



Scottish Government  
Riaghaltas na h-Alba



SRUC

NON-NOTIFIABLE PESTS  
AND DISEASES

## BEEKEEPING MODULES

These presentations are funded by the Scottish Government as part of Scotland's Honey Bee Health Strategy  
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This presentation is part of a suite developed by the Scottish Government and SRUC to provide local associations advice and information on statutory beekeeping requirements, best practice, and how the Scottish Government provides support to Scottish beekeepers.



## Aims of Module

- ▶ To provide information about non-notifiable diseases and pests

This module aims to look at non-notifiable diseases, some of which will have little impact on the colony such as chalkbrood to ones such as nosema which can be more serious. We will also look at the non-notifiable pests such as Wax Moth and Acarine. Non notifiable means these pests are not controlled by legislation so there are no legal requirements to report or control them. For advice, please contact the SRUC Bee Advisor



## Non-notifiable diseases

- ▀ Chalkbrood
- ▀ Sacbrood
- ▀ Nosema apis and N. ceranae
- ▀ Chronic Bee Paralysis Virus

Here we will be looking at the most common pests and diseases you may find in Scotland. The main non-notifiable diseases include: Chalkbrood, Sacbrood, Chronic Bee Paralysis and Nosema



## Non-notifiable pests

- Acarine
- Wax Moth
- Braula

Acarine mites are rarely seen these days due to the use of varroacides. Wax moth can be an issue if used frames are not stored correctly. Braula can be found in areas with no varroa again due to the uses of miticides.

## Key Preventative Measures

Strong colonies

Healthy brood

Plenty of food

Good Varroa control

Fertile young queens

Disease checks

Plenty of space

Good biosecurity

Spaced out Apiary

Measures to prevent disease include having strong colonies with plentiful brood. This can help to keep disease at bay, particularly if the bees show hygienic behaviours. Anything that increases stress on a colony leaves it more susceptible to pests and diseases. This includes starvation, so ensuring your bees have enough food is essential to bee health. This means feeding sugar syrup and pollen if required. If you do not monitor for varroa you may not be aware of the level of infestation your colony has, and a high varroa load is detrimental to the colony health. Diseases can thrive in these circumstances. Young fertile queens laying lots of eggs will help keep the colony strong, unlike an old queen which may begin to lay less. Colonies headed by older queens can have more chalkbrood. It is important to monitor regularly for diseases so you can take action if needed. Good biosecurity ensures you are not spreading disease or

pests between hives and having the hives well-spaced out will reduce drifting.

Ensuring the bees have plenty of space during the summer will reduce swarming, and also the spread of diseases such as CBPV.

## Chalkbrood

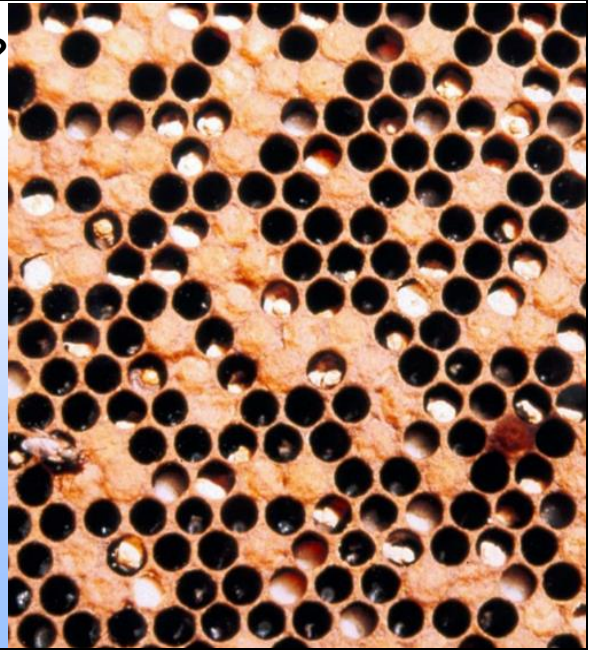


Do you recognize this?

Chalkbrood is fairly common in Scotland and strong hives can deal with it without it becoming a major problem. The first picture shows the chalkbrood in the cells. The picture on the right shows the black and white chalkbrood mummies that have been removed by the bees.

## Chalkbrood – What Is It?

- Chalkbrood disease is caused by the fungus *Ascospaera apis*.
- Chalkbrood disease is not usually a serious disease.
- Chalkbrood disease is common in the spring when temperatures are cooler, the brood is rapidly expanding, and the smaller honey bee workforce cannot maintain brood nest temperature.



Chalkbrood is a fungal disease. When ingested by the larva it penetrates the gut wall to absorb nutrients. As the spores germinate and multiply, the larva eventually dies of starvation. Cool humid weather can make it worse.

## Symptoms Of Chalkbrood



- Spores germinate in gut and absorb nutrients from larvae, causing starvation
- Spores stick to cells
- Larvae swells and hardens after a few days
- Problem for smaller colonies or those under stress (for example suffering heavy varroa infestations)

The larva and fungus swells and fills the brood cell where it will eventually harden to its distinctive 'mummified' appearance. It looks like mottled white and black colour, and each chalkbrood mummy will produce millions of infective spores which stick to the cells, hive components and adult bees.

Higher levels of chalkbrood can be associated with the presence of EFB, so it's important to carry out a full disease inspection in this case

## Treatment

- Colonies which are susceptible can be re-queened
- Avoid damp apiary sites
- Good ventilation
- Bailey comb exchange or shook swarm may help



Chalkbrood is not usually a serious disease among strong healthy colonies. Possible solutions include reducing the size of the brood nest for example by transferring to a nuc or by using dummy boards. Requeening sometimes helps as does re-siting or changing comb.

## Sacbrood



Do you recognise this? This is Sacbrood.

## Sacbrood – What Is It?

- Sacbrood is a viral infection of the brood
- It is caused by the **Iflavirus** genus
- Larva fails to pupate after being sealed in its cell.
- It does not usually cause colony loss



It is a relatively common disease during the first half of the brood-rearing season and can often go unnoticed, affecting only a small percentage of the brood. You can see a gondola-shaped larvae protruding from cells. Larvae that have become infected with Sacbrood Virus fail to pupate and die just after capping.

## Symptoms

- The infected larva turns from its usual pearly white to a pale-yellow colour
- The larva will die and begin to dry out, turning a dark brown to black colour
- The skin of the dead larva also changes into a tough plastic-like sac, which is filled with fluid
- The workers will uncap creating an uneven brood pattern
- Discoloured, sunken or perforated cappings scattered through the brood

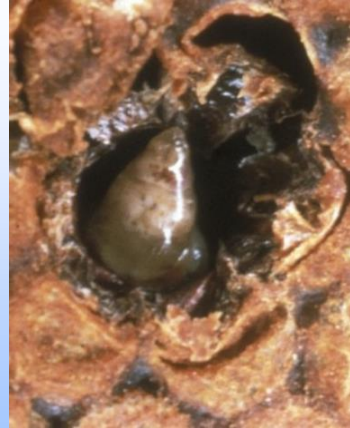


The virus particles replicate in the developing larva, which appear to develop normally until after being capped over. Larvae which have died of sacbrood are described as resembling 'chinese slippers' or 'gondola shaped'. Sacbrood can also cause a scattered brood pattern and can be mistaken for foubrood.

However, if the sac is broken the contents look like a granular, brownish liquid and is more-or-less watery depending on the state of decomposition of the larva

## Spread

- *Varroa destructor* is able to vector sacbrood virus
- Intervention of the beekeeper by transferring material from infected colonies to a healthy colony.
- Feeding behaviour of nurse bees and bees robbing infected colonies.



Robbing and drifting can spread sac brood virus between colonies, as can the movement of frames by the beekeeper. The virus is spread between bees in the colony via the faecal-oral route, and queens may also transfer the virus onto their offspring via their eggs. The virus can remain viable in honey or pollen for up to a month if not exposed to sunlight or heat.

## Sacbrood Treatment

- ▶ Re-queening the colony can help to alleviate the symptoms of sacbrood
- ▶ Regular frame replacement may help
- ▶ Good biosecurity



A colony should be able to handle the infection without intervention, but if the disease is persistent, it may help to remove most of the diseased combs and replace them with clean comb. Colonies with persistent sacbrood infections may benefit from either requeening the colony with a younger queen to break the possible transmission route of virus from queen to brood, or by caging the current queen for ten to fourteen days to stimulate a short brood break; preventing re-infection of larvae that are at the susceptible age. All of these things will help improve levels of sacbrood as well keeping a strong colony.

## Nosema

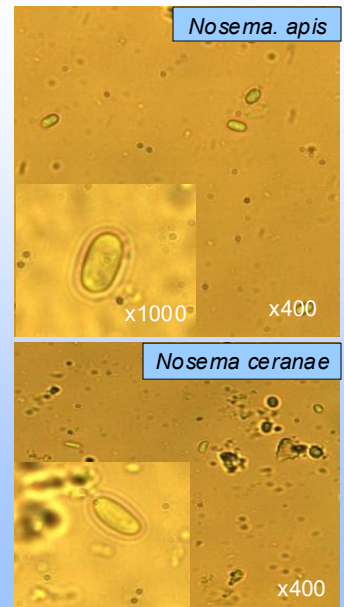


There are two types of Nosema, Can anyone suggest what type you can see in the picture?

Answer = *Nosema apis*

## Nosema apis and N. ceranae – what is it?

- Both Nosema species are spore forming microsporidia (fungus).
- They multiply within living cells of the gut and can weaken both individual bees and entire colonies.
- This makes them more susceptible to other pests and diseases, as well as affecting digestion, metabolism, hormone production, queen egg laying, homing and learning



x1000

National Bee Unit

You can see from the microscope pictures that they are difficult to distinguish from each other.

Molecular testing can determine whether it is apis or ceranae. SASA offers a limited service where a sample of adult bees is examined for the presence of Nosema.

Nosema may spread most rapidly in the spring when the brood

nest is expanding, particularly if normal comb cleaning behaviour coincides with confinement of foraging bees.

Cell cleaning prior to storing autumn-fed sugar syrup (when little natural forage is available) may also result in the spread of

**Nosema**  
infection.

Infection is easily spread by beekeepers placing combs contaminated

With **Nosema** spores into healthy colonies

- it is very important not to transfer soiled combs between hives.

## Symptoms



### Nosema apis

- Dysentery
- Smaller bees
- Distended abdomens

### Nosema ceranae

- Smaller bees
- Distended abdomens
- Spring losses
- Weak or dwindling colony

The symptoms of *Nosema apis* can be confused with dysentery which is much more common. For *Nosema ceranae* is almost impossible to see symptoms until it is too late

## Treatment for Nosema

GOOD FORAGE / SHOOK SWARM / BAILEY COMB EXCHANGE

### Diagnosis

Microscope

PCR

### Treatment

Renew  
Frames

80% Acetic  
acid

### Control

Strong  
heathy  
colony's

Good  
biosecurity

In large, thriving colonies, Nosema infection is usually suppressed and rarely reaches levels that warrant control treatments. You can reuse and sterilise frames with acetic acid. Feeding or good forage can often help. A shook swarm or bailey comb exchange may reduce the virus load in the hive. You can also send in a sample of bees to SASA for PCR testing.

## CHRONIC BEE PARALYSIS VIRUS



INTRODUCTION SLIDE. What do you see? Shiny, dark, hairless bees

## Chronic Bee Paralysis Virus – What Is It?

- ▶ RNA virus
- ▶ Affects Adult bees
- ▶ Spreads by body contact
- ▶ Affects the brain
- ▶ Single bee can have 10 billion virus particles



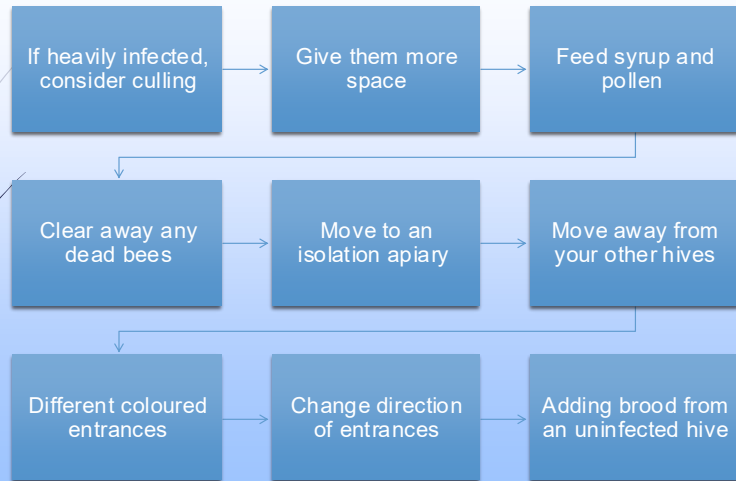
CBPV often occurs in booming hives in spring/ summer. Infection can vary from light to heavy. It can spread quickly and the numbers of dead bees both inside and outside the hive can be shocking. There is a risk it can spread to other hives. Sometimes a hive can recover especially if it is a light infection

## CBPV Symptoms

Circling Trembling	Paralysis	Unable to fly	Crawling
Bloated abdomens	Dead bees in hive and at entrance	Hairless	Dark/Black
Nibbling	Ejecting from hive	Little response to smoke	K Wing

CBPV symptoms used to be classed as type one or two. Now it is thought these symptoms are more varied and you will see them at different stages of development and at different levels of disease. K wing is when the wings are dislocated and look like they are in a K shape which means they cannot fly. Bees will be listless and many will not move or respond to smoke. You will see dead bees at the entrance of infected hives and not around the whole apiary. You may not see all of these symptoms at once.

## Managing CBPV - How To Deal With It



These are ways in which you can minimise the spread of the disease. If the colony is highly infected culling it may be an option and it would prevent spread to other colonies. Giving more space means the bees have more space to move without rubbing against each other and spreading the virus quicker. Feeding syrup and pollen gives the bees the nutrients they need to recover and allows them to be stronger. Removing dead bees will remove those with the disease. Moving to an isolation apiary reduces the spread to other hives and changing entrances will prevent robbing and drifting. As this is a disease of adult bees adding brood will boost the hive and help them recover. Requeening will reduce young brood and is unlikely to work. Reduce entrances on weak hives not infected. Research has shown that dead and infected bees are highly contagious and therefore removing those bees can prevent spread. Doing a Bailey Comb Exchange may help. Research is ongoing and new more effective management strategies may emerge

## Poisoning Symptoms



- ▶ Lack of flying bees around the apiary
- ▶ Dead bees carrying pollen scattered on approach to hive entrance
- ▶ 'Zapped fly syndrome' (spinning on back)
- ▶ Fewer foraging bees at the entrance
- ▶ Poisoned bees denied entry to the hive
- ▶ In severe cases, dead adult bees will be found inside the hives as well and brood will die from neglect
- ▶ Most or all hives in an apiary may be affected
- ▶ Remaining bees may behave aggressively.

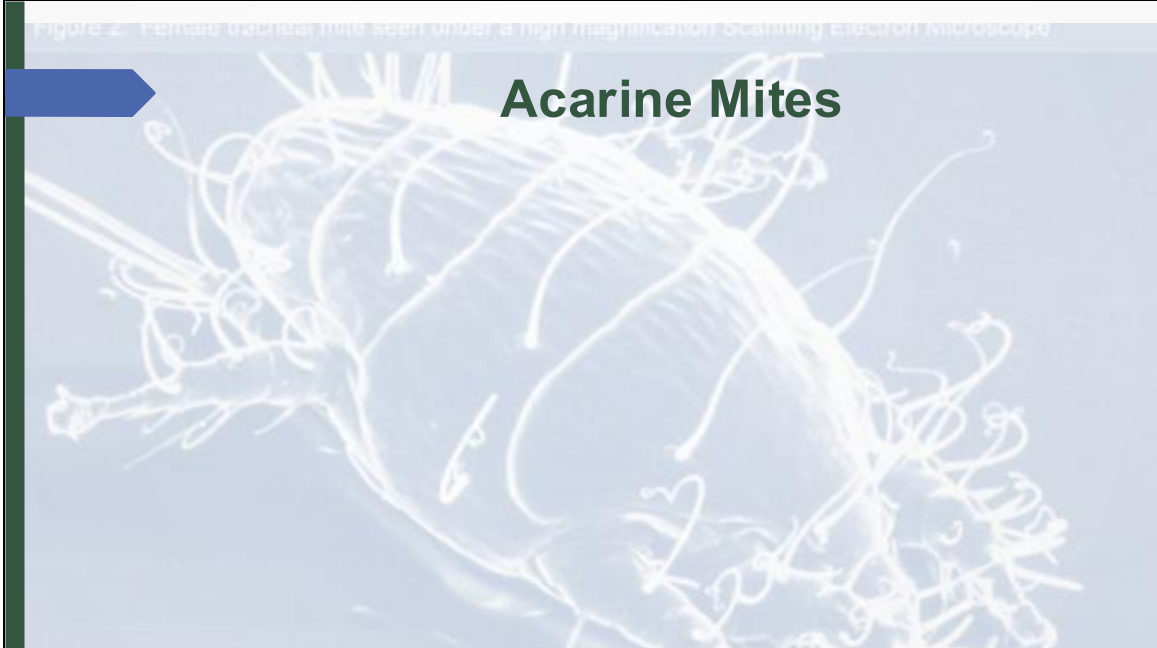
You may see some or all of the symptoms on the slide. CBPV can sometimes be confused with poisoning due to the mass number of dead bees but there are difference. Most reports of suspected poisoning are negative. With poisoning the dead bees will be scattered around the apiary and affect many hives unlike just outside one or two with CBPV. Report any suspected poisoning to WIIS

Common pests



Do you know what you are looking at in the picture? A Healthy Trachea with no Acarine infection

Figure 2. Fungal tracheal mite seen under a high magnification Scanning Electron Microscope



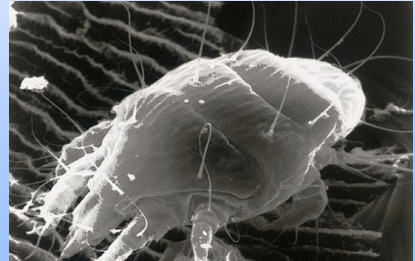
Acarine mites are tracheal mites which develop in the breathing tubes of a bee.

## Acarine Mites

- Acarapisosis is the infestation of the breathing tubes (trachea) of the adult bee by the parasitic mite *Acarapis woodi*.
- It is in the trachea that the acarine mites reproduce and feed.
- It is not normally a serious disease

### Symptoms include:

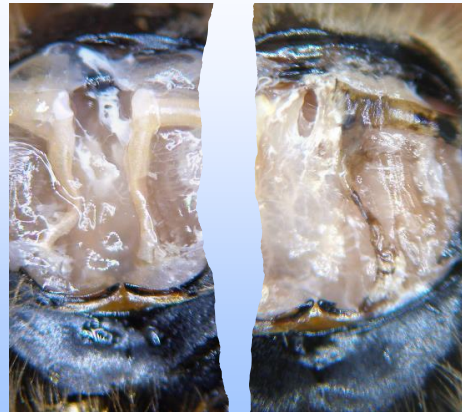
- Bees cluster in front of the hive
- Appearing confused and disorientated
- Unable to return to the hive
- Bees may also display K wing



The mites lay their eggs in the trachea, when they hatch the larvae begin to feed on the haemolymph (blood) of the bee. These symptoms may occur with other diseases such as CBPV. SASA offers a limited service where a sample of adult bees is examined for the presence of Acarine mites. These days acarine mites are rarer due to the use of Varroacides. Some symptoms appear to be similar to Chronic Bee Paralysis Virus (CBPV)

## Tracheal / Acarine disease

- Tracheal mite infection is not usually a serious disease
- There are currently no approved treatments for Acarine.
- The best method of control available to the beekeeper is to re-queen colonies that are susceptible to the disease.



Healthy

Diseased

The disease can only be easily diagnosed by carrying out a dissection and microscopic examination (using a dissecting microscope with up to x40 magnification) of the primary trachea. In a healthy or un-infested bee the trachea will have a uniform, creamy-white appearance like the one on the left. The diseased trachea on the right shows patchy dis-colouration or dark staining. It generally doesn't cause a strong hive much of a problem.

Wax Moth



Can you see the wax moth in the hive debris?

## Wax Moth



Greater Wax Moth, *Galleria mellonella*

Lesser Wax moth, *Achroia grisella*

### Causes

- Unhygienic practices
- Leaving comb badly stored
- Very weak colonies



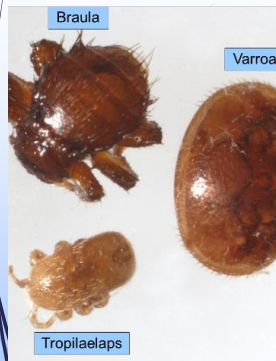
Greater Wax Moth has a bigger impact than the lesser wax moth. Wax moth is known for causing Bald Brood a common disorder in the colony. Good strong colonies will not usually tolerate infestation by wax moth, and it is not usually a problem in the field in healthy colonies. However, it is a problem in either weak colonies or hives where colonies have died or in stored combs. In the field hives should be kept as strong and healthy as possible, combs should not be left lying around the apiary and dead colonies should be removed as this will attract wax moths (basic apiary hygiene!). Lightly infested boxes may be placed on strong colonies to clean out, but heavily infested combs cannot be effectively treated and should be burned

Braula



Can you spot the bee louse?

## Braula



- Also known as the Bee Louse is a **wingless fly**
- It can be distinguished from Varroa by its more rounded shape and its **six legs**, which are visible on both sides of its body.
- Their larvae make narrow 1mm tunnels under the wax cappings, which result in the comb appearing **cracked**.

Beekeepers in areas that are varroa free are more likely to see Braula as it is thought Varroacides have eradicated it in areas with varroa. Many hives can cope with a Braula infection with little impact being observed.

## Other pests



- Mice
- Woodpeckers
- Badgers
- Farm animals
- Pine martins

These can sometimes cause an issue if they can get in or near your hives. Mouse guards, mesh and fencing can protect hives from damage

## Who To Contact and When

**SRUC Advisor** – for general beekeeping advice and non notifiable pests & disease

**Bees Mailbox** – when you suspect you have notifiable pests or disease or need advice of bee inspectors

Suspected Poisoning  
wiis-  
scotland@sasa.gov.scot

Policy if you have a request about laws rules and plans

Sasa – diagnosing notifiable disease

SBA, Association & mentors –general everyday advice and support

[Lorraine.Johnston@sruc.ac.uk](mailto:Lorraine.Johnston@sruc.ac.uk) for general advice.

Email [www.Bees\\_Mailbox@gov.scot](mailto:www.Bees_Mailbox@gov.scot) for notifiable disease, The Wildlife Incident Investigation Scheme= WIIS for poisoning, Scottish Government Policy for laws and plans via the bees mailbox. Sasa for disease testing and varroa and the SBA for general support.

## Sending a Sample to SASA for Nosema

[Adult Bee Diseases | SASA \(Science & Advice for Scottish Agriculture\)](#)

### REPORTING POISONING TO WIIS

[Wildlife Incident Investigation Scheme \(WIIS\)](#)

[SASA \(Science & Advice for Scottish Agriculture\)](#)



### **CLICK ON QR codes or links to take you to the correct pages for reporting. Submitting a sample for analysis**

The adult bees sampled should be as fresh as possible, contain a minimum of 30 bees, and be packaged in a crush resistant container, preferably cardboard. If a plastic container is used, then the bees should be wrapped in kitchen paper to prevent them degrading in transit.

## Resources Available: Scottish Government and SRUC

Contact: [Bees\\_Mailbox@gov.scot](mailto:Bees_Mailbox@gov.scot)

[Scottish Government Honey Bee Health Strategy 2022-2032](#)

[Scottish Government Honey Bee Implementation Plan](#)

[SRUC Bee Podcasts](#)



Here are some of the Government and SRUC resources available to you. If you have any queries you can contact the Honey Bee Health Team by email.

Information about how the Scottish Government supports honey bees in Scotland can be found via the QR codes or links  
SRUC podcasts on honey bee management can be found using the QR code or link

## Resources Available – Others

[BeeBase – Information for Scottish Beekeepers](#)

[Scottish Beekeepers Association](#)

[Bee Farmers Association](#)

[Foulbrood 2025](#)



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