

## APPENDIX 5 – NEW ZEALAND EXAMPLE DRENCHSMART REPORT



In association with:















Case Study Farmer 18




Season: Autumn 2017

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## DRENCH SUMMARY

Drench Active	Quick Drench Selection	Species	Starting FEC	Percentage Reduction	Combined Percentage Reduction	Resistance Status	Test Confidence
Benzimidazole		Strongyle	4935	71.6%	69.7%	Resistance Confirmed	Med
		Nematodirus	140	0.0%			Low
Combination (BZ & Lev)		Strongyle	3535	98.7%	98.4%	No Resistance Detected	High
		Nematodirus	140	90.9%			Med
Abamectin		Strongyle	2380	99.3%	99.3%	No Resistance Detected	High
		Nematodirus	35	100.0%			Low
Moxidectin		Strongyle	5075	99.9%	99.8%	No Resistance Detected	High
		Nematodirus	105	97.0%			Med
Combination (Lev & Aba)		Strongyle	3465	99.1%	99.1%	No Resistance Detected	High
		Nematodirus	70	96.4%			Low
Combination (BZ, Lev, Aba)		Strongyle	4445	99.9%	99.9%	No Resistance Detected	High
		Nematodirus	70	100.0%			Low

### Availability Legend

-  Available for Use – this active has not demonstrated resistance at this point in time
-  Use Cautiously – this active may be developing resistance and should be used cautiously
-  Do not use – this active is not working effectively on this property and use should be discontinued

**For more detailed explanations on drench use please refer to the recommendations section of this report**

## DAY 10 LARVAL CULTURE SPECIES RESISTANCE SUMMARY \*\*

Note: Following consultation with the client, it was decided to do a larval culture on Combination (BZ & Lev), a drench they have been using which is close to 'suspected resistance' rather than Benzimidazole, a drench they do not use which failed.

To identify resistance for each parasite species for each drench active, we use Larval Cultures and average faecal egg counts (FEC). Using the species proportion of the Day 1 Larval Culture and the FEC from the Day 1 mob sample, we extrapolate a Day 1 FEC for each parasite species and active combination. For example, if 100% of the species found in the Day 1 Larval Culture are *Trichostrongylus* and the Day 1 strongyle FEC in the Benzimidazole sample is 270epg then we would use a Day 1 FEC of 270epg for *Trichostrongylus* in the Benzimidazole sample.

We do the same for the Day 10 FEC for each parasite species, using the average Day 10 FEC for each active. For example, if 83% of the species found in the Day 10 Larval Culture for Benzimidazole were *Trichostrongylus*, and the average Day 10 strongyle FEC in the Benzimidazole sample was 218epg; then the Day 10 FEC for *Trichostrongylus* in the Benzimidazole sample is extrapolated as 83% x 218epg = 181epg.

We then calculate the FEC reduction percentage (Reduc %) for *Trichostrongylus* in the Benzimidazole sample as  $(270\text{epg} - 181\text{epg})/270\text{epg} = 33\%$ .

Nematodirus eggs can be identified when processing FEC, so Nematodirus reduction percentages can be calculated directly from FEC counts.

### Parasite Species

	<i>*Ostertagia/Teladorsagia</i>		<i>*Trichostrongylus</i>		<i>*Haemonchus</i>		<i>Cooperia</i>		<i>Oesophagostomum / Chabertia</i>		<i>Other</i>		<i>*Nematodirus</i>	
	Reduc %	Validity	Reduc %	Validity	Reduc %	Validity	Reduc %	Validity	Reduc %	Validity	Reduc %	Validity	Reduc %	Validity
<b>Combination (BZ &amp; Lev)</b>	81.4%	Y	98.2%	Y	100.0%	Y	100.0%	Y	100.0%	Y	N/A	N/A	90.9%	Y

\* Species of most significance, \*\* Please Note: The egg counts of each worm type are extrapolated from the larval culture results, this is an indicator of trends only, not an absolute result. Nematodirus is not included in the main data table as its susceptibility or resistance is evident from the FEC data.

## CHART CODES

### Reduction % Key:

99% and Above – Drench is effective against this species

95% - 98% (inclusive) – Resistance is developing

94% and below – Drench is NOT effective against this species as resistance has been confirmed

### Test Validity:

Y = Pre-test worm species present at more than 50epg

N = Pre-test worm species present at less than 50epg

“Where a pre-test/pre-drench worm species is present at less than 50epg for that species – then no validity should be attributed to that result.”

Source: [www.wormboss.com.au](http://www.wormboss.com.au)

# RESULTS INTERPRETATION AND RECOMMENDATIONS SECTION

## Faecal Egg Count Reduction Test Recommendations

The most important worms in sheep in your part of New Zealand are *Haemonchus*, *Ostertagia*, and *Trichostrongylus*.

- ✦ The Day 1 Larval Culture (LC) result is shown on page 11. It revealed *Haemonchus*, *Ostertagia*, *Trichostrongylus*, *Cooperia*, *Chabertia* and *Nematodirus* parasites were present on Day One
- ✦ Day 10 LC results are shown in the Day 10 Larval Culture Species Resistance Summary (page 4)

## Benzimidazoles (BZ)

- ✦ Failed for Strongyle FEC reduction (71.6%)
- ✦ Failed for *Nematodirus* FEC count reduction (0.0%)
  - Low starting FEC for *Nematodirus*
- ✦ Day 10 Larval Culture not performed on clients request
- ✦ We recommend not to use

#### Combination (BZ & Lev)

- ✦ Passed overall for Strongyle FEC reduction (98.7%) however LC results show a fail for the *Ostertagia* species (81.4%)
  - Day 10 Larval Culture performed on clients request, as this is a drench family of interest
  - *Ostertagia*, *Trichostrongylus* and *Nematodirus* parasites present both at Day 1 and Day 10
- ✦ Failed for *Nematodirus* FEC reduction (90.9%)
- ✦ We recommend not to use

#### Abamectin (Aba)

- ✦ Passed for both *Nematodirus* (100%) & Strongyle (99.3%) FEC reduction
  - Low starting FEC for *Nematodirus*, we recommend a re-test when more *Nematodirus* parasites are present
- ✦ Available for use

#### Moxidectin (MOX)

- ✦ Passed for Strongyle FEC count reduction (99.9%)
- ✦ Suspected failed for *Nematodirus* FEC reduction (97.0%)
- ✦ Available for use to control Strongyle parasites, use with caution in spring when *Nematodirus* is present and use Drench Checks

#### Combination (Lev & Aba)

- ✦ Passed for Strongyle FEC count reduction (99.1%)
- ✦ Suspected failed for *Nematodirus* FEC reduction (96.4%)
  - Low starting FEC for *Nematodirus*, re-test when more *Nematodirus* parasites are present
- ✦ Available for use to control Strongyle parasites, use with caution in spring when *Nematodirus* is present and use Drench Checks

#### Combination (BZ, Lev & Aba)

- ✦ Passed for both *Nematodirus* (100%) & Strongyle (99.9%) FEC count reduction
  - Low starting FEC for *Nematodirus*, re-test when more *Nematodirus* parasites are present
- ✦ Available for use

Although you have effective drenches working on your property, we recommend you look into utilizing alternative parasite control options. The FECPAK<sup>G2</sup> system would allow you to regularly monitor parasite levels, easily link to your Veterinarian or advisor, drench only when necessary, and continue to monitor drench efficacy. You may also consider using sires from breeders who select using parasite resistant traits (SIL WormFEC breeding values). The views and interpretations expressed in this report are that of Techion Group Limited. It is not claimed to be the only interpretation. Any questions in relation to the conclusions contained in this report can be directed to Techion Group Limited. Consultation with your vet or advisor is welcomed.

Kind regards,

Techion Group Ltd.

## APPENDIX A: GENERAL INFORMATION

### CUSTOMER DETAILS

**Farmer Name:** Case Study Farmer 18  
**Phone:** XX-XXX-XXXX  
**Email:** XXXXXXXXXXXXXXXXXXXXX  
**Address:** XXXXXXXXXXXXXXXXXXXXX

### CONTRACTOR DETAILS

**Contractor Name:** XXXXXXXX  
**Certification Number:** DS007  
**Phone:** XX-XXX-XXXX  
**Mobile:** XXX-XXX-XXXX  
**Email:** XXXXXXXXXXXXXXXXXXXXX

### COLLECTION DETAILS

**Submission Lab Number:** 62252, 62359  
**Day One Collection Date:** 13/3/17  
**Day Ten Collection Date:** 22/3/17  
**Starting FEC:** 910epg  
**Age of Animals:**  
**Last Treatment Date:**  
**Drench Used:**

**DRENCH SELECTION**

- ✦ Benzimidazole, Combination (BZ & Lev), Abamectin, Moxidectin, Combination (Lev & Aba), Combination (BZ, Lev & Aba)

**CUSTOMER FARMING OPERATION INFORMATION**

Farming Type: (percentage of stock in each group):

Beef	Sheep	Dairy	Goats	Dry Stock	Other -
35 %	65 %	%	%	%	%

**If Sheep – What does the farmer do with their lambs:**

Breed, sell some store and fatten some

**Stock Units (approx):**

8,500

**Drench/s currently using:**

Ravensdown combo, Abamectin, Combination Triple, Moximax

**Does the farmer undertake a pre – lamb drench:**

No, except for our hoggets

**Drench Used:**

Combination Triple

**Which pre - lamb ewe classes are drenched:**

None

**Country Type: High Country / Hill Country / Low Land / Other:**

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**Other Comments:**

## APPENDIX B: DRENCHSMART PROTOCOL INFORMATION

### PROTOCOLS

- Starting FEC must be a minimum of 500epg, although recommendation is levels of 700-800epg
- Starting FEC is validated through the Techion Laboratory
- A sensitivity of 35epg is used for all FEC tests
- DrenchSmart agreement is signed by all parties involved (Customer, Contractor and Techion)
- All drenches used in trial are within the listed expiry period and batch numbers are provided
- A measured composite mob sample of 12 animals pre-drench is used and then 12 individual samples post-drench
- All treatments are administered orally
- All animals involved in the trial are ear tagged – no exceptions

### DRENCH RESISTANCE – A DEFINITION

*“Drench resistance occurs once a population of a species of worm can survive a dose of a drench that would have previously killed it.”*

Source: [www.wormboss.com.au](http://www.wormboss.com.au)

### DETECTING DRENCH RESISTANCE

The test used to determine the drench resistance status for sheep drenches on your property is called a Faecal Egg Count Reduction Test (FECRT). This test is based around the fact that when parasites are first ingested by grazing animals, it will take 18 - 21 days before it is able to produce eggs and betray its presence. Put another way, if a fully effective drench treatment has been administered, the earliest we would expect to see eggs in faecal samples is 18 - 21 days later. If we drench accurately and see eggs in samples 10 days post-treatment, this is normally accepted as evidence that some worms have survived the treatment, i.e. the drench is not working properly.

FECRT tests are normally expressed as the percentage reduction in eggs counted between the pre and post-drench (10 days) periods. A treatment that is 100% successful would result in all worms being killed and egg counts at day 10 would be 0. In this case, the reduction would be 100%. In other words the higher the percentage (%) figure the better the drug is performing.

### DRENCHSMART – RESISTANCE LEVELS

Reduction	Resistance Status
98% and Above	No Resistance Detected – drug still effective
95% - 97%	Resistance Developing – the start of resistance has been identified
94% and Below	Drench Resistance Confirmed



## GENERAL NOTES ON TESTING FOR DRENCH RESISTANCE

- Because sheep and cattle do not generally share the same worms, a drench type that is failing to control sheep worms may still work effectively on cattle worms, i.e. don't extrapolate sheep results to cattle and vice versa
- There are many different parasite species on each farm and the mix of these species is likely to change through the season. Often when resistance is detected it is to an individual species only. By identifying the times of the year that the species is not present or stock classes the species does not affect then the use of the drug may still be possible at these times
- Because DrenchSmart tests work on measuring a percentage reduction, result accuracy is improved when we have a high starting FEC. If the starting FEC is less than 500 eggs per gram (epg) we need to be much more conservative when interpreting results. Sample size is also important. The more valid results we have the more confident we can be with our results
- A combination of issues such as starting FEC, sample size and other factors are used to assign a level of test confidence

Confidence Level	Interpretation
High	Can be very confident in results
Medium	Results are good and unlikely to change if we re-tested
Low	Would need to see a very poor reduction before resistance was declared with confidence. Results indicative only

## APPENDIX C: DATA RECORDS

### PRE-FECRT LARVAL CULTURE RESULTS - DAY ONE

#### STRONGYLE GROUP OF PARASITES

Scientific Name	Common Name	Site	Importance	Percentage Composition	Comments
Haemonchus contortus	Barbers pole worm	Abomasum	Rare in Southland and Otago but important if present	57.5%	
Teladorsagia (Ostertagia) spp	Small brown stomach worm	Abomasum	Important in spring and summer	3.9%	
Trichostrongylus axei	Stomach hair worm	Abomasum	Important in late summer and autumn	28.4%	
Trichostrongylus spp	Black scour worm	Small intestine	Important in late summer and autumn		
Cooperia spp	Small intestinal worm	Small intestine	Common in autumn but rarely important	5.9%	
Strongyloides papillosus	Threadworm	Small intestine	Common in autumn but rarely important	0.0%	
Bunostomum trigonocephalum	Hookworm	Small intestine			
Oesophagostomum / Chabertia	Nodule worm	Large intestine	Rarely important	2.0%	
	Large mouth bowel worm	Large intestine			
Trichuris ovis	Whipworm	Large intestine		0.0%	
Nematodirus	Thin neck intestinal worm	Small intestine	Important in early spring through autumn	2.1%	
<b>Total %</b>				<b>100</b>	

### DRENCHSMART – RESULTS – BENZIMIDAZOLE (BZ)

Note: Only 1 mob sample, rather than 12 individual samples were received for the Day 10 collection.

**Drench Tested:** Benzimidazoles

**Day One Result**

	Strongyle	Nematodirus	Total	EPG
Average:	141	4	145	5075

**Starting Average FECs:**

4935	140
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**Day 10 Results**

Strongyle	Nematodirus	Total	EPG
40	4	44	1540

**Day 10 Average FEC's:**

Strongyle	Nematodirus	Total
1400	140	1540

**REDUCTION PERCENTAGES:**

71.6%	0.0%	69.7%
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### DRENCHSMART – RESULTS – COMBINATION (BZ & LV)

**Drench Tested:** Combination (BZ & Lev)

**Day One Result**

	Strongyle	Nematodirus	Total	EPG
Average:	101	4	105	3675

**Starting Average FECs:**

3535	140
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**Day 10 Results**

Strongyle	Nematodirus	Total	EPG
2	1	3	105
1	0	1	35
2	0	2	70
0	0	0	0
0	0	0	0
0	0	0	0
1	1	2	70
4	1	5	175
0	0	0	0
4	0	4	140
0	1	1	35

**Day 10 Average FEC's:**

Strongyle	Nematodirus	Total
45	13	57

**REDUCTION PERCENTAGES:**

98.7%	90.9%	98.4%
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**DAY 10 LARVAL CULTURE SPECIES COMPOSITION – COMBINATION (BZ & LEV)**

Note: Day 10 Larval Culture performed on clients request, as this is a drench family of interest.

Species	Reduction Percentage (%)	Valid Result
Ostertagia /Teladorsagia	81.4%	Y
Trichostrongylus	98.2%	Y
Haemonchus	100.0%	Y
Cooperia	100.0%	Y
Chabertia / Oesophagostomum	100.0%	Y
Other	N/A	N/A
Nematodirus	90.9%	Y

**DRENCHSMART – RESULTS – ABAMECTIN (ABA)**

**Drench Tested: Abamectin**

**Day One Result**

	Strongyle	Nematodirus	Total	EPG
Average:	68	1	69	2415
Starting Average FECs:	2380	35		

**Day 10 Results**

	Strongyle	Nematodirus	Total	EPG
	0	0	0	0
	1	0	1	35
	0	0	0	0
	1	0	1	35
	0	0	0	0
	0	0	0	0
	1	0	1	35
	1	0	1	35
	0	0	0	0
	0	0	0	0
	1	0	1	35
<b>Day 10 Average FEC's:</b>	16	0	16	
<b>REDUCTION PERCENTAGES:</b>	99.3%	100.0%	99.3%	

DRENCHSMART – RESULTS – MOXIDECTIN (MOX)

**Drench Tested:** Moxidectin

**Day One Result**

	Strongyle	Nematodirus	Total	EPG
Average:	145	3	148	5180

**Starting Average FECs:**

5075	105
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**Day 10 Results**

Strongyle	Nematodirus	Total	EPG
0	0	0	0
0	0	0	0
0	0	0	0
1	0	1	35
1	0	1	35
0	1	1	35
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

**Day 10 Average FEC's:**

6	3	10
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**Reduction Percentages:**

99.9%	97.0%	99.8%
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DRENCHSMART – RESULTS – COMBINATION (LV & ABA)

**Drench Tested:** Combination (Lev & Aba)

**Day One Result**

	Strongyle	Nematodirus	Total	EPG
Average:	99	2	101	3535

**Starting Average FECs:**

3465	70
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**Day 10 Results**

Strongyle	Nematodirus	Total	EPG
0	0	0	0
1	1	2	70
1	0	1	35
0	0	0	0
0	0	0	0
3	0	3	105
5	0	5	175
1	0	1	35
0	0	0	0
1	0	1	35
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

**Day 10 Average FEC's:**

30	3	33
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**REDUCTION PERCENTAGES:**

99.1%	96.4%	99.1%
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### DRENCHSMART – RESULTS – COMBINATION (BZ, LEV & ABA)

**Drench Tested:** Triple Combination (BZ, Lev & Aba)

**Day One Result**

	Strongyle	Nematodirus	Total	EPG
Average:	127	2	129	4515

**Starting Average FECs:**

4445	70
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**Day 10 Results**

Strongyle	Nematodirus	Total	EPG
1	0	1	35
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

**Day 10 Average FEC's:**

Strongyle	Nematodirus	Total
3	0	3

**REDUCTION PERCENTAGES:**

99.9%	100.0%	99.9%
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### DRENCHSMART – RESULTS – CONTROL

**Drench Tested:** Control

**Day One Result**

	Strongyle	Nematodirus	Total	EPG
Average:	141	2	143	5005

**Starting Average FECs:**

4935	70
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**Day 10 Results**

Strongyle	Nematodirus	Total	EPG
66	2	68	2380
0	0	0	0
94	10	104	3640
25	1	26	910
48	0	48	1680
62	7	69	2415
44	3	47	1645
99	3	102	3570
43	3	46	1610
53	1	54	1890

**Day 10 Average FEC's:**

Strongyle	Nematodirus	Total
1869	105	1974

**REDUCTION PERCENTAGES:**

62.1%	0.0%	60.6%
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