Research

Worm eater shows green promise

A new weapon in the war against nematode parasites of livestock is on the verge of deployment. It could help fulfil an increasing demand for agricultural commodities free of chemical inputs.

Duddingtonia flagrans, a nematode wormeating fungus, has been shown to markedly reduce the number of nematode larvae in young sheep. As a promising biological control agent it also boosts sheep productivity through improved worm control and has no detectable impacts on other soil and pasture organisms.

If commercialisation of the fungus proves successful, *D. flagrans* could assist farmers battling the rising tide of nematodes resistant to anthelmintic chemicals.

According to Dr Malcolm Knox of CSIRO Livestock Industries, the success of *D. flagrans* is due to two important characteristics. Firstly, the naturally occurring, free-living soil fungus has a tough-walled 'chlamydospore', which can survive passage through the gut of sheep, cattle, horses and pigs. Secondly, when excreted in manure, along with nematode eggs, the fungal spores germinate and produce networks of sticky filaments. These trap the newly hatched nematode larvae, paralysing them and allowing the fungus to penetrate and consume the parasite's body. are too few spores, a smaller proportion of emerging larvae will be destroyed.

'Previous studies have shown that when sheep were given an adequate daily dose of chlamydospores, there was more than 80% reduction in the number of infective larvae derived from nematode eggs in faeces,' Knox says.

To have an impact on the larval population on a pasture, Knox says the fungus would have to be present for long enough to reduce larvae numbers to low levels. Application of the fungus is likely to occur in conjunction with chemical controls and management practices that also help minimise pasture contamination.

If the fungus is to be used as a biological control agent, however, it must be produced on a large scale to enable daily feeding to flocks of sheep. Knox and his CSIRO colleagues are now working with a commercial partner to do just that.

'We've gone from producing limited amounts of chlamydospores in the lab, to small commercial batches,' Knox says.

'Our commercial partner is also looking



The fungus's microscopic chlamydospores pass through sheep and germinate once in the paddock.

When Knox and his colleagues fed chlamydospores on a daily basis to 4–5 month old sheep, they found that the average egg count in treated sheep was reduced to about one-third that of untreated controls. Treated sheep also gained 1.5–2 times more weight than the controls. However, the number of chlamydospores fed to sheep is important. If there



A magnified view of a nematode worm trapped by *D. flagrans*.

at the most effective delivery mechanism for the spores, which will probably be some sort of feed supplement.

While the current research focus is on sheep, if the commercialisation work is successful it could lead to new control methods for nematodes in cattle, horses and pigs. Importantly, while the fungus kills the majority of nematodes that para-



Drenching is a current, costly way of controlling nematode worms.

sitise these animals, studies have shown it has no negative effects on other free-living soil nematodes, earthworms or microarthropods.

'The positive outcome of the environmental impact assessment of *D. flagrans* deployment augurs well for application of this technology to livestock production systems,' Knox says.

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MORE READING:

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- Knox MR, Josh PF and Anderson LJ (2002). Deployment of *Duddingtonia flagrans* in an improved pasture system: dispersal, persistence, and effects on free-living soil nematodes and microarthropods. *Biological Control*, 24:176–182.

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