dusting or spraying in hives
- Mixing with sugar syrup for ingestion

2. Timing of application: Typically administered during low honey flow periods to avoid contamination.



Stewardship concern of antimicrobial use

Target pathogen / disease	Active substance / class	Stewardship concern	Countries/examples where use is authorized/permitted	Countries/examples where use is not authorized/permitted
Paenibacillus larvae (American foulbrood, AFB)	Oxytetracycline	Residues; selection for resistance; legal status varies	USA, Canada, India, Argentina	Australia; EU countries generally
Paenibacillus larvae (AFB)	Tylosin	Residues; resistance; authorization varies	USA, Canada	Australia; EU countries generally
Paenibacillus larvae (AFB)	Lincomycin	Residues; resistance; authorization varies	USA, Canada	Australia; EU countries generally
Melissococcus plutonius (European foulbrood, EFB)	Oxytetracycline	Residues; resistance; authorization varies	USA, Canada, India, Argentina	Many EU countries; New Zealand; Uruguay; Chile
Melissococcus plutonius (EFB)	Oxytetracycline, tylosin, lincomycin	Residues; resistance; authorization varies	USA, Canada	Many EU countries; New Zealand; Uruguay; Chile



American foulbrood: why antibiotics are not a complete solution

- Cause: *Paenibacillus larvae*, a spore-forming bacterium.
- Highly resistant spores can persist for years and spread through contaminated honey, wax, combs, equipment and colony movements.
- Antibiotics can suppress vegetative bacteria but do not destroy the spores.
- Clinical suppression therefore does not equal eradication.
- Management must prioritize diagnosis, movement control, biosecurity and appropriate regulatory measures.
- Antimicrobial use, where legally authorized, should not replace source control and disease-control measures.



European foulbrood: antimicrobial stewardship considerations

- Cause: *Melissococcus plutonius*, a non-spore-forming bacterium.
- Transmission is associated with mechanical contamination and movement of contaminated combs/materials.
- Antibacterial products have been reported historically, but treatment practices and legal status differ among countries.
- Clinical management should begin with accurate diagnosis and reduction of colony stress.
- Biosecurity, hygiene, equipment management and appropriate colony management reduce transmission pressure.
- You should not automatically assume that giving antibiotics routinely or “just in case” is appropriate



Antimicrobial residues: the food-safety dimension

**Application /
exposure**



Hive



Honey & wax



Harvest / trade



**Consumer /
market**

- Potential residues may occur in honey, beeswax and other hive products depending on compound, route, timing and persistence.
- International markets may apply strict residue requirements; non-compliance can result in rejected consignments and economic losses.
- Bee wax matters because some antimicrobial compounds can persist and be redistributed within the hive.

Bee health: Alternatives to antimicrobials

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Biosecurity First: The foundation of antimicrobial stewardship in African Beekeeping

Prevent disease



Reduce antimicrobial need



Protect bee health



Protect honey and bee wax quality



Mitigate AMR

- ❖ According to the *Regulation (EU) 2016/429*, biosecurity means **the sum of management and physical measures designed to reduce the risk of introduction, development and spread of diseases** to, from and within: (a) an animal population or (b) an establishment, zone, compartment, means of transport or any other facilities, premises or location; or According to *WOAH Scientific and Technical review (2021)*, 39 (3), biosecurity' means **all those operational activities that are applied to reduce the risk of introduction and spread of specific honey bee disease agents.**
- ❖ These measures apply to exotic and/or established pests/diseases, and are mainly related to the responsible use of veterinary medicines and antimicrobials in beekeeping operations



140 GBPs grouped into 7 heading exist according to WOA-H-FAO approach

	N. of GBPs identified
1. General apiary management	63
2. Veterinary medicines	8
3. Disease management (general)	23
4. Hygiene	7
5. Animal feeding and watering	7
6. Record keeping	25
7. Training	7

[Available online:](#)

<https://openknowledge.fao.org/server/api/core/bitstreams/285dd834-945f-4964-8b7d-d2a4c5aab293/content>





Biosecurity measures in beekeeping (BMB): Europe

Biosecurity Measures for AFB and EFB

1. **Do not treat with antibiotics/antimicrobial**
2. **Renew 30%** of the combs of the brood chamber every year
3. **Monitor presence of AFB and EFB** during winter for early disease detection (cultural or biomolecular method)
4. **Have a fast intervention** on positive colonies (shook swarm or destruction)
5. **Keep young queens**
6. **Do not feed with honey** of uncertain origin



- ❖ There is a national bee biosecurity program code and program established by the Australian Honey Bee Industry Council (AHBIC) in consultations with beekeepers and government.
- ❖ They provide strict protocols for disease/pest prevention and management to increase productivity of Australian honey bee industry.
- ❖ They focus on **high priority exotic pests/diseases** that will have serious consequences for the Australian honey bee industry should they enter and become established in Australia, but also on **established pests/diseases** in the country



<chromeextension://efaidnbmnnnibpcajpcglclefindmkaj/https://beeaware.org.au/wp-content/uploads/2019/05/Biosecurity-Manual-for-Beekeepers.pdf>

Established pests	Exotic pests
American foulbrood	Varroa mites
Small hive beetle	Tropilaelaps mites
Asian honey bee	Tracheal mite
European foulbrood	Asian hornet
Wax moth	Africanised honey bee
Nosema	Cape honey bee
Sacbrood virus	Large hive beetle
Braula fly	Dwarf honey bee
Chalkbrood disease	Giant honey bee
Black queen cell virus	



- ❖ USDA provides research and guidelines for managing bee diseases and pests through various programs, including annual surveys funded by APHIS (USDA's Animal and Plant Health Inspection Service) to monitor honey bee health.
- ❖ The guidelines cover diagnostic laboratory techniques for identifying diseases, parasites, and pests affecting honey bees.
- ❖ Health regulations and practices are also informed by strict EPA (Environmental Protection Agency) regulations aimed at protecting managed bee colonies from pesticide misuse.



BMB in South Africa

- ❖ BMBs in South Africa are similar to global practices and involve operational activities aimed at preventing the entry and spread of pests and diseases that can harm honey bee colonies.
- ❖ These measures include monitoring for WOAHA notifiable pests and diseases, controlling beekeeper movements between hives, using disinfection strategies, quarantine protocols, and educating beekeepers about best practices to maintain healthy colonies.



WOAH contribution in BMB

- ❖ Global standards for bee disease management.
- ❖ Emphasis on antimicrobial resistance and responsible use.

Home » What we do » Animal Health and Welfare » **Animal Diseases**

Animal Diseases

This portal gives easy access to resources and information on both terrestrial and aquatic animal diseases.

WOAH defines "listed diseases" as a disease, **infection** or **infestation** listed in Chapter 1.3 of the *Terrestrial* and *Aquatic Codes* after adoption by the World Assembly of Delegates. **The list of aquatic animal diseases** and **the list terrestrial animal diseases** are selected based on the criteria detailed in the *Terrestrial Code* and the *Aquatic Code*. Consult the internal procedures for the decision to add (or remove) pathogenic agents of **terrestrial animals** or **aquatic animals** to (or from) WOAH's List.

This portal gives access to all listed diseases as well as other additional important diseases not listed by WOAH, including several emerging diseases and more than 50 wildlife diseases which may have a serious impact on global health and can adversely affect wildlife conservation.

207 diseases

 [Reset filters](#)

Type of Animal

Species ▾

Animals ▾

Type of disease

All ▾

 Search...

Any

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

<https://www.woah.org/en/what-we-do/animal-health-and-welfare/animal-diseases/>



Conclusions

- ❖ Biosecurity measures in beekeeping are vital for the health and productivity of African bees
- ❖ Encourage the adoption of biosecurity measures and training for beekeepers.
- ❖ Encourage sharing of experiences and practices among stakeholders to minimize risk of disease exposure at national, regional and international levels.
- ❖ Needs of regulations for their implementation.

Thank You



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