Anthelminthic resistance update

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This report details the analysis of data submitted to Gribbles Veterinary laboratories for the season November 2022 to May 2023 for fully differentiated faecal egg count reduction tests (FECRT) from sheep.

Data was obtained from cases that clearly identified the test anthelmintic and sample groups contained 10+ animals per treatment group. Data at genus level required a pre-treatment egg count of 50 eggs per gram (epg) per genus to be determined valid. All other test requirements and methodology were as described by McKenna (2018). The final data set contained resistance information for 2451 valid species, collected from 135 submissions over this period. 1599 data points were excluded due to insignificant numbers of genus in a FECRT (<50 epg in the pre-FECRT) and/ or the test anthelmintic not being clearly identified on the submission form. A number of factors contribute to having <50 epg in the pre-FECRT assigned to one genus, including the season the FECRT was performed, prevalence of different genus on different farms and regions across New Zealand, and egg output of the genus present.

Submissions that did not clearly identify that they were FECRT were not included in the study. Submissions where part of the FECRT were performed in-clinic, with only the larval culture being performed at Gribbles Veterinary were also excluded from the study, due to lack of compliance with the laboratory's accreditation and quality procedures.

The results of these analyses, based on a total of 54 cases from the North Island and 81 cases from the South Island, are presented in table 1. The percentage of resistance for single, double and triple-active anthelmintics remain relatively similar to those reported in the 2022 update (Riddy, 2022). Of the 110 farms tested using a triple combination anthelmintic, 33% of *Teladorsagia* showed resistance. *Trichostrongylus* showed a similar pattern of resistance with 36% of the 120 farms tested displaying resistance to the triple combination anthelmintic used in the FECRT.

Of note is the decrease in usage of single-actives in FECRT as they become less available for use. No serious trends of increase in resistance were detected in comparison to the data obtained in the 2021-2022 report. Conversely, no great reduction in resistance was noted. There were less tests conducted this season, down from 162 to 135. The extreme weather seen in many regions over this testing period may have been a contributing factor. These reduced test numbers may have a masking effect, with less farms being surveyed for resistance or susceptibility.

It is noted by the author that a number of the single-actives and one of the dual combinations in use are not available commercially at present. The data collected by Gribbles Veterinary is done passively through submissions to the laboratory and relies on the information supplied by the submitting veterinary. Incorrect recording of the test anthelmintic, use of older stock, or off-licence use of products may explain these abnormalities.

Stratification of cases by geographical location, for both anthelmintic and genus for the percentage of resistance can be found in figure 1 and figure 2. The corresponding data regarding total data points analysed (including both resistant and susceptible nematodes) can be found in table 2 and table 3.

Table 1: The prevalence of anthelmintic resistance identified in sheep nematodes by fully differentiated faecal egg count reduction tests (FECRTs) undertaken on case submissions to Gribbles Veterinary laboratory during 2022-2023 (n=2451)

PARASITE	BZ	LEV	ABA	MOX	BZ/LEV	LEV/ABA	DERQ/ABA	ABA/OXF	ABA/MONE	ABA/CLO	TRIPLE
Cooperia	9/45 (20%)	0/52 (0%)	15/52 (29%)	9/32 (28%)	0/51 (0%)	5/64 (8%)	0/29 (0%)	0/5 (0%)	0/35 (0%)	0/5 (0%)	3/91 (3%)
Haemonchus	2/16 (13%)	0/18 (0%)	1/25 (4%)	1/15 (7%)	0/30 (0%)	0/17 (0%)	0/19 (0%)	0/0 (0%)	0/22 (0%)	0/5 (0%)	0/47 (0%)
Nematodirus	21/30 (70%)	11/35 (31%)	4/38 (11%)	4/18 (22%)	8/32 (25%)	2/46 (4%)	1/24 (4%)	0/4 (0%)	0/29 (0%)	1/3 (33%)	2/70 (3%)
Oesoph/Chabertia	2/28 (7%)	1/36 (3%)	0/31 (0%)	0/16 (0%)	0/30 (0%)	0/41 (0%)	0/21 (0%)	0/5 (0%)	0/22 (0%)	0/2 (0%)	0/57 (0%)
Teladorsagia	32/54 (59%)	37/62 (60%)	27/61 (44%)	14/35 (40%)	32/62 (52%)	18/74 (24%)	6/38 (16%)	1/4 (25%)	10/45 (22%)	5/5 (100%)	36/110 (33%)
Trichostrongylus	32/60 (53%)	36/70 (51%)	28/67 (42%)	18/41 (44%)	28/64 (44%)	28/84 (33%)	4/42 (10%)	3/6 (50%)	2/48 (4%)	3/6 (50%)	43/120 (36%)

Benzimidazole BZ, Levamisole LEV, Ivermectin IVE, Abamectin ABA, Moxidectin MOX, Derquantel DERQ, Monepantel MONE, Oxfendazole OXF, TRIPLE includes several brands with 3 actives in combination)

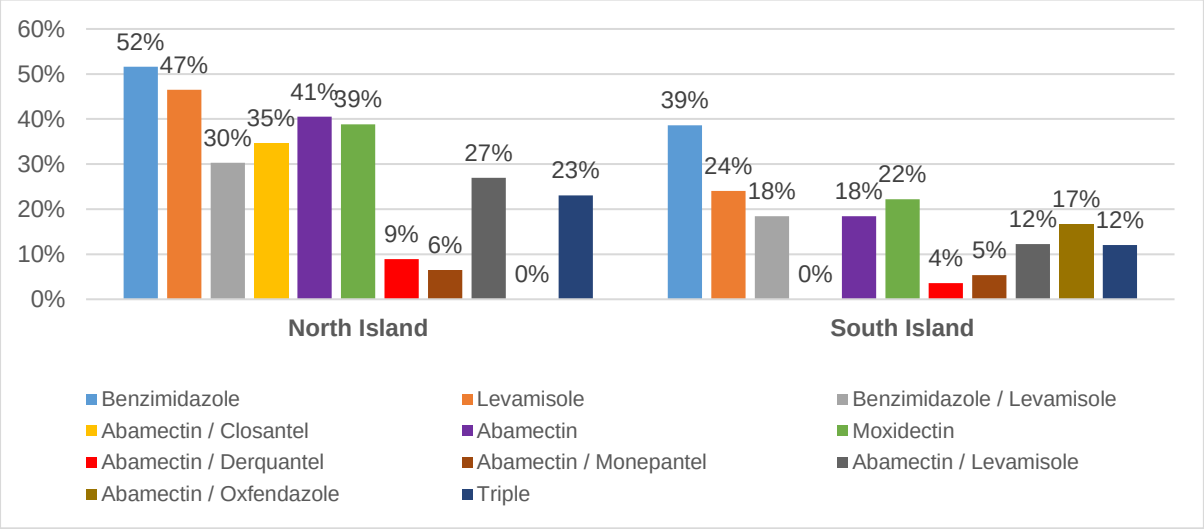

Figure 1: Prevalence of resistance to anthelmintic recorded in sheep FECRTs submitted to Gribbles Veterinary laboratories during 2022-2023 by location (n=2451).

Table 2: Total number of nematode data points analysed from sheep FECRTs submitted to Gribbles Veterinary laboratories for the North Island and South Island of New Zealand during 2022-2023 by test anthelmintic.

	North Island	South Island
Benzimidazole	62	171
Levamisole	86	187
Benzimidazole / Levamisole	155	114
Abamectin / Closantel	26	0
Abamectin	111	163
Moxidectin	67	90
Abamectin / Derquantel	90	83
Abamectin / Monepantel	108	93
Abamectin / Levamisole	89	237
Abamectin / Oxfendazole	0	24
Triple	221	274

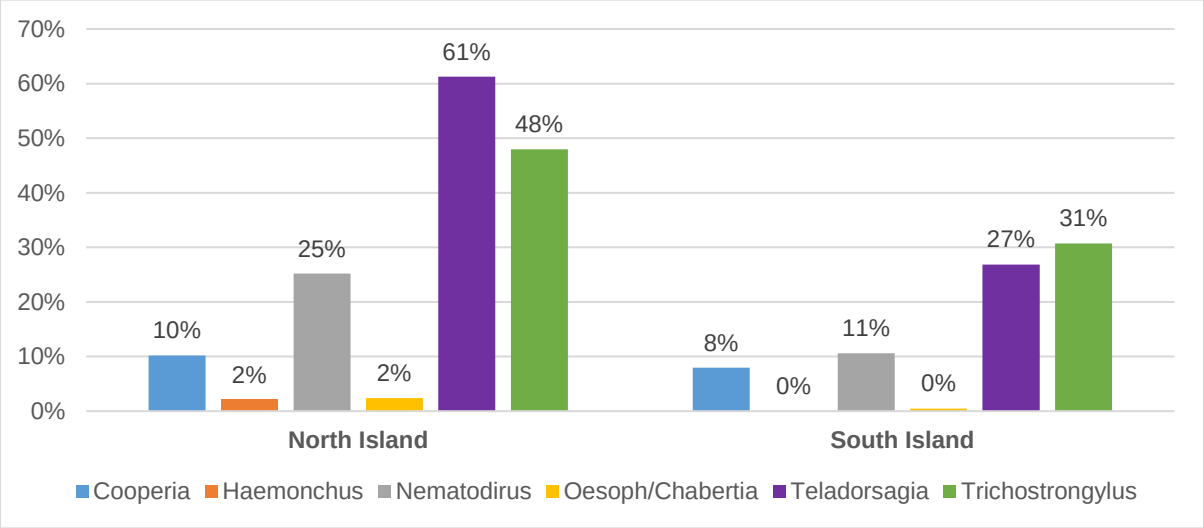

Figure 2: Prevalence of resistance to anthelmintic to genus level recorded in sheep FECRTs submitted to Gribbles Veterinary laboratories during 2022-2023 by location (n=2451).

Table 3: Total number genus data points analysed from sheep FECRTs submitted to Gribbles Veterinary laboratories for the North Island and South Island during 2022-2023 by location.

	North Island	South Island
Cooperia	186	275
Haemonchus	189	25
Nematodirus	131	198
Oesoph/Chabertia	84	205
Teladorsagia	204	346
Trichostrongylus	221	387

In conclusion, as we see the shift in the way we manage parasite control across New Zealand, we will continue to monitor resistance using this passive surveillance method. The use of education, development of control plans which limit anthelmintic usage and current data regarding anthelmintic resistance, gives us a tool-box of management strategies to work with. The lack of any clear increase in resistance between the 2021/2022 and 2022/2023 FECRT seasons is positive. However as we know, resistance is a developing problem and the need for continued analysis of annual data is required before any definitive conclusions on resistance can be made. The continued production of these annual updates will help create a clearer picture of the true level of parasite resistance for farms submitting samples to Gribbles Veterinary for analysis.

References:

McKenna PB. Update on the prevalence of anthelmintic resistance. *VetScript* 3:46–47, 2018

Riddy SF. Update on the prevalence of anthelmintic resistance 2021–2022. Gribbles Veterinary, Nov 2022.