Honey Bee Surveillance Programme; incidence of American and European foulbrood in 2020

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Foulbrood is a notifiable disease in honey bees. Two different types of foulbrood exist, American foulbrood (AFB) and European foulbrood (EFB). Both species are endemic and are highly contagious, yet display very different clinical symptoms in the honey bee colony and attack the developing larvae at different stages of development. This makes the identification of the disease difficult in the field especially at early stages of infection, however good knowledge of the clinical symptoms associated with both diseases, monitoring the health of the brood in the colony as part of any routine weekly or fortnightly inspections of the colony during the active season together with good biosecurity measures and hygienic beekeeping methods, will all help in the control of foulbrood.

The Honey Bee Health Surveillance Programme, co-ordinated by Department of Agriculture, Food and the Marine provides an additional support to beekeepers. DAFM recommend all samples suspected of showing clinical symptoms of foulbrood or diagnosed by the individual beekeeper using any field tests methods (Vita lateral flow device or matchstick test) should be submitted to the Honey Bee Surveillance Programme for confirmation. The routine submission of samples randomly sampled is also recommended as a means to monitoring the prevalence of foulbrood in the honeybee population. Since 2017, this bee disease diagnostic service is **FREE** to beekeepers, yet it remains an under-used service by beekeepers.

American Foulbrood (AFB)

This is caused by the spore forming bacterium, *Paenbacillus larvae*. The spores are highly resistant to both high temperatures and chemicals and can remain viable for many years even in old equipment in the absence of bees. However, once bees are re-introduced and larva become available, nurse bees transfer spores to the developing larva in the larval food, the bacteria subsequently germinates and reproduces killing the larva and consuming its body tissues completely. This occurs only after the larval cell is sealed; hence clinical symptoms associated with AFB are associated with **sealed brood**:

Typical symptoms include:

- Pepper pot brood pattern
- Sunken, moist capping
- Perforated cell capping
- Ropey larva remains (matchstick test)
- Dry scale

European Foulbrood (EFB)

EFB is caused by a non-spore forming bacterium, *Melissococcus plutonius*. Similar to AFB, nurse bees accidently transfer the bacterium to the developing larva in contaminated larval food. The bacteria multiply in the gut, but do not invade the larval tissue. Instead it eats the larval food and the developing larva starves to death. This generally occurs just before the cell is sealed hence clinical symptoms associated with EFB are apparent at the **unsealed brood stage**, but clinical symptoms may disappear when food is in plenty of supply. Clinical symptoms associated with EFB include

- Poor brood pattern
- Twisted/flaccid larvae
- Discoloured larvae
- Unpleasant smell

2020 Honey Bee Health Surveillance Programme Results for AFB and EFB

Figure 1: *Results from the brood comb samples analysed as part of the Honey bee Health Surveillance programme in 2020.*

Both AFB and EFB are endemic in Ireland and can be easily spread between colonies within an apiary and between apiaries both by the beekeeper and by the bees themselves. Figure 1 shows the incidence of AFB and EFB confirmed by the Honey Bee Health Surveillance Programme in 2020. It should be noted that this data does not reflect the prevalence of, AFB and EFB in Ireland but instead shows the incidence of disease in the samples received. In 2020, a total of 375 samples were submitted to the Honey Bee Health Surveillance Programme, of which 146 were brood comb samples. This relatively small cohort of samples was received from 82 beekeepers, indicating a number of beekeepers submitted multiple samples. A total of 23 positive (figure 1: red dots) cases of AFB were confirmed which constitutes 13 outbreaks when multiple samples from a single apiary are considered. One outbreak of EFB was also confirmed in 2020 (Figure 1: yellow dot), however this result should be treated with caution as the majority of brood comb samples received were sealed brood samples while the required sample type for a reliable EFB test is unsealed brood. A total of 6 samples could not be tested (Figure 1: green dots) as samples were far too small or were full of honey stores or pollen stores. To assist beekeepers, The Honey Bee Surveillance Programme has produced a document which describes when and how to submit samples can be readily viewed or downloaded as a pdf at https://www.gov.ie/en/publication/9e1ff-beekeeping-honey/#bee-health.

In addition to AFB and EFB numerous pest and pathogens can co-exist in a colony and can spread readily between colonies within an apiary and between apiaries. To minimise this problem and subsequently maintain healthier stocks, beekeepers need to remain vigilant, examine colonies regularly for clinical symptoms of disease and submit samples regularly to the Honey Bee Health Surveillance Programme.