Duddingtonia flagrans
What is it?

A natural strain of fungus isolated from the environment (Australia, early 1990s)

Found around the world

Application as a biological control for larvae of parasitic worms of grazing animals




Duddingtonia flagrans
WHY DO WE NEED IT?

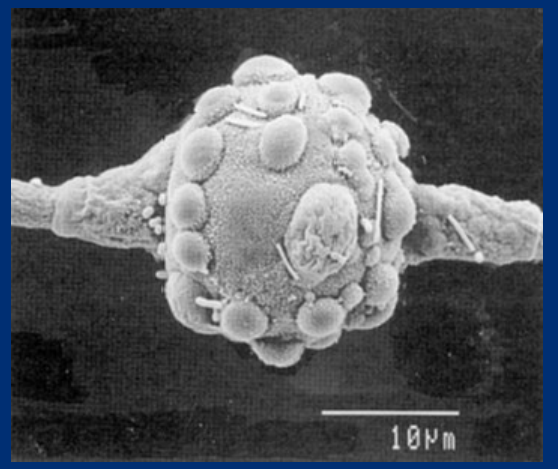
- Resistance to dewormers is getting worse all the time
- Need for reduced reliance on dewormers to control worms
- Emergence of integrated parasite management (IPM) programs
  - Can’t rely on any one means for control any more

Duddingtonia flagrans
HOW DOES IT WORK?

- By feeding a supplement containing inert fungal spores which pass into the manure, having no effect within the animal
- Breaks the parasites' life cycle by trapping, paralysing and consuming infective larvae within the animal's manure
- Equally-effective against resistant worms

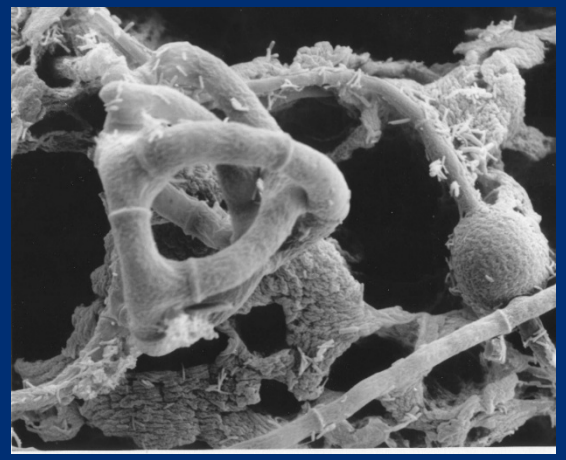
Mechanism of Action

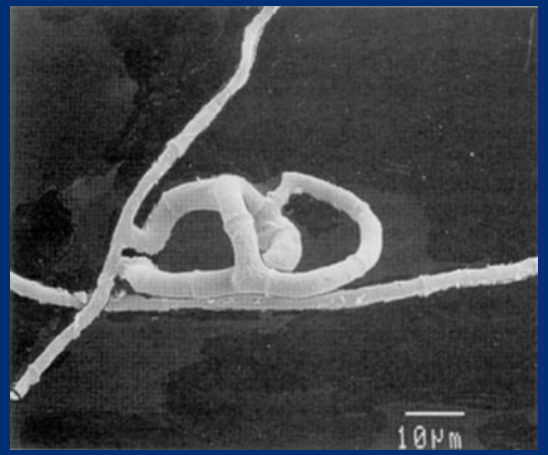
Mature chlamydospore



Thick walled to survive passage through GI tract

Trapping net made of loops





Mechanism of Action

Nematode trapped in a net

Anterior part of infective larvae captured in a hyphal loop

Field Study: Sheep LSU

Implement *Duddingtonia flagrans* as a biological control

Evaluate worm burden in treated animals as compared to controls

Expect reduction – No/Yes?

Evaluate the larval population on summer pasture forage

Expect reduction - Yes

Experimental Design

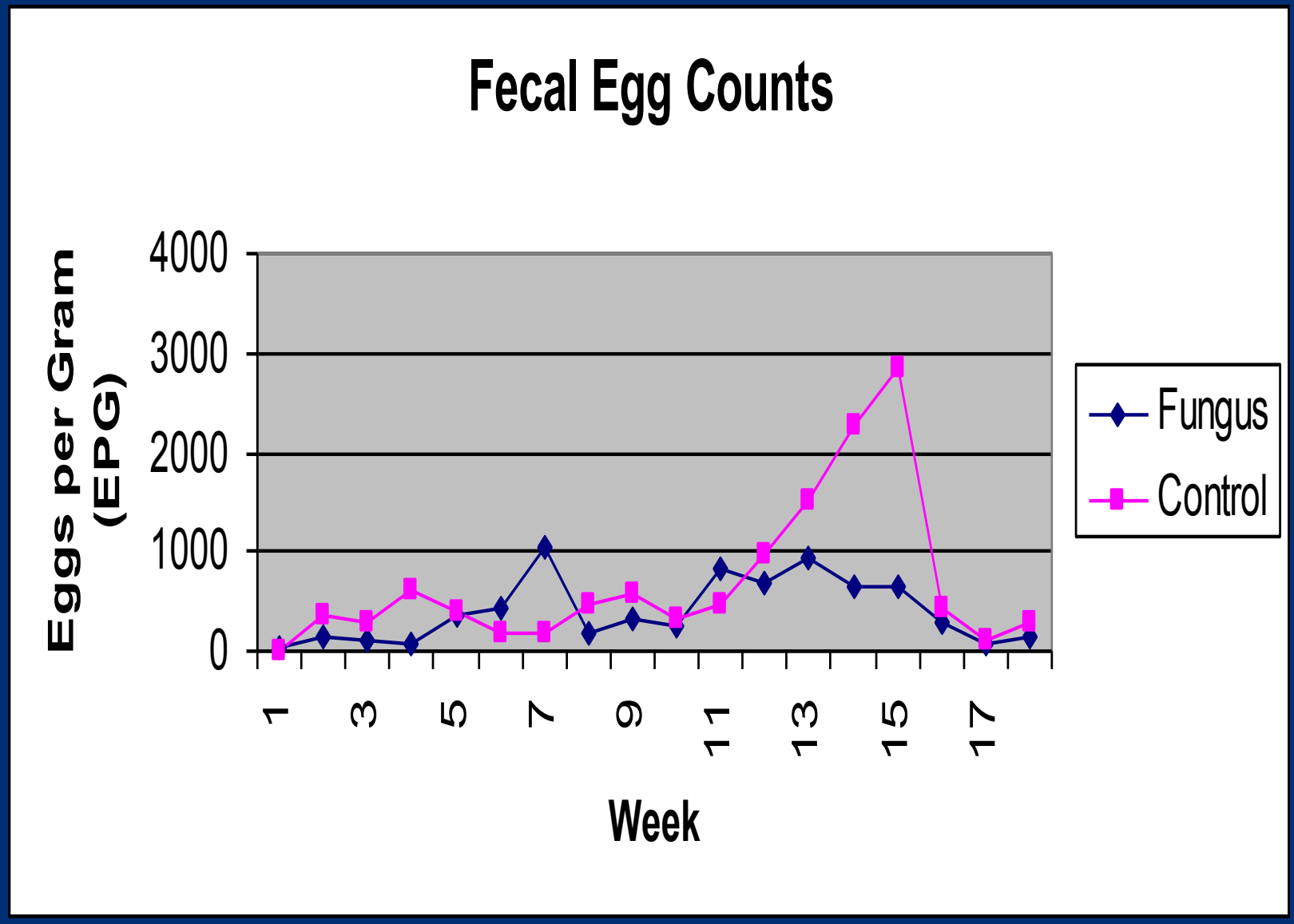
Ewes grazed summer pasture under natural infection conditions for 18 weeks

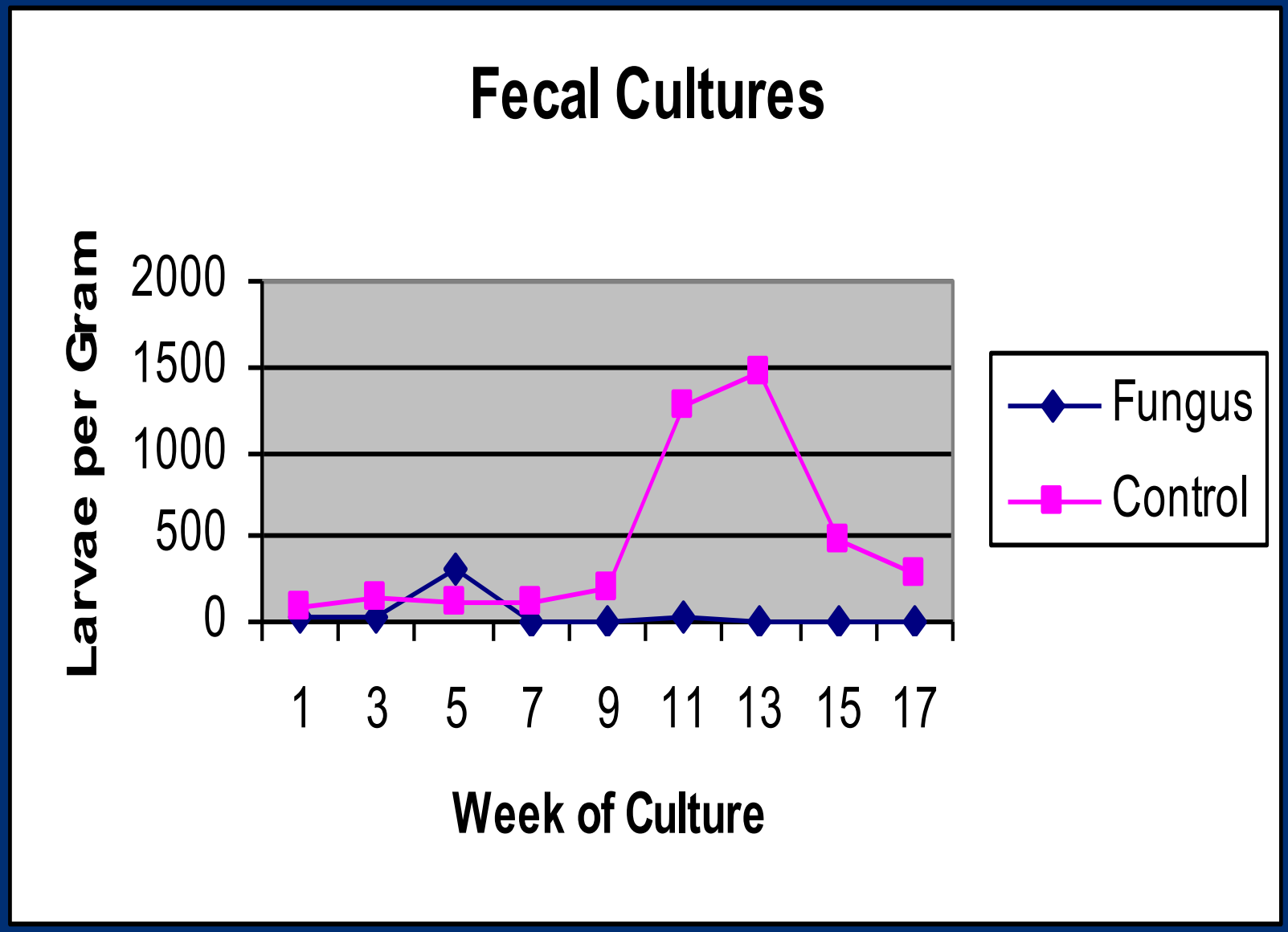
Ewes were randomly allocated on FEC to fungus and control groups

Existing pasture was split equally

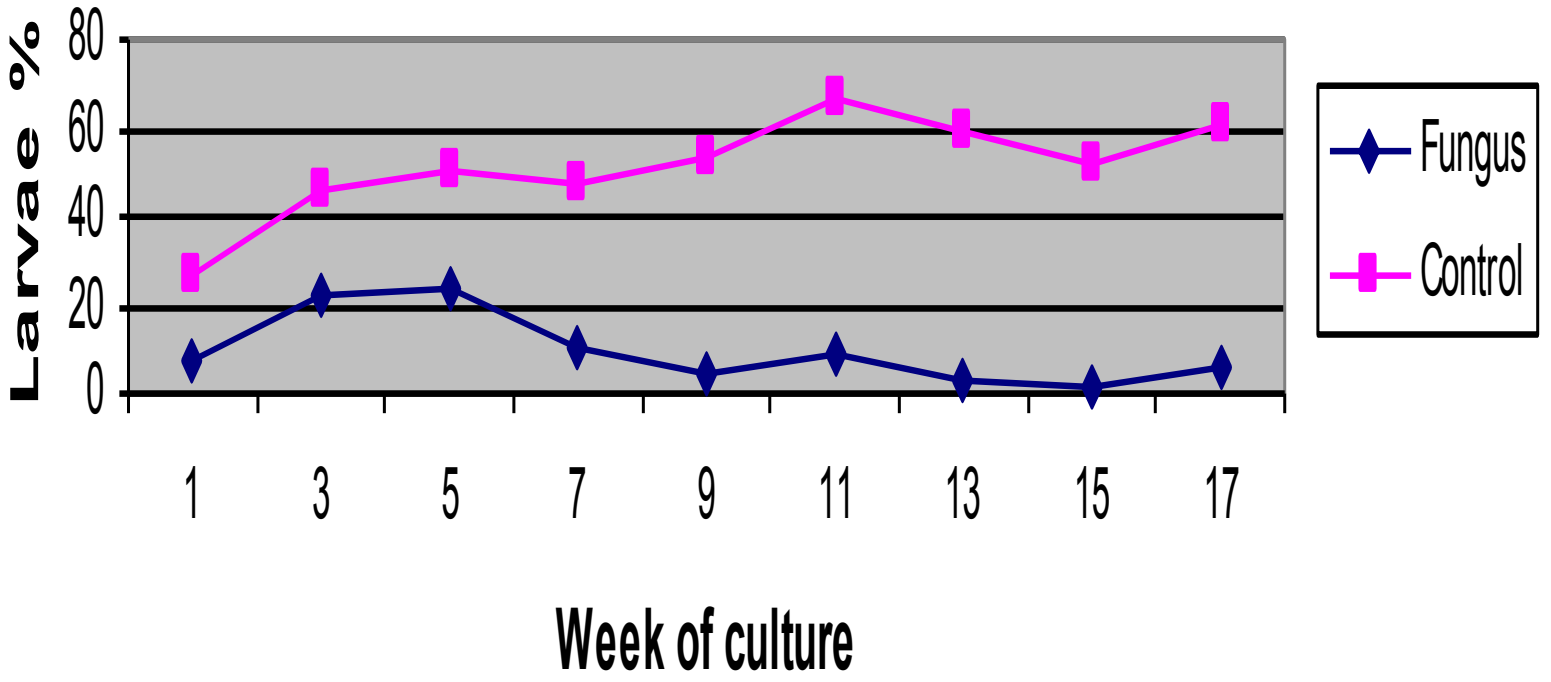
All animals were provided supplement feed with the fungus group getting 500,000 spores per kg body weight

Pasture forage samples were collected every 2 weeks and tracer lambs were used at the end of the study

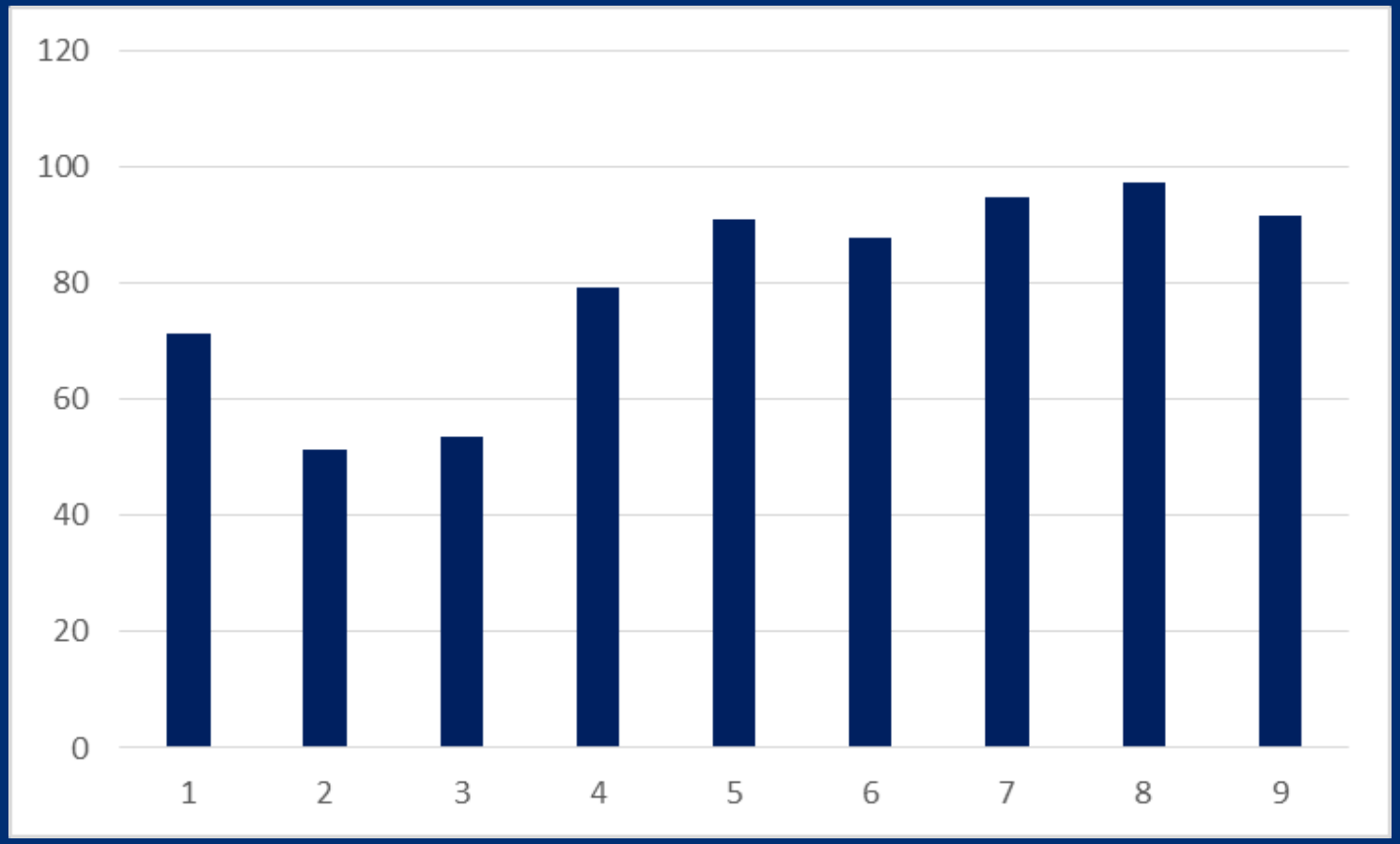

Fecal Egg Counts
Eggs per Gram (EPG)
4000
3000
2000
1000
0
1
3
5
7
9
11
13
15
17
Week
Fungus
Control

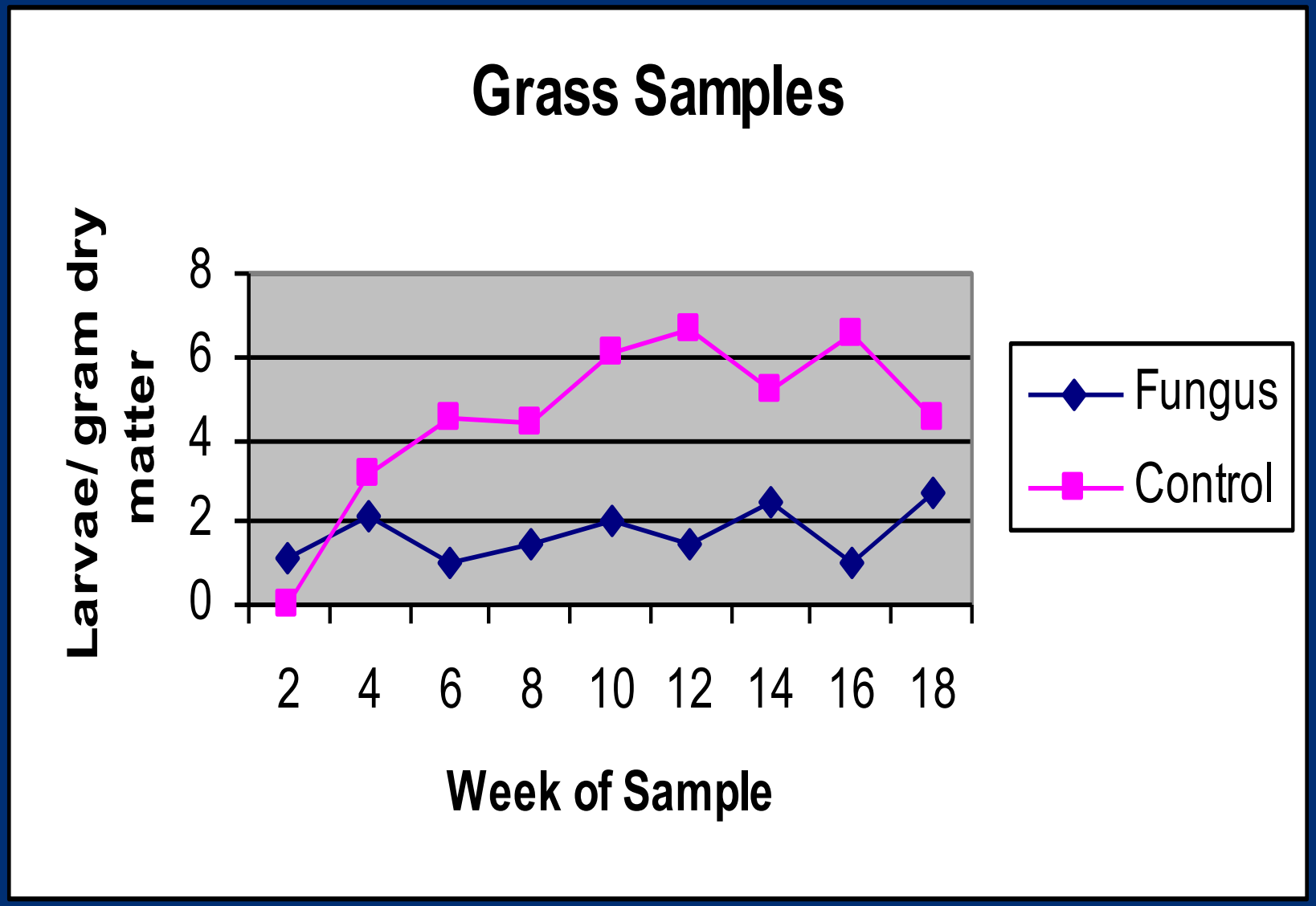

Fecal Cultures
Larvae per Gram
2000
1500
1000
500
0
1
3
5
7
9
11
13
15
17
Week of Culture
Fungus
Control

% Recovery of Larvae

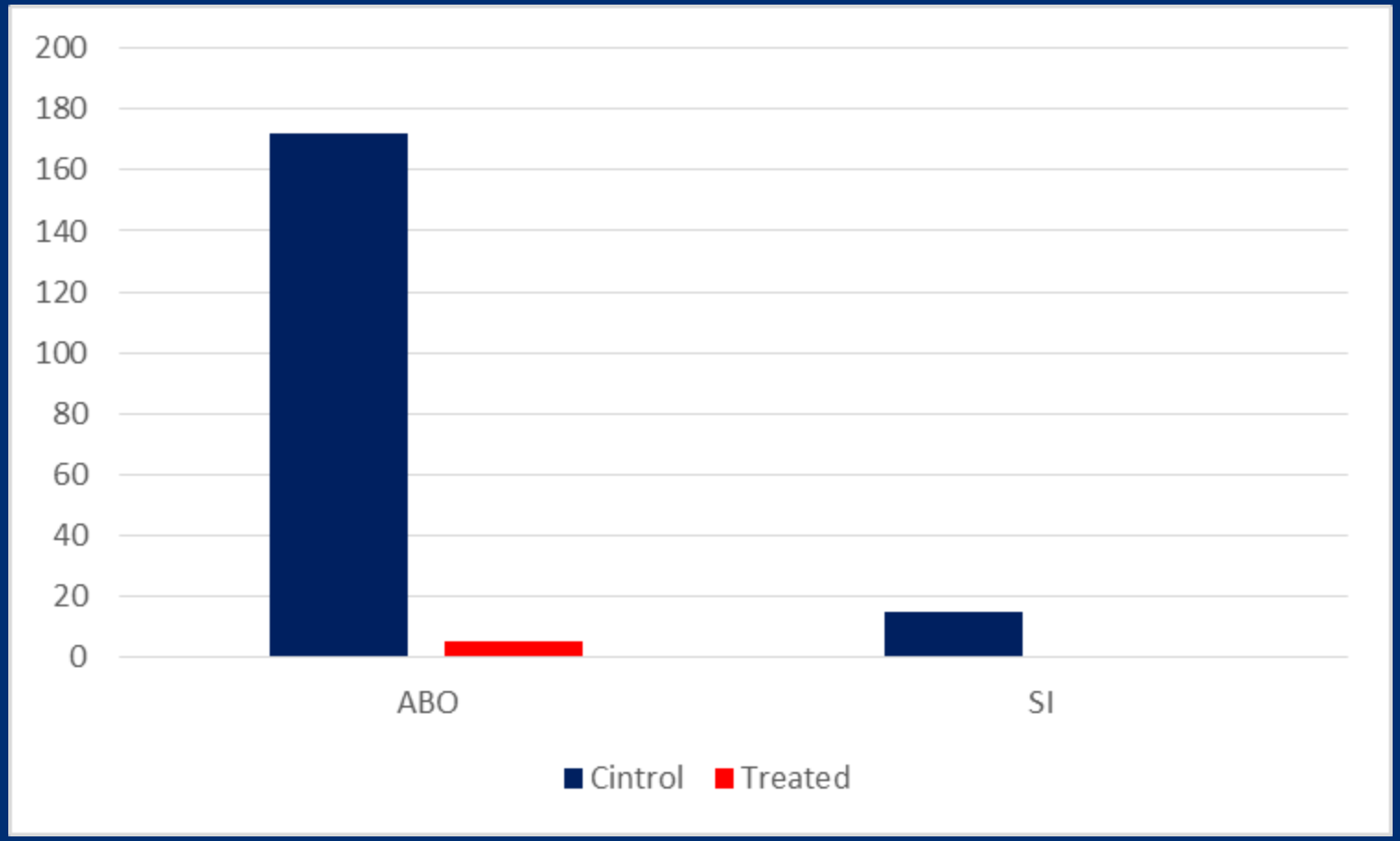


Percent Reduction in Larvae




Grass Samples
Larvae/ gram dry matter
0
2
4
6
8
2
4
6
8
10
12
14
16
18
Week of Sample
Fungus
Control

Tracer Worm Count at Necropsy



Summary

No initial effect on worm burden in the animal, but toward the end of the study reinfection was curtailed in fungus fed

Duddingtonia flagrans spores were highly effective in reducing larvae in sheep feces

Pasture forage sampling showed continual reduced larval population on the *Duddingtonia flagrans* pasture

The *Duddingtonia flagrans* pasture tracer lambs had fewer worms at end of trial

Tracer studies in sheep - Australia

- Statistically-significant reductions in worm burden in tracer animals in 5 trials
- Reductions ranged 54 – 87 %, average 68 %
- Worm species included Barbers pole worms (*Haemonchus* spp.), Brown stomach worms (*Teledorsagia* spp.) and Bankrupt/Black scour worms (*Trichostrongylus* spp.), including multi-resistant strains
- Modelling of epidemiology of worm infections shows these reductions will substantially reduce the production losses due to worms

Potential Treatment Effect

It has been estimated 10% of the worm population is within the host animal vs 90% is on the pasture

- If 10% of worms are within the animal and a dewormer is 95% (?) effective:
- 10 x 0.95% = 9.5% reduction
- If 90% worms are on pasture and Df is 70% effective: 90% x 0.70 = 63%
  (7 times more) via manure

Conclusion

- The use of *Duddingtonia flagrans* as a biological control agent is a promising aid for reducing pasture infectivity and subsequent reinfection

BioWorma®

Active Constituents: a minimum of 500,000 chlamydospores per gram

Daily feeding rates: 6g/100kg bodyweight

Available: Premixers, Feedmills and Veterinarians (not available in US yet – probably early fall)

Withholding periods: Meat & Milk: 0 days

Packsizes: 7.5kg, 15kg, 25kg and 1000kg

BioWorma® : Summary

Firstly complete Fecal Egg Count (FEC)/FAMACHA/animal condition

- Deworm the selected (TST) animals with an effective dewormer
- Move animals onto low-worm pasture (if available)
- Administer *D. flagrans* in daily rations
  - Duration of feeding will usually be 8-16 weeks
- Most worm-susceptible animals are:
  - Youngsters (3-12months)
  - Periparturient females (late stage of pregnancy & while lactating)
- Strategic use during periods when weather conditions are conducive to larval development and transmission onto pasture at temperatures above 40°
- Worm management strategy for your area - Veterinarian, Animal Health Advisor or Government Advisory groups
- Strategic Integrated Parasite Management (IPM) plan
  - It is important to consider the principles of refugia

Cost (?) of BioWorma®

- Guideline – Subject to change depending on various factors including shipping and distribution costs subsequent to marketing
  - Looks like estimated cost of the product itself $60-70 per pail depending on size (4 sizes)
  - Estimated cost per animal
    - Youngsters - $0.09-0.12/head/day.
    - Adults - $0.24-0.36/head/day
  - Final cost will include marked up shipping and distribution

International
Animal Health Products
THE AUSTRALASIAN COMPANY

More Information:

www.bioworma.com

American Consortium for Small Ruminant Parasite Control

ACSRPC.org, wormx.info