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Improvements in nematophagous fungi to control gastro-intestinal parasites

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Abstract

Gastro-intestinal parasites are a major cause of production loss in New Zealand livestock, and the continuing development of anthelmintic-resistant strains represents a significant threat to the future New Zealand agricultural economy. This has led to an increased interest in alternative (non-chemotherapeutic) controls, including potential application of the nematode-trapping fungi *Duddingtonia flagrans* and *Arthrobotrys oligospora*. These species are capable of reducing the number of free-living stages of trichostrongyloid nematodes developing in faeces, following oral administration or the addition of fungal material to faeces. However, high spore mortality through the gastro-intestinal tract currently limits the development of a commercial product, even for the robust chlamydospores of *D. flagrans*. The potential to reduce spore mortality by applying a protective coating to the spores was investigated, and an *in vitro* rumen simulation bioassay was used to quantitatively evaluate and compare the survival of *D. flagrans* and *A. oligospora* spores in a series of experiments. These experiments revealed that unprotected *D. flagrans* chlamydospores were superior to *A. oligospora* conidia in their ability to withstand the debilitating effects of rumen fluid. However, the survival of *A. oligospora* was improved by integration into a biopolymer formulation. Dried *D. flagrans* chlamydospores were more resistant to a simulated rumen environment than freshly harvested chlamydospores, and exposure to water as an incubation medium was less detrimental than rumen fluid to the survival of both fresh and dried *D. flagrans* chlamydospores. The application of a stearic acid coating to dried *D. flagrans* chlamydospores failed to improve spore survival in either a simulated rumen environment, or efficacy during subsequent *in vivo* testing. However, as the application of a biopolymer formulation successfully improved the survival of *A. oligospora* conidia, it is likely that similar formulations may be successfully applied to other fungal species. These results highlight the potential for development of formulations containing multiple species of nematophagous fungi, including the application of fungal species that were previously unsuitable due to very high spore mortality.
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"Horses know nothing of money, status, beauty or accomplishment......
Horses see only our hearts, and they accept us or reject us on what they find within......
In short, horses do naturally what humans can pass a lifetime without ever mastering."

Author Mary Midkiff quoted in *The Denver Post*
# Table of Contents

Embargo ................................................................. ii
Abstract ................................................................. iii
Acknowledgements .................................................. iv
List of Figures ......................................................... x
List of Tables ........................................................ xii

Chapter 1. Introduction and Literature Review .......... 1
  1.1 Introduction .................................................. 1
  1.2 Objectives and Limitations ................................. 3
    1.2.1 Objectives ............................................... 3
    1.2.2 Limitations .............................................. 4
  1.3 Literature Review ............................................ 4
    1.3.1 The parasites and their lifecycles .................. 4
    1.3.2 Parasites of sheep ..................................... 5
    1.3.3 Parasites of cattle ..................................... 6
    1.3.4 Environmental factors influencing pre-parasitic
development and transmission of larvae onto pasture .... 6
      1.3.4.1 Micro-environmental factors ....................... 8
      1.3.4.2 Dung Microfauna .................................. 8
        1.3.4.2.1 Flies (Diptera) ................................. 8
        1.3.4.2.2 Earthworms (Annelida) ..................... 9
        1.3.4.2.3 Dung Beetles (Coleoptera) ................. 10
    1.3.5 Nematophagous Microfungi ........................... 11
      1.3.5.1 *Arthrobotrys oligospora* ....................... 12
        1.3.5.1.1 Taxonomy, morphology and factors influencing
growth ......................................................... 12
        1.3.5.1.2 The application of *Arthrobotrys oligospora* 15
      1.3.5.2 *Duddingtonia flagrans* ......................... 18
        1.3.5.2.1 Taxonomy, morphology, and factors influencing
growth ......................................................... 18
        1.3.5.2.2 The application of *Duddingtonia flagrans* 21
1.3.5.2.3 Potential environmental implications of un-naturally high levels of *Duddingtonia flagrans* on non-target organisms

1.3.5.3 Limitations on the application of nematode-trapping fungi as a biological control

Chapter 2. *In vitro* rumen simulation bioassay for evaluation of *Arthrobotrys oligospora* and *Duddingtonia flagrans* spores

2.1 Introduction

2.2 Materials and Methods

2.2.1 Experimental Design

2.2.2 Preparation of spore inoculum

2.2.3 Rumen Fluid

2.2.4 Assay Procedure

2.2.5 Statistical Analysis

2.3 Results

2.3.1 *Arthrobotrys oligospora*

2.3.2 *Duddingtonia flagrans*

2.4 Discussion

Chapter 3. *In vitro* evaluation of *Arthrobotrys oligospora* formulations using a rumen simulation bioassay

3.1 Introduction

3.2 Materials and Methods

3.2.1 Experimental Design

3.2.2 Preparation of uncoated spore inoculum

3.2.3 Preparation of coated spore inoculum

3.2.4 Rumen Fluid

3.2.5 Assay Procedure

3.2.6 Statistical Analysis

3.3 Results

3.3.1 Spore Germination

3.3.2 Protective Ability

3.3.3 Serial Dilutions

51
3.4 Discussion

Chapter 4. *In vitro* evaluation of fresh and dried *Duddingtonia flagrans* chlamydospores using a rumen simulation bioassay

4.1 Introduction

4.2 Materials and Methods

4.2.1 Experimental Design

4.2.2 Preparation of spore inoculum

4.2.3 Assay Procedure

4.2.4 Statistical Analysis

4.3 Results

4.4 Discussion

Chapter 5. *In vitro* evaluation of stearic acid coated *Duddingtonia flagrans* chlamydospores using a rumen simulation bioassay

5.1 Introduction

5.2 Materials and Methods

5.2.1 Experimental Design

5.2.2 Preparation of spore inoculum

5.2.3 Assay Procedure

5.2.4 Statistical Analysis

5.3 Results

5.4 Discussion

Chapter 6. *In vivo* evaluation of coated *Duddingtonia flagrans* chlamydospores

6.1 Introduction

6.2 Materials and Methods

6.2.1 Experimental Design

6.2.2 Fungal Treatments

6.2.3 Experimental Procedure

6.2.4 Faecal Cultures

6.2.5 Presence/Absence test

6.2.6 Statistical Analysis

6.3 Results

6.3.1 Faecal cultures

6.3.2 Presence/Absence tests
6.4 Discussion
Chapter 7. General Discussion
Chapter 8. References
Chapter 9. Appendices
List of Figures

Figure 1-1. General lifecycle of trichostrongylid parasites of sheep and cattle (adapted from Department of Animal Science, Oklahoma State University website, http://www.ansi.okstate.edu/exten/sheep/f3858/f-3858.html). 4

Figure 1-2 – Illustration of *Arthrobotrys oligospora*, scale bar = 100 µm (Gronvold et al., 1993a). 13

Figure 1-3a thru c – Formation of *D. flagrans* traps; a- lateral branch growing from parent hyphae, b- branch curls back and anastomoses with parent branch, c- secondary loops form off primary loop (from Gronvold et al., 1996). Figure 3d – Scanning Electron Microscope image of *D. flagrans* net (Gronvold et al., 1993). 19

Figure 1-4 Variations of conidia of *Duddingtonia flagrans* (Skipp et al., 2002). 20

Figure 1-5 Formation of intracalary chlamydospores of *Duddingtonia flagrans* (Gronvold et al., 1996). 20

Figure 2-1 Rumen simulation bioassay (1 bottle). 36

Figure 2-2 Rumen simulation bioassay – bottles in incubator. 37

Figure 2-3 Germinated chlamydospores of *Duddingtonia flagrans* (200x). Germ tube is the thicker portion of initial growth, indicated by white arrow. Hyphae is indicated by black arrow. 37

Figure 2-4 Germinated chlamydospore of *Duddingtonia flagrans* (100x), with considerable hyphal growth. 37

Figure 2-5 Germination of *Arthrobotrys oligospora* conidia following *in vitro* exposure to rumen fluid. 39

Figure 2-6 Germination of *Duddingtonia flagrans* spores following *in vitro* exposure to ovine or bovine rumen fluid. 40

Figure 3-1 12 h germination of *Arthrobotrys oligospora* spores as a percentage of the 1 h germination. 51

Figure 4-1 Arithmetic means of germination percentage for *D. flagrans* chlamydospores following the rumen simulation bioassay and a 48 h incubation at 20°C. 58

Figure 5-1 Comparison of 1 h and 48 h germination of stearic acid coated spores (referenced 104, 106, 107, 108 & 109) with uncoated controls, illustrating least-squared means for germination percentage of *D. flagrans* chlamydospores following 48 h in rumen simulation bioassay and 48 h incubation at 20°C. 65
Figure 5-2  Comparison of the overall spore germination following 1 h and 48 h, incubation in either media.

Figure 6-1 Faecal culture of *Trichostrongylus colubriformis* with lid off.

Figure 6-2 Faecal cultures of *Trichostrongylus colubriformis*.

Figures 6-3 and 6-4 Faecal cultures of *Trichostrongylus colubriformis* on Baermann funnels.

Figure 6-5 Mean number of L3 recovered from 10 g laboratory faecal cultures, from sheep orally dosed with *Duddingtonia flagrans* chlamydospores. Coated spores were spray coated with stearic acid and allocated the reference numbers 104-109. 2000 *Trichostrongylus colubriformis* eggs were added to each culture. Error bars show 95% confidence intervals of the means.

Figure 6-6 Testing for presence of *Duddingtonia flagrans* in faeces (100x magnification). White arrow indicates *D. flagrans* chlamydospore, black arrow indicates *Rhabditis* sp. nematode trapped in net of *D. flagrans*. 


List of Tables

Table 1-1 List of nematode parasites recorded from sheep in New Zealand. 5
Table 1-2 List of nematode parasites recorded from cattle in New Zealand. 6
Table 1-3 Summary of literature on *in vitro* addition of *Arthrobotrys oligospora* conidia to faeces. 15
Table 1-4 Summary of literature on *In vitro* addition of *Arthrobotrys oligospora* fungal culture to faeces. 16
Table 1-5 Summary of literature on *in vitro* addition of *Arthrobotrys oligospora* fungal culture to petri dish. 17
Table 1-6 Summary of literature on *In vitro* rumen simulation stress selection of *Arthrobotrys oligospora*. 17
Table 1-7 Summary of literature on *in vivo* passage of *Arthrobotrys oligospora* conidia. 17
Table 1-8 Summary of literature on *in vitro* addition of *Duddingtonia flagrans* conidia/chlamydospores to faeces. 22
Table 1-9 Summary of literature on *in vitro* stress selection/*in vitro* trap formation of *Duddingtonia flagrans* with/without larval reduction. 23
Table 1-1 Summary of literature on *in vivo* passage of *Duddingtonia flagrans* spores with/without larval reduction. 25
Table 2-1 Treatment groups for *in vitro* evaluation of *Arthrobotrys oligospora* and *Duddingtonia flagrans* spores exposed to rumen simulation assay. 1 h, 12 h, 24 h, 36 h and 48 h samples were taken for each treatment. 35
Table 2-2 ANOVA table for final model *Arthrobotrys oligospora*, germination determined by the effects of time and time$^2$, plus the error. 38
Table 2-3 ANOVA table for final model for *Duddingtonia flagrans*, germination determined by the effects of time and time$^2$, plus the error. 39
Table 3-1 Treatment groups for *in vitro* evaluation of *Arthrobotrys oligospora* biopolymer formulations exposed to rumen simulation assay. 1 h, and 12 h samples were taken for each treatment. 46
Table 3-2 Arithmetic means of germination percentage following incubation at 25°C. 49
Table 3-3 ANOVA table for one-way ANOVA whereby the 1 h germination is determined by the treatment group, for treatment numbers 1, 2, 3, 5 and 6.

Table 3-4 Least-squared means percentage initial and final germination of *Arthrobotrys oligospora* conidia following 12h exposure to rumen fluid and 48h incubation. Means with the same letter were not significant different, as determined by LSD (P≤ 0.05).

Table 3-5 ANOVA table for one-way ANOVA where the model states that 12 h germination is determined by the treatment group, for treatment numbers 1, 2, 3, and 6.

Table 3-6 ANOVA table for protective ability of coatings, whereby model states the relative germination (12 h germination as a percentage of 1 h germination) is determined by treatment plus the error, for treatment numbers 1, 2, 3, and 6.

Table 3-7 Number of germinated spores/g of product in formulations A, C and D, following 66 h incubation at 30°C.

Table 4-1 Treatment groups for *in vitro* evaluation of fresh and dried *Duddingtonia flagrans* chlamydospores exposed to water or rumen fluid. 1 h, 24 h, 48 h and 72 h samples were taken for each treatment.

Table 4-2 ANOVA table for two-way ANOVA, where 1 h germination is determined by spores, medium, and medium*spores interaction, plus the error.

Table 4-3 ANOVA table for one-way ANOVA, change in germination is determined by treatment (spore source/medium), plus the error.

Table 5-1 Treatment groups for *in vitro* evaluation of stearic acid coated *Duddingtonia flagrans* chlamydospores exposed to water or rumen fluid. Samples were taken at 1 h and 48 h for each treatment.

Table 5-2 ANOVA table for final model, whereby spore germination is determined by the effects of replicate, time, coating, medium, time*medium and time*coating, plus the error.

Table 6-1 Table of treatment groups and description of treatments.

Table 6-2 showing the number of animals testing positive in presence/absence test for each treatment group, over the number of animals tested.