This information is a professional communication for the bee industry. The OAHN group is a dedicated group of specialists working in government, university, laboratory and beekeeping practice, who meet regularly to discuss bee disease and health issues. It is the intent of this program to monitor and protect the health of bees in Ontario.

Ontario Animal Health Network
Bee Expert Network
Industry / Producer Report

August 2016 Report #1

Highlights

- Small Hive Beetle Update
- New apiary import requirements requested by Eastern Canadian provinces
- American Foulbrood update from Dr. Durda Slavic
- American Foulbrood susceptibility testing
- Honey bee testing at the Animal Health Laboratory
- Updates to Canada's Antimicrobial Use Policy

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Introducing OAHN

The Ontario Animal Health Network, or OAHN (pronounced "Owen"), is a new, collaborative approach to animal disease surveillance in Ontario.

We've set up a Bee Expert Network – a group of specialists working in government, university, laboratory and in beekeeping practice. This group meets twice a year to monitor and discuss bee disease trends and health issues in Ontario.

Similar approaches have been used to deal with outbreaks and animal health emergencies in other commodities. It helped the Ontario swine industry limit the spread of porcine epidemic diarrhea and it was also used to help the sheep industry deal with the recent detection of Bluetongue in cattle in Ontario.

We want producers and industry to be involved as well. We'll be sending a summary of our semi-annual meetings with information relevant to producers. Check out our website at www.oahn.ca for more information on OAHN.

Small Hive Beetle Facts

The Small Hive Beetle (SHB), *Aethina tumida*, is a honey bee pest capable of damaging and stressing honey bee colonies in addition to causing honey spoilage. SHB adults are long lived (up to 6 months), can disperse by flying (up to 14 km), and have a great ability to reproduce. SHB can live independently from honey bees; however, they will actively seek out honey bee colonies for shelter, food and breeding areas. SHB has been shown to have less impact on honey bee colonies in colder climates, such as Ontario's, due to a shortened reproductive season. Also, a strong hive is capable of keeping beetle populations to a minimum. During honey extracting season, the honey hot room is the primary area which Ontario beekeepers need to be vigilant in managing in order to prevent SHB reproduction.

SHB in Ontario

In September 2010, SHB was reported in Essex County. This was the first ever confirmed case of SHB in Ontario. On March 7, 2011 a quarantine area was established for bees in Essex County and part of Chatham-Kent to mitigate the spread of SHB to other areas of the province. Since 2010, cases of SHB have been periodically identified both inside and outside the quarantine area. In the majority of cases, these SHB finds have been in counties adjacent to other jurisdictions with SHB (Michigan, New York and Quebec). In May 2015 OMAFRA had confirmed the presence of SHB in a single, small, non-commercial operation within the Niagara Region and by the fall of 2015, OMAFRA had identified a total of 25 SHB-positive apiaries within the region.

As the status and presence of SHB is evolving in Ontario, the province is transitioning from

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eradication to a management strategy. With input from members of the Ontario Beekeepers' Association's SHB Working Group, OMAFRA developed a Small Hive Beetle Management Strategy for 2016 with the following objectives:

1. Minimize the impact of SHB to beekeepers
2. Mitigate the spread of SHB in Ontario
3. Minimize disruption of economic activity for beekeepers and growers who require pollination services

More details on the Small Hive Beetle Management Strategy, including an interactive map which tracks the most recent spread of SHB, can be found on OMAFRA's website at: www.ontario.ca/beekeeping.

Industry Response

The Ontario Beekeepers' Association (OBA) has responded by developing and offering extension and outreach sessions to beekeepers across the province. As of June 6, 2016, the OBA has delivered 15 sessions which primarily focus on the following topics:

1. SHB biology
2. Reproductive capacity of SHB in Ontario's climate using examples from the OBA's field work within the Essex and Chatham-Kent quarantine area
3. Efficacy of the SHB control methods available for use within Ontario
4. Recommended SHB best management and biosecurity practices

New Apiary Import Requirements Requested by Eastern Canadian Provinces

The eastern provinces, specifically Québec (QC), New Brunswick (NB), Nova Scotia (NS) and Prince Edward Island (PEI), have implemented requirements for the 2016 beekeeping season that include enhanced pre-transport inspection of Ontario honey bee colonies for SHB. Beekeepers who plan on moving colonies to any of the eastern provinces should first contact their local apiary inspector or the Provincial Apiarist to ensure that the appropriate import requirements are being met. Apiary inspections will typically consist of brood nest and top bar inspections for a proportion of colonies within the bee yard. A list of apiary inspectors can be found on OMAFRA's website at www.ontario.ca/beekeeping.

Requirement	QC	NB	NS	PEI
Brood nest Inspections	10% of yard or 10 colonies minimum	10% of yard or 10 colonies minimum	10% of yard or 10 colonies minimum	10% of yard or 10 colonies minimum
Top bar Inspections	100% of colonies in yard	40% of colonies in yard	100% of colonies in yard	50% of colonies in yard
Inspections are valid for	30 days	30 days	10 days	30 days
Regional Restrictions	No bees from Quarantine Area or Niagara County	No bees from Quarantine Area	No bees from Quarantine Area	No bees from Quarantine Area

If ON operation is SHB-positive	No colonies accepted	Will accept colonies	Will accept colonies	Will accept colonies
If ON yard is SHB-positive	No colonies accepted	Will accept all colonies except those that were found to be SHB positive	No colonies accepted	No colonies accepted

American Foulbrood update from Dr. Durda Slavic*

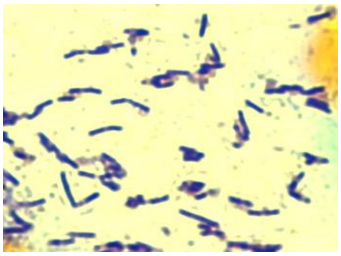

Fig. 1 Gram stain of *P. larvae*

American Foulbrood (AFB) is the most devastating bacterial disease that affects honey bee larvae. It is caused by *Paenibacillus larvae*, a gram-positive, rod-shaped bacterium (Fig. 1). *P. larvae* can also form spores which can be described as a 'resting stage' of the live bacteria. This resting stage is protected by a special envelope that is formed when living bacteria are exposed to harsh conditions including extreme heat and chemicals. The envelope provides protection against a variety of environmental conditions and ensures survival for a prolonged period of time (e.g., over 60 years). When spores encounter optimal living conditions, they can revert back into fully functional bacterial cells.

In the case of *P. larvae*, only spores can cause AFB and only in honey bee larvae, as the name of the disease suggests. Adult bees are not affected, but they play an important role in spreading the disease – they feed the spores to honey bee larvae in the early stages of their lives via contaminated larval food. It has been shown that larvae are most susceptible to infection within the first 12-36 hours after hatching. At that time, fewer than 10 spores are needed for AFB to develop. When they reach the larval midgut, the spores revert back to fully functional bacterial cells which produce enzymes resulting in degradation of the larvae into a semi-fluid, glue-like mass. This mass eventually dries out, forming AFB scales which are important for disease persistence because they contain billions of spores. This number of spores, together with spore resistance, makes control of AFB very difficult.

Genetic characterization of *P. larvae* isolates using the enterobacterial repetitive intergenic consensus (ERIC) method showed that there are 4 different types of *P. larvae*: ERIC I-IV. They differ primarily based on their ability to cause the disease (virulence) and their geographic distribution. ERIC III and ERIC IV isolates can cause AFB in honey bee larvae, but have not been isolated from field clinical cases in decades – these isolates can only be found in bacterial culture collections in certain laboratories. By contrast, ERIC I and ERIC II isolates are frequently isolated from clinical cases of AFB. ERIC I isolates are known to be spread worldwide, while it was thought that ERIC II isolates were present only in Europe. However, more recent study showed that these isolates are also present in Canada and New Zealand, indicating that ERIC II is wider spread than initially thought.

Aside from differences in geographic distribution, differences in the ability to cause the disease have been observed among different ERIC types. ERIC II to IV isolates kill honey bee larvae within 7 days of infection. Brood cells have not yet been capped at this stage, and up to 90% of the dead larvae are removed by nurse bees, resulting in fewer spores and slower spread of AFB within the colony. In contrast, ERIC I isolates are less virulent at the larval level and take up to 12 days to kill infected larvae. Most of the infected larvae are capped at that time, resulting in a lower removal rate (approximately 60%) of dead larvae by nurse bees, resulting in the presence of more spores and rapid within-colony spread of

AFB.

*A more detailed AFB update from Dr. Slavic is featured in the July/August 2016 edition of the Ontario Bee Journal.

AFB is a notifiable disease in Canada, meaning that its presence must be reported to the Canadian Food Inspection Agency (CFIA) which in turn reports annually the number of cases to the World Organization for Animal Health (OIE). Any sign or suspicion of AFB must be reported to a local apiary inspector or the provincial apiarist at the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). For more information on AFB detection and a description of clinical signs, please visit the OMAFRA website at www.ontario.ca/beekeeping.

Dr. Slavic is a veterinary bacteriologist in the Animal Health Laboratory, with over 11 years of experience in diagnostic bacteriology. She has a wide range of expertise in bacterial culture, susceptibility testing, and molecular test development. She is an associate faculty within the Department of Pathobiology and Department of Population Medicine and has served as an advisory committee member for 5 graduate students. Dr. Slavic has collaborated with numerous University of Guelph faculty members on a variety of projects that resulted in over 30 peer-reviewed publications. More recently, her lab established a method for *Paenibacillus larvae* isolation from clinical samples and is currently working on developing a susceptibility testing system for this organism.

American Foulbrood susceptibility testing

In November 2015, OMAFRA's Apiary Inspection Program submitted 90 samples of AFB to the U.S. Department of Agriculture (USDA) for susceptibility testing. The samples were collected from AFB-positive apiaries within Ontario between 2012 and 2015. All samples were cultured and tested for sensitivity to Oxytetracycline and Tylosin, both of which are antibiotics registered for use in Ontario. Oxytetracycline is the most commonly used antibiotic in Ontario for the control of AFB. The testing was conducted using a disc diffusion assay. Results showed that all AFB samples were found to be susceptible to both antibiotics. To date, there have been no documented cases of antibiotic-resistant AFB within Ontario.

Honey bee testing at the Animal Health Laboratory (AHL)

The Animal Health Laboratory at the University of Guelph now offers quantitative detection of honey bee (*Apis mellifera*) pathogens as a diagnostic service. The test results can be used to identify the presence of pathogen infections, and to assist distinction between low-grade latent infection and high-level infection that can lead to disease and declines in honey bee health.

Tests offered at the AHL include the diagnosis and quantification of acute bee paralysis virus (ABPV), black queen cell virus (BQCV), chronic bee paralysis virus (CBPV), deformed wing virus (DWV), Israeli acute paralysis virus (IAPV), Kashmir bee virus (KBV) and sacbrood bee virus (SBV), *Nosema apis* and *N. ceranae*, and detection for *Tropilaelaps spp*. The AHL also offer microscopy examination of trachael mites (*Acarapis woodi*), in addition to tests to confirm the presence of Varroa mite (*Varroa destructor*) and Small Hive Beetle (*Aethina tumida*) through molecular analysis. American foulbrood (*Paenibacillus larvae)* and European foulbrood (*Melissocus pluton*) can be cultured, isolated and tested for antimicrobial resistance.

For research project sample testing please contact AHL:
Email: ahlinfo@uoguelph.ca
Tel: 519-824-4120 ext. 54530

Updates to Canada's Antimicrobial Use Policy:

As part of a growing effort to address antibiotic resistance, the World Health Organization for Animal Health has committed to a strategy to change how antimicrobials are used in animals. As antibiotics are also used to address honey bee diseases (Oxytetracycline and Tylosin for both American Foulbrood and European Foulbrood) the apiary sector will also be included in changes to be implemented in Canada and the USA. In Canada, the federal government is leading this initiative through Health Canada. Each of the provinces may have specialists and working groups engaged. In addition, professional associations (such as the Canadian Association of Professional Apiculturists) and industry associations (Canadian Honey Council, Ontario Beekeepers Association) are able to comment on the upcoming proposed strategies in honey bees. Some of the approaches being proposed may include:

- Requiring a prescription by a veterinarian for a beekeepers to access antibiotics for honey bees
- Facilitation of low risk veterinarian natural health products for animals as additional tools for maintenance of health and welfare of animals
- Eliminating over the counter sales of antibiotics

The ultimate goals are to reduce the usage of antibiotics, ensure proper usage and minimize the development of resistance in animal production systems. These goals will be achieved through improved measures selected through the consultation process involving associations and specialists.

There will be a comment period for beekeepers (individual and through associations) to address any of the proposed strategies highlighted in the release of the Federal Regulatory Proposal Gazette (estimated to be released summer 2016).

For more information:
http://healthycanadians.gc.ca/health-system-systeme-sante/consultations/veterinary-drugs-antimicrobial-resistance-antimicrobiens-medicaments-veterinaires/index-eng.php