

Pests and diseases of honey bees

May 2019, Primefact 1681, First edition

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The major threats

Bee brood diseases that are established (endemic) or exotic, exotic mites (exotic meaning not known to exist in Australia) and the parasite braula fly are some of the main threats to the commercial beekeeping industry in New South Wales.

Prompt identification of these pests and diseases is therefore vital to limiting the economic impact on hives.

This guide aims to give beekeepers the knowledge to make a quick assessment of the presence of pests and diseases.

As well as the symptoms of each pest or disease, this guide also advises on the type of sample required to confirm identification. These include larval smears, adult bees, comb sampling and pest samples.

Honey samples can also be tested for American foulbrood disease (AFB) spores to indicate the level of infection within an apiary. Collect at least 200 grams of honey from bulk storage containers. Samples can be sent to the diagnostic laboratory listed at the end of this guide.

The suspected presence of any of the exotic pests should be reported to NSW DPI immediately on the **Exotic Disease Hotline – 1800 084 881**.

Other pests and diseases

These may include:

Disease	Sampling method
Nosema	30+ adult bees (fresh)

Pests	Sampling method
Tracheal mite (exotic)	30+ adult bees (fresh or stored in alcohol)
Wax moth	Adult moth or mature moth larvae
Any unknowns	Contact apiary officer immediately

Wax moth is particularly a problem of stored equipment. Wax moth and small hive beetle larvae look similar but wax moth larvae produce silky webbing.

Healthy brood – larval stage

Healthy larvae are pearly white, glistening and positioned in the centre of the cell.



Figure 1: Healthy honey bee larvae

Sealed stage

In healthy brood the caps on the brood are convex (they bulge outward slightly).

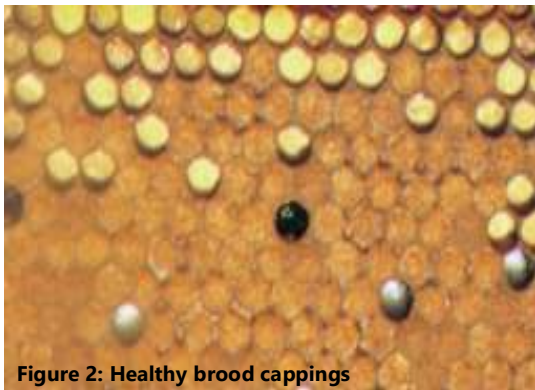


Figure 2: Healthy brood cappings

Figure 3 shows the appearance of diseased brood typical of American or European foulbrood infection.

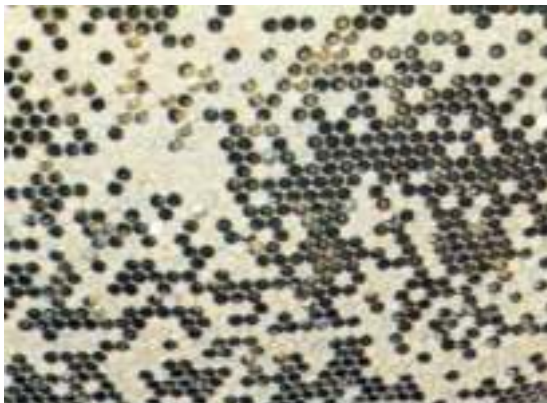


Figure 3: Unhealthy brood with a foulbrood infection

Note: Be careful when checking the age of affected larvae. Bees can uncap diseased sealed brood, giving the impression that only the unsealed brood is affected.

European Foulbrood (endemic)

The larvae turn yellowish and assume unnatural positions in the cell. The four large white larvae in Figure 4 are healthy. Two smaller larvae are showing early signs of discolouration. Empty cells are characteristic of this disease.

Age of brood affected. Commonly brood of 3–5 days. Occasionally sealed brood.

Cell position of diseased brood. Twisted, in a 'C' position. Occasionally stretched out on cell wall.

Colour of diseased brood. Yellow-brown.

Ropiness of moist material. Sometimes ropes (like American foulbrood) due to secondary infections but mostly with a lumpy or granular appearance.

Smell. Strong sour smell.

Scale characteristics. Dead larvae develop into loose scales in the cell.

What should be sent for diagnosis.

Comb sample containing, or larval smear slide made from, suspect brood.



Figure 4: Two discoloured larvae with European foulbrood infection, unhealthy brood pattern

American Foulbrood (endemic)

The caps on the sealed brood may be sunken and/or perforated. In a number of the cells, black scales (dead, dried up pupae) can be seen on the lower 'V'. Sometimes the tongue of a diseased pupa is attached to the top of the cell.

Age of brood affected. Brood of 7–10 days from late larval to pupal stages.

Cell position of diseased brood. Bottom of cells along bottom 'V'.

Colour of diseased brood. Brown-black.

Ropiness of moist material. Ropy to smooth.



Figure 5: American foulbrood infected pupae on matchstick

Smell. Distinct odour.

Scale characteristics. Scales stick to cell walls firmly as in Figure 6.



Figure 6: Advanced American foulbrood infection, dead pupae form "scale" at cell base

What should be sent for diagnosis.

Comb sample containing, or larval smear slide made from, suspect brood.

Chalkbrood (endemic)

Dead brood can be covered with a fluffy downy coating. The dead brood dried out, shrinks, and becomes brittle and chalky.

Age of brood affected. Both sealed and unsealed brood, larvae and pupae.

Cell position of diseased brood. Early stages: fluffy and swollen to full dimensions of the cell.

Colour of diseased brood. Generally white, but can be grey-black.

Ropiness of moist material. Nil.

Scale characteristics. Loose; dead, dried out larvae rattle when shaken.

What you should send for diagnosis.

Dead larvae or comb containing suspect brood as in Figure 7.



Figure 7: Open cells with larvae showing different stages of chalkbrood infection

Sacbrood (endemic)

The diseased larvae bloat and form a gondola/banana shape that may be slightly darker towards the head.



Figure 8: Sacbrood infected larvae

Age of brood affected. Sealed brood of 7–10 days and pupae.

Cell position of diseased brood. On the bottom, or occasionally sides of cells; gondola/banana shaped as in Figure 8.

Colour of diseased brood. Yellow to grey-brown to black.

Ropiness of moist material. Nil.

Scale characteristics. Loose in the cell.

What you should send for diagnosis. Diagnostic service for this disease currently not available.

Small Hive Beetle (endemic)

The Small Hive Beetle (*Aethina tumida*) prefers warm to hot, humid conditions. The adults are broad, flattened beetles about 5–7 mm long and dark brown to nearly black as in Figure 9.



Figure 9: Small hive beetle adult.

Larvae are elongate white grubs found within the colony. Pupae are white to brown and develop in the soil. From egg to adult takes 38–81 days with five generations a year.

Adults and larvae inhabit hives where they feed on combs containing honey, pollen and brood. The adult beetles cause little damage to the hive, however the larvae kill brood and cause honey to ferment. This can result in bees abandoning their hives. Larvae are mainly active over the summer

months. Small hive beetle is also a pest of stored equipment.

What you should send for diagnosis. Mature larvae or adult beetles in sealed container.

Braula Fly (exotic except Tasmania)

Braula coeca is a wingless fly 1–5 mm long that can be seen with the naked eye. They are red and have 6 legs. They tend to collect mostly on the queen bee.



Figure 10: Two Braula flies on a worker honey bee thoracic segment.

The wingless flies attach themselves to the hairs of the honeybee's body. The female lays her eggs under the cappings of honey comb. The eggs hatch into larvae and as the larvae feed they form tunnels, damaging the honey comb. Larvae pupate, emerging as adults after 3 weeks.

Braula do little damage, although they may affect queen bee performance. They only occur in Tasmania.

Braula fly is also called 'bee louse'.

What you should send for diagnosis. Adult flies, as shown in Figure 10, in a sealed container.

Varroa Mites (exotic)

Varroa mite feeds on adult and developing bee larvae and reproduces under capped cells of pupating honey bee stages. Mites can deform developing bees or kill them outright when multiple mites reproduce in a single cell.

The Varroa mite adults are an oval shape. Adult females are reddish-brown in colour and are 1.1 mm long and 1.7 mm broad. They are visible to the eye.

Varroa is a major pest throughout most of the world, with Australia being the last major beekeeping country to be free of the pest.

Note Varroa mite on worker pupae abdomen in Figure 11 below.



Figure 11: Varroa mite adult on the abdomen of a worker honey bee pupa.

Adult workers and drone bees are the main method of transferring mites between bees and hives. This occurs when the bees touch each other or drift to other hives.

Age of brood affected. Brood just prior to capping and during pupation.

Cell position of diseased brood. Normal.

Diseased brood. Reddish-brown mites can be seen.

Ropiness of moist material. Nil

Characteristics. Deformed bees, presence of mites.

What you should send for diagnosis.

Bee brood sample containing mites or 30+ adult bees in a sealed container.

Note, the adult Varroa mite on the drone honey bee thorax in Figure 12 below.



Figure 12: Adult honey bee drone with one adult Varroa mite at the base of its thoracic segment

Parasitic Mite Syndrome

Parasitic mite syndrome describes the brood symptoms that occur with high varroa levels. Symptoms are similar to American foulbrood with chewed / sunken brood cappings in a spotty brood pattern.



Figure 13: Three sunken larvae exhibiting parasitic mite syndrome. Note an adult varroa mite in each cell

Larvae can be in varied positions within the cell and often have Varroa feeding on them as in Figure 13. Unlike AFB, larvae are white or yellow in colour (not brown), will not 'rope out', and dry scales can easily be removed from the cells.

Tropilaelaps Mite (exotic)

Reddish-brown Tropilaelaps mite adults are approximately 1 mm long. Mites feed on developing pupa and lay eggs in

capped brood cells. Mites deform developing bees or kill them outright when multiple mites reproduce in a single cell. They move very fast on comb and bees.

Age of brood affected. Late larval or pupal stage; some brood develops into deformed adult bees.

Diseased brood. Reddish-brown mites can be seen.

Ropiness of moist material. Nil



Photo credit I.B. Smith, USDA-ARS

Figure 14: *Tropilaelaps* mite adult on left and *Varroa* mite adult on right

Characteristics. Deformed bees.

What you should send for diagnosis.

Bee brood sample containing mites or 30+ adult bees in a sealed container.

Laboratory contacts:

Contact phone number for diagnostic laboratory:

Elizabeth Macarthur Agricultural Institute (EMAI)

P: Customer service: 1800 675 623

E: laboratory.services@dpi.nsw.gov.au

International: +61 2 4640 6333

Postal address

Private Bag 4008, Narellan NSW 2567

Delivery address

Woodbridge Road, Menangle NSW 2568

Please obtain and fully complete a laboratory submission form to go with any submitted samples. Forms can be found on the NSW DPI internet site at:

https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/834250/ema-bee-disease-diagnostics-form-2018.pdf or contact your local NSW DPI office.

Further information

For further information contact your nearest NSW Department of Primary Industries office or the honey bee website at <http://www.dpi.nsw.gov.au/animals-and-livestock/bees>

Reference number PUB19/118

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