RELACS
IMPROVING INPUTS FOR ORGANIC FARMING

FiBL

Duddingtonia flagrans: biocontrol fungus for reducing the use of anthelmintics

Problem

Gastrointestinal worms are common in all grazing livestock species. Animals are usually treated with synthetic anthelmintics to control worm infection. Anthelmintics represent a contentious input in organic farming because anthelmintic resistance spreads rapidly and synthetic residues in faeces threaten biodiversity.

Solution

Grazing animals are given spores of the naturally occurring biocontrol fungus *Duddingtonia flagrans*. Spores germinate in the faeces and the fungus consumes worm larvae before they contaminate pasture and re-infect animals.

Outcome

Duddingtonia can reduce the emergence of infective worm larvae from ruminant and horse faeces by over 95% under optimal conditions. Trials have shown that worm burdens in lambs grazing after Duddingtonia treated sheep are reduced by 57-75% compared to lambs grazing after untreated sheep.

Applicability box

Input used

☐ Copper	x Anthelmintics
☐ Mineral oil	☐ Antibiotics
☐ Fertilisers	☐ Vitamins

Geographical coverage
Global

Application time
During the grazing season

Period of impact
Actual and future herd/flock

Equipment
Feeder; feed additive containing Duddingtonia spores

Best in
Grazing ruminants and horses

Practical recommendations

Many gastrointestinal worm species have a life cycle that comprises juvenile and adult worms in the gastro-intestinal tract of their host animal as well as worm eggs and larvae in the excreted faeces. Unlike a synthetic anthelmintic, Duddingtonia does not kill the worms in the animal but eliminates the free-living stages in the faeces (Figure 1). Therefore, it reduces pasture infectivity and is only useful in grazing animals.

Duddingtonia is presented to the animals in the form of spores in a feed additive. The thick-walled spores resist digestion and pass through the gastro-intestinal tract into the faeces. There they germinate and form trapping organs that capture, paralyse and consume emerging infective worm larvae.

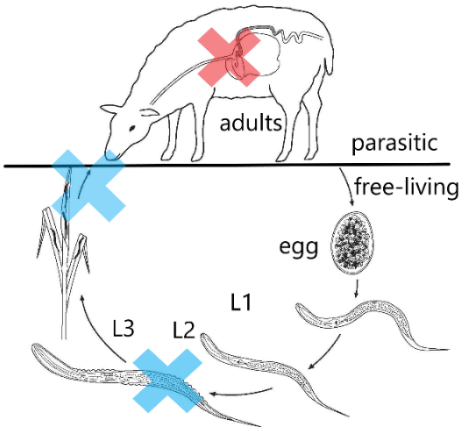

Figure 1: Life cycle of a typical gastrointestinal worm species of ruminants and horses. Anthelmintics act on the parasitic stages (represented by red cross) while *Duddingtonia flagrans* acts on the free-living stages (represented by blue crosses) (Figure: FiBL)
Picture 1: Gastrointestinal worm larvae trapped in a mycelium of *Duddingtonia flagrans* (Photo: FiBL)

Duddingtonia is best fed daily during climatic periods that allow larval development and re-infection of grazing animals. Biocontrol with Duddingtonia should be embedded in an integrated parasite management strategy with or without anthelmintic treatments and other elements, e.g. grazing management and bioactive forages. Faecal egg counts should be used to monitor the effectiveness of the parasite management strategy and to adapt it if necessary.

Duddingtonia is effective irrespective of the resistance status of the parasitic worms. It, therefore, presents an effective method to control untreatable multi-resistant nematodes.

On-farm application

System approach

The parasite management strategy is complementary to disease prevention strategies such as high-quality feed, appropriate stocking density, grazing management, and appropriate housing conditions.

Evaluation

Duddingtonia is not yet registered as a feed additive in Europe and thus not yet available for on-farm application. Farmers will be informed through organic farmer's associations and other relevant information channels once registration is completed and the product is available. The cost of the Duddingtonia additive is expected to be higher than the cost of anthelmintics.

Further information

Further readings

- Maurer, Veronika and Werne, Steffen (2019) Biologische Kontrolle von Magen-Darmwürmern mit dem Pilz Duddingtonia flagrans. [Contrôle biologique des vers gastro-intestinaux avec le champignon Duddingtonia flagrans.] Forum für Kleinwiederkäuer, 2019 (4), pp. 6-11. Available at: https://orgprints.org/id/eprint/37108/
- RELACS Practice Abstract on "Faecal egg counts to improve worm control in organic sheep farming", available at: https://relacs-project.eu/wp-content/uploads/2021/05/RELACS_PA_04_FEC_SRUC_SA_final.pdf
- RELACS Practice Abstract on "A basket of options to control worms in organic sheep production systems", available at: https://relacs-project.eu/wp-content/uploads/2022/04/RELACS_PA_10_Basket_of_options_SRUC_final.pdf

Weblinks

Check the Farm Knowledge Platform for more practical recommendations.

Check www.duddingtonia.com for recommendations based on trials with a product registered in Australia.

About this practice abstract and RELACS

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RELACS: 'Replacement of Contentious Inputs in Organic Farming Systems' (RELACS) builds on results of previous research projects and takes far-advanced solutions forward. As a system approach to sustainable agriculture, organic farming aims to effectively manage ecological processes whilst lowering dependence on off-farm inputs. The RELACS partners will evaluate solutions to further reduce the use of external inputs and, if needed, develop and adopt cost-efficient and environmentally safe tools and technologies.

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