

## Bee Diseases

### American Foul Brood (AFB)

(This is a currently notifiable disease)

American foulbrood (AFB) is a serious, contagious notifiable bacterial disease of honeybee brood. The cause of AFB disease is a virulent spore-forming bacterium, *Paenibacillus larvae* var. *larvae*. AFB Spores can remain dormant for many years on hive and beekeeping equipment and in honey or wax. AFB can appear and spread quickly through a honeybee colony and if left untreated may result in the death of the colony in a short space of time.

**Note:** It is this ability of the bacillus to spore that makes the AFB disease so resistant to disinfection. Any suspected incidence must be reported without delay.

#### Recognition:



In infected hives there is noticeable irregularity (or pepperpot appearance) in the brood pattern. Cappings over the dead brood are generally darker and tend to be sunken, greasy looking and perforated on the side.

The infected larvae die within the sealed cell and the appearance of the cell changes. The cappings become sunken. They may be perforated if the adult bees nibble holes in them. These holes tend to be ragged. The cells may be moist, greasy or very dark. At this stage the dead larval remains are various shades of brown and have a sticky/slimy consistency. At this stage if a matchstick is inserted into the cell a mucus like 'rope' can be drawn out. This is 'The Ropiness test'.

The larvae then start to dry becoming a darker brown and finally end up as a very dark brown rough scale attached to the cell wall. This makes them difficult for the bees to remove and keeps the infection in the cell. Scales can be detected by holding the comb so that they are facing the light which gets reflected from their rough surface.

Pepperpot Brood pattern in the early stages, only a few cells will be affected but eventually it will spread throughout causing a 'pepper-pot' brood pattern.

#### Life Cycle

Infection of the larva is by ingestion of the spores in contaminated brood food. Germination of the spores in the adult bee is prevented by the bactericidal effect of 10-hydroxydecenoic acid (10-HDA) from the worker bees mandibular glands.

Once in the larval gut however the conditions are ideal for germination and the bacterial population doubles about every 8 hours. When the honeybee larva voids the contents of its gut prior to metamorphosis sporulation begins and the cell contents become a source of further infection. The bacteria continue to multiply in the haemolymph and this leads to the death of the larva. Once larval death has occurred the bacteria again sporulate within the body. Adult bees cleaning away dead remains in the hive become infected.

AFB bacteria gradually destroys larval tissue. The image on the left shows honeybee larvae in various stages of AFB bacterial tissue damage.

## Vectors

American Foul Brood bacteria can exist in beekeeping equipment, honey, wax, dead brood and will spread quickly during normal hive / colony manipulations.

- Beekeepers - Transferring contaminated equipment / material between hives, colonies and apiary sites.
- Robbing - Colonies weakened by AFB will fall prey to robbing, transferring spores to other colonies and apiaries.
- Drifting - As with Robbing will transfer spores to other colonies.
- Swarming - Swarms can carry the spores with them to new sites where the disease will spread once new brood is produced.

**Note: beekeepers are the principal and most rapid means of spreading American Foul Brood disease. Effects on Apis mellifera colonies**

Colonies infested with AFB will show visible signs of its presence in the hive. The ability of the bacillus to spore makes the AFB disease resistant to disinfection. Any suspected incidence must be reported without delay. Colonies infected with AFB will ultimately be destroyed, remaining bees from an infected colonies will drift and abscond to other sites further spreading the disease.

**Note: AFB is a notifiable disease under UK Law, suspected incidence must be reported without delay.**

## How to Manage American Foul Brood

All colonies in the UK are at risk of contracting foul brood diseases. If disease occurs but is not detected and controlled the infection will spread rapidly through not just your apiary but also those of neighbouring beekeepers. Early detection and intervention is necessary to contain and avoid further spread of this disease.

Please obtain an up to date copy of the CSL 'Foul brood diseases of honey bees' booklet by visiting the DEFRA website or downloading direct from the EMBA website.

### Detection

**Hive Examination** - Close examination of brood frames in spring and autumn is required to detect AFB. Bees should be gently shaken from the frames to allow full inspection, abnormalities are then easily spotted.

**Checking Brood Pattern and Condition** - Carefully examine the whole frame by holding it to the light and checking both sealed and unsealed brood for abnormalities such as unusual brood patterns, discoloured larvae, perforated cappings, or AFB scales on the cell walls (completely dried out larvae).

**Uncapping Brood** - Open any cells with abnormal looking cappings and check the consistency of any dead remains by probing with a matchstick. Dispose of the matchstick into the lit smoker, do not discard it as it will be infected.

## Monitoring

Vigilance is important with all honeybee diseases. Check all apiaries and colonies regularly for health and suspect any colonies that are not thriving where there is no already known reason. Colonies that die out should be examined thoroughly and sealed to prevent robbing and spread of any disease present.

## Controls

AFB and EFB (European Foul Brood) are present in the UK and are notifiable under the Bee Diseases Control Order 1982. Due to their destructive nature prompt action is the only means of control. Beekeepers must notify the authorities immediately of any suspected incidence. Colonies found to be infected are destroyed by burning under the supervision of a bee inspector. Bees and combs are both destroyed, however hives and appliances can be sterilised for re-use by scorching and other equipment such as gloves, overalls, boots and smoker by washing with hot water.

**Note: Presently there are no effective medical treatments for AFB or EFB**

- Apiary Housekeeping:
- Always maintain a high level of hygiene in all your beekeeping practices
- Carry out methodical health inspections on a regular basis, checking for brood disease particularly in spring and autumn.
- Never transfer combs between colonies without checking for brood diseases
- Systematically replace old brood combs in your hives melting down the old comb to maintain clean and healthy brood.
- Never bring colonies or equipment into your apiary without establishing their origin, condition, and disease status.
- Sterilise any secondhand equipment or hive components before introducing them into your apiary
- Discourage drifting and robbing in the apiary
- Suspect stray swarm health until you know otherwise
- Report any incidence of disease or suspicious conditions immediately to your local association

## AFB / EFB Suspected?

Scottish Beekeepers suspecting AFB or EFB in their apiaries must immediately contact their Scottish Executive Bee Officer at their local Scottish Executive Environment and Rural Affairs Department (look up SEERAD in the phone book).

Environment and Rural Affairs Department  
Scottish Executive  
Room 440  
Pentland House  
47 Robb's Loan  
EDINBURGH  
EH14 1TY

Email: ceu@scotland.gsi.gov.uk  
Telephone: 0131 556 8400  
Fax: 0131 244 6116

Beekeepers south of the border in England and Wales should contact the Central Science Laboratory National Bee Unit.

National Bee Unit Office  
Central Science Laboratory  
Sand Hutton  
York  
YO41 1LZ

Email: nbu@csl.gov.uk  
Telephone: +44(0)1904 462510  
Fax: +44(0)1904 462240

Samples are taken from hives that are suspect for analysis and a Standstill Notice issued on the apiary prohibiting removal of bees and equipment. If tests are positive an officer will return to carry out the necessary disease control measures.

**Remember - you are required by law to report foul brood diseases.**