

A new strategy for controlling European foulbrood in honey bees

Current control measures for European Foulbrood are outdated and new, natural methods of control are needed to combat this increasingly common disease

Honeybees are not only important for the honey and wax they produce, they are vital as pollinators of agricultural and horticultural crops worth at least £200M per annum. The industry depends on healthy honeybees.

Unfortunately, honeybee colonies are susceptible to diseases, and those caused by bacteria in particular are difficult to control. European foulbrood (EFB) caused by infection of the young bee larvae with the bacterium *Melissococcus plutonius*, is a serious notifiable disease which is becoming increasingly common.

The bacterium and other associated organisms multiply rapidly and block the gut of the larva, which dies of starvation. The bacterium then invades the rest of the body of the larva causing it to take on a characteristic sickle shape and to emit a foul odour.

Current methods of control are based on research done 50 years ago. The options are destruction of heavily infected colonies by burning or treatment with an old antibiotic, oxytetracycline. But the

emergence of oxytetracycline-resistant strains of the bacterium in other parts of the world, and the concern about antibiotic residues in a 'natural' product, make the search for an alternative method of control all the more pressing.

Research aims

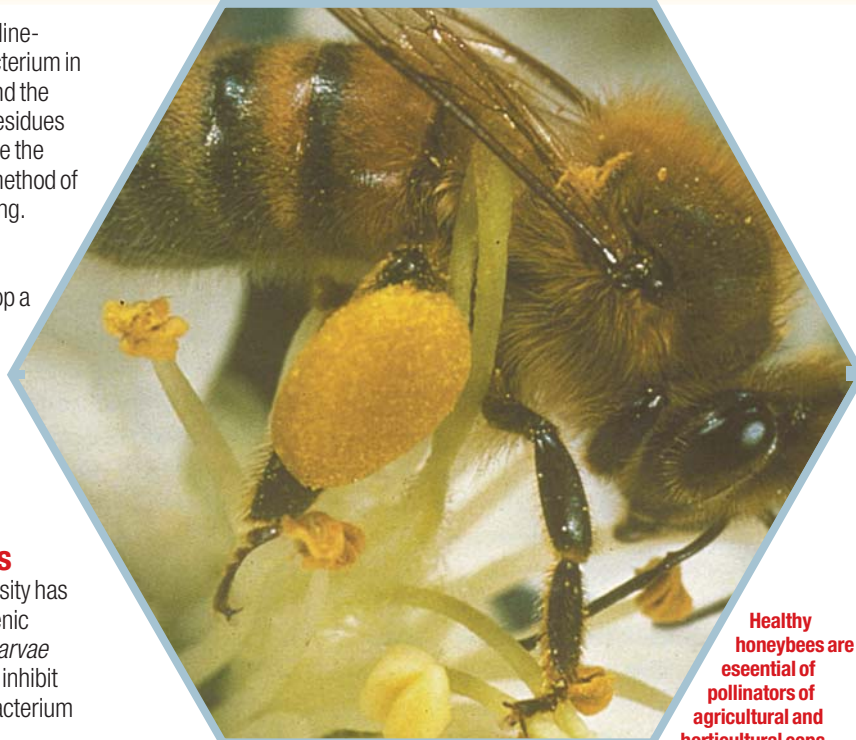
This project aims to develop a natural method for the treatment and control of European Foulbrood which could be used by beekeepers to replace the current oxytetracycline treatment.

Research methods

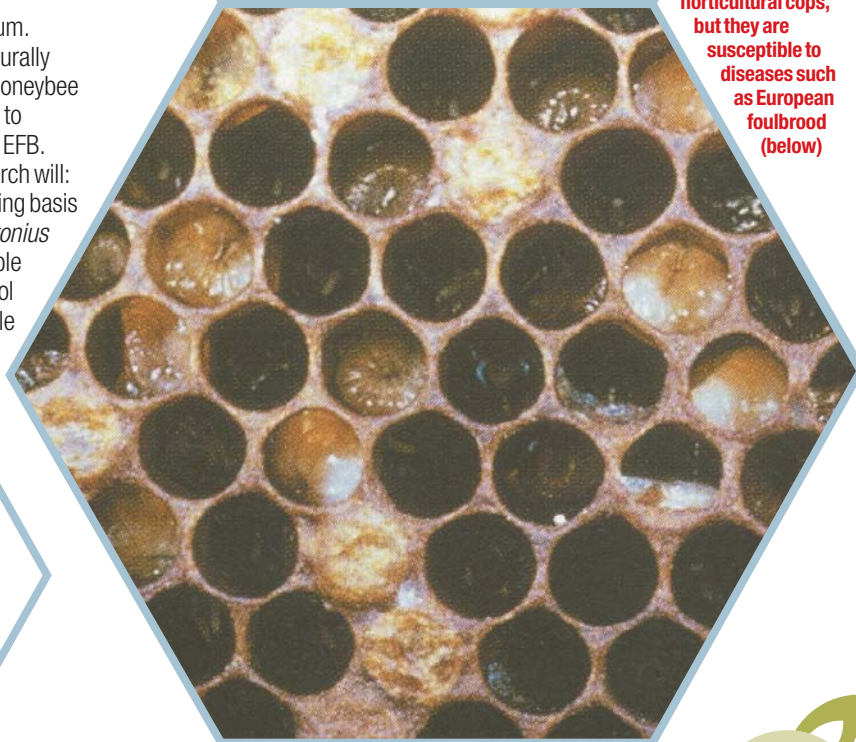
Research at Cardiff University has shown that a non-pathogenic bacterium, *Paenibacillus larvae* var. *pulvifaciens* (PLP) can inhibit the growth of a range of bacterium including *Melissococcus plutonius*, the EFB bacterium.

PLP has been found naturally occurring at low levels in honeybee colonies, but not sufficient to provide protection against EFB. Through this project research will:

- Determine the underlying basis of toxicity of PLP to *M. plutonius*
- Identify the most suitable strain of PLP for EFB control
- Isolate the most suitable



Healthy honeybees are essential of pollinators of agricultural and horticultural crops, but they are susceptible to diseases such as European foulbrood (below)



“Concern about antibiotic residues in a ‘natural’ product, make the search for an alternative method of control all the more pressing”

Dr Max Watkins
Vita (Europe) Ltd

HortLink

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strain of PLP for tracking studies of how EFB infects and spreads within honeybee colonies

- Study the distribution of PLP in honeybee colonies
- Determine the most suitable dose and application methods for effective control

It is hoped that PLP could be used as a remedial or prophylactic treatment, or both. If the results are successful, PLP will have to be registered as a veterinary medicine

Benefits to the industry

PLP provides a natural method of treating and controlling EFB which could easily be applied by all beekeepers. It will replace an outdated antibiotic, oxytetracycline and its associated problems, with an effective yet natural medicine, providing British agriculture and horticulture with healthy pollinators.

The bacterium causing European foulbrood, *Melissococcus plutonius* (right) and the strong antibiotic effect of *Paenibacillus larvae* var. *pulvifaciens* on its growth in a petri dish



What is HortLink?

LINK is the UK Government's principal mechanism for supporting collaborative research partnership between UK industry and the research base.

The **HortLink** programme was launched in 1996 and has now been extended. The aims of the extended programme are:

- To improve the sustainability of the horticultural industry.
 - To improve knowledge and understanding of processes and factors which determine the performance of the horticultural industry.
 - To enable access by the horticultural industry to innovative ideas and technology by involving a wide range of research institutes and university departments.
 - To promote wider awareness of the benefits of advanced horticultural techniques/methods, especially to SMEs.
- Further information from the programme co-ordinator.
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“PLP provides a natural method of treating and controlling foulbrood which could easily be applied by all beekeepers”

Dr Brian Dancer
Cardiff University



Project details

Development of a method of biological control of European foulbrood in honeybees to supersede antibiotic treatments and sanitary colony destruction by burnings

Reference number
HORT 242

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