American Foul Brood (AFB)

AFB is caused by a spore forming bacterium called *Paenibacillus larvae*. These spores are the infective stage of the disease and infection begins when food contaminated with spores are fed to larvae by the nurse bees. Once in the gut of the larva the spores germinate, bacteria move into the larval tissues, where they multiply enormously. Infected larvae normally die after the cell is sealed and millions of infective spores form in their remains. Spores are very resistant to extremes of heat and cold, and to many disinfectants and remain viable for many years.

Symptoms of AFB

The characteristic disease signs of AFB include some or all of the following:

- Uneven or 'Pepper-pot' brood pattern
- Sunken, greasy or perforated, darkened cell cappings
- Roping, sticky larval remains when drawn out with a matchstick
- Dark "scales", which are difficult to remove from cells

Spread

The most common method of transmission from infected hive to healthy hive is the beekeeper. The spores can easily transferred, if frames of honey or brood are moved between hives, or if other contaminated equipment is used. However, robbing by adult bees of dead or dying infected colonies is also an important mode of transmission. If left to run its course, all colonies infected with AFB will eventually die from the disease.

Control

The control method for AFB is simple in the UK: all infected colonies are compulsorily destroyed. The first stage is to destroy the adult bees and brood combs by burning, then the hives and any appliances are sterilised by scorching with a blow lamp or for polystyrene hives using a sterilising solution.

European Foul Brood (EFB)

EFB is caused by the bacterium *Melissococcus plutonius*. Larvae become infected by consuming contaminated food fed by the nurse bees. The bacteria multiply within the larval gut, competing with it for its food. They remain in the gut and do not invade larval tissue; larvae that die from the disease do so because they have been starved of food. This normally occurs shortly before the cells are capped.

Symptoms of EFB

An infected colony may show some or all of the signs below:

- Erratic or uneven brood pattern
- Twisted larvae with creamy-white guts visible through the body wall
- Melted down, yellowy white larvae
- An unpleasant sour odour
- Loosely-attached brown scales

Unlike AFB, the remains of larvae that die from EFB do not rope when drawn out with a matchstick.

Spread

As with AFB the beekeeper is the primary method of transmission, if brood combs other items are transferred from an infected hive to a healthy hive. However, robbing of weakened infected colonies and swarms are also methods by which the disease can be transmitted.

Control

There are three options available to the beekeeper in the UK who has colonies infected with EFB;

1. The colonies may be treated with the shook swarm husbandry method
2. The colonies may be treated with the antibiotic oxytetracycline (as the formulation Terramycin®).
3. The colonies may be destroyed, as for AFB. This will be carried out if the colony is too small for other treatment methods, is too heavily infected to respond to treatment, or at the beekeepers request.

However, the range of options available will also depend upon the time of year that the disease is diagnosed and other factors such as the strength of the colony or the level of infection. Should EFB be diagnosed in your bees, these options will be fully explained to you by your local Appointed Bee Inspector (ABI) to allow the best course of action to be taken.

Inspecting for foul brood diseases.

- Dedicate an inspection just to looking for signs of disease.
- Shake the bees off frames of brood and examine the unsealed and sealed brood methodically.
- Become familiar with healthy brood and look for any unusual cells.

Check your observations against those in the table below.

Observation – Depending on the development of the infection not all of these may be present.	**Suspect**		**Note**
	AFB	**EFB**	
Affects sealed brood.	Y		***A***FB affects brood ***A***fter cell sealed.
Wax cappings perforated	Y		Adult bees nibble holes to try to remove infected larva within. But can also be seen because of varroa damage.
Wax cappings sunken	Y		
Some cappings moist or greasy and darker than other cells.	Y		
Patchy or 'pepperpot' brood pattern.	Y		
Unpleasant smell.	Y		
Dead larval remains are light to dark brown in colour, slimy consistency.	Y		
Very dark brown larval remain, rather rough scale lying on lower side of cell extending from just behind the mouth of the cell back to the base.	Y		
If matchstick inserted and slowly withdrawn, the remains can be drawn out in a brown mucus-like thread for 20 mm or so.	Y		
Affects mainly unsealed brood, killing larvae before they are sealed in their cells.		Y	***E***FB affects ***E***arly in brood development
Dead larva often collapses as through it had been melted, turning yellowish-brown eventually drying to form a loosely attached brown scale.		Y	
Gut on an infected larva may be visible through its translucent cell wall.		Y	
Infected larva has a creamy white colour.		Y	Caused by mass of bacteria living in the infected larva.
May be unpleasant odour.		Y	

Precautions to take if you suspect foul brood in a hive

- Close the hive.
- Reduce the hive entrance to prevent robbing.
- Disinfect your beekeeping equipment and gloves before examining other colonies, or if you use disposable gloves, select a new pair.
- Either;
  - Contact the NBU immediately*. An inspector will contact you as soon as possible and arrange a visit to your apiaries if necessary.
    * Seasonal Bee Inspector:- *Ceri Morgan ceri.morgan@fera.gsi.gov.uk, Tel No: 01239 612078, Mobile No: 07775 119486*
    * Regional Bee Inspector:- *Francis Gellatly francis.gellatly@fera.gsi.gov.uk, Tel No: 01558 650588, Mobile No: 07775 119480*
- Do not remove any hives, bees or equipment from the site until the disease (if confirmed) has been controlled. This is a self imposed 'Standstill' which is a requirement under the legislation.