

Efficacy Study 2

DON-ACVM-2016 13B EFFICACY

OTAGO



This randomised controlled dose confirmation study evaluated the efficacy of Eprinomectin/Levamisole Spot-On against naturally acquired gastrointestinal nematode infections on a commercial sheep farm in Otago. Primary efficacy against each nematode species and life stage was assessed using Total Worm Count Reduction.

Eighteen mixed sex, weaned, approximately 5 month old Romney x Coopworth lambs were enrolled from a larger mob based on pre-trial

FECs and liveweight. Mean wool staple length was 66mm. The eight heaviest lambs were allocated into the negative control group. On day 12, the eight animals per group with the highest day 0 FECs were humanely slaughtered.

Eprinomectin/Levamisole Spot-On was highly effective against all adult and immature gastrointestinal strongyles present in the study.

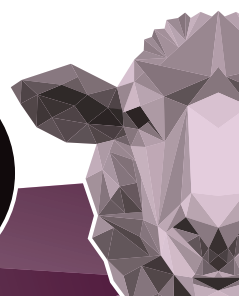
ARITHMETIC MEAN EFFICACY % | TOTAL WORM COUNTS

	<i>Tel. cir</i>	<i>T. axi</i>	<i>N. spa</i>	<i>N. fil</i>	<i>T. col</i>	<i>T. vit</i>	<i>C. cur</i>	<i>Oes. spp</i>	<i>T. ovi</i>
Eprinomectin/ Levamisole Spot-On Efficacy (%)	100	100	100	100	100	100	100	100	100
Mean Worm Counts in Control Animals	1379	157	1136	2414	1959	8926	165	109	43

FEC RESULTS (% EFFICACY)

Secondary treatment efficacy was assessed based on the reduction of mean FEC on day 14 post treatment compared to day 0, for remaining animals. Eprinomectin/Levamisole Spot-On achieved 100% efficacy against allworm species present.

	<i>Tel. spp</i>	<i>Nem. spp</i>	<i>N. spa</i>	<i>N. fil</i>	<i>T. col</i>
Day 0	421	401	2700	175	210
Day 7	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)



*Teladorsagia circumcincta (Tel. cir)*

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Control	550	1750	1100	950	2000	1400	1900	-

Trichostrongylus axei (T. axi)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Control	400	50	150	50	100	250	100	-

Trichostrongylus colubriformis (T. col)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Control	400	50	150	50	100	250	100	-

Trichostrongylus vitrinus (T. vit)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Control	17261	7831	12710	7339	8282	5576	3485	-

Nematodirus filicolicis (N. fil)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Control	1712	1456	896	1520	1392	624	352	-

Nematodirus spathiger (N. spa)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Control	3638	3094	1904	3230	2958	1326	748	-

Cooperia curticei (C. cur)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Control	3638	3094	1904	3230	2958	1326	748	-

Oesophagostomum spp (Oes. spp)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Control	130	50	90	220	110	70	90	-

Trichuris ovis (T. ovi)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Control	10	30	20	60	80	40	60	-



Efficacy Study 1

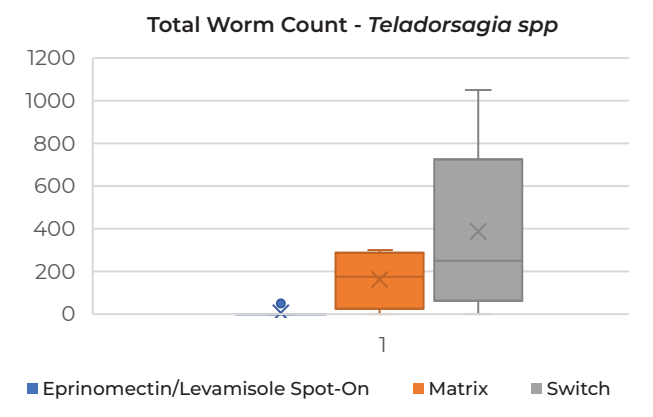
DON-ACVM-2017-S1

HELENSVILLE

This randomised negatively and positively controlled dose confirmation study evaluated the efficacy of Eprinomectin/Levamisole Spot-On against naturally acquired gastrointestinal nematode infections on a commercial sheep farm in Helensville. The positive control products were Matrix Hi-Mineral, a triple combination oral containing abamectin, oxfendazole and levamisole (Boehringer Ingelheim, A9390) and Switch Hi-Mineral, a double combination oral containing abamectin and levamisole (Boehringer Ingelheim, A9970). Primary efficacy against each nematode species and life stage was assessed using Total Worm Count Reduction.

Forty mixed sex, weaned, approximately 3 month old Coopworth lambs were enrolled from a larger mob based on pre-trial FECs. Wool staple length was 40-50 mm. Lambs were randomly allocated into four treatment groups (including negative controls) containing 10 animals. The eight animals with the highest FECs pre-treatment were selected for slaughter in the study at Day 10.

Eprinomectin/Levamisole Spot-On was highly effective against all gastrointestinal nematodes identified. Differences in mean adult TWCRs for *Teladorsagia spp* between Eprinomectin/Levamisole Spot-On and Switch Hi-Mineral were statistically significant ($p < 0.05$).



GEOMETRIC MEAN EFFICACY %

	<i>Tell. spp</i>	<i>H. con</i>	<i>T. axi</i>	<i>T. spp</i>	<i>C. cur</i>	<i>Oes. spp</i>	<i>C. spp</i>	<i>T. ovi</i>	<i>N. spp</i>
Eprinomectin/Levamisole Spot-On	99*	99.6	99.5	99.3	99.9	99.7	99.3	99.9	99.9
Matrix Hi-Mineral	82.7	99.9	99.5	99.3	99.9	99.7	99.3	99.9	99.9
Switch Hi-Mineral	67.9*	99.5	99.5	99.3	99.9	99.7	99.3	99.9	99.9

The *Teladorsagia spp* efficacy for the Eprinomectin/Levamisole Spot-On treatment group was significantly higher ($*p < 0.05$) than the efficacy for Switch.

Raw worm counts for the Eprinomectin/Levamisole Spot-On, Matrix and Switch groups for *Teladorsagia spp* are shown below:

Treatment	<i>Tell. spp</i>	<i>H. con</i>	<i>T. axi</i>	<i>T. spp</i>	<i>C. cur</i>	<i>Oes. spp</i>	<i>C. spp</i>	<i>T. ovi</i>	<i>N. spp</i>
Eprinomectin/Levamisole Spot-On	0	0	0	50	0	0	0	0	0
Matrix Hi-Mineral	100	200	300	0	250	0	300	150	
Switch Hi-Mineral	150	1050	50	750	0	350	100	650	
Controls	2000	650	1250	2150	750	150	0	3400	

***Haemonchus contortus (H. con)***

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Matrix Hi-Mineral	0	0	0	0	0	0	0	0
Switch Hi-Mineral	50	0	0	0	0	0	0	0
Controls	3300	950	850	2300	750	1350	100	6550

Trichostrongylus axei (T. axi)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Matrix Hi-Mineral	0	0	0	0	0	0	0	0
Switch Hi-Mineral	0	0	0	0	0	0	0	0
Controls	50	100	200	150	150	50	0	400

Small Intestinal Trichostrongylus spp (T. spp)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Matrix Hi-Mineral	0	0	0	0	0	0	0	0
Switch Hi-Mineral	0	0	0	0	0	0	0	0
Controls	0	300	200	200	150	50	100	200

Nematodirus spp (N. spp)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Matrix Hi-Mineral	0	0	0	0	0	0	0	0
Switch Hi-Mineral	0	0	0	0	0	0	0	0
Controls	1100	500	450	950	350	500	200	700

Cooperia curticei (C. cur)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Matrix Hi-Mineral	0	0	0	0	0	0	0	0
Switch Hi-Mineral	0	0	0	0	0	0	0	0
Controls	250	1100	1500	500	300	550	300	800

Oesophagostomum spp (Oes. spp)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Matrix Hi-Mineral	0	0	0	0	0	0	0	0
Switch Hi-Mineral	0	0	0	0	0	0	0	0
Controls	30	20	40	60	50	20	30	70

Chabertia spp (C. spp)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Matrix Hi-Mineral	0	0	0	0	0	0	0	0
Switch Hi-Mineral	0	0	0	0	0	0	0	0
Controls	20	20	10	40	10	20	10	30

Trichuris ovis (T. ovi)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Matrix Hi-Mineral	0	0	0	0	0	0	0	0
Switch Hi-Mineral	0	0	0	0	0	0	0	0
Controls	240	60	80	470	60	40	50	40

Efficacy and PK Study

DON-ACVM-2018-S1

WAIPAWA



This randomised negatively and positively controlled dose confirmation study evaluated the efficacy of Eprinomectin/Levamisole Spot-On against naturally acquired gastrointestinal nematode infections on a commercial sheep farm in Waipawa. The positive control product was a single active oral levamisole product (Levicare Hi-Mineral, Boehringer Ingelheim, A5146). Primary efficacy against each nematode species and life stage was assessed using Total Worm Count Reduction.

Thirty-six Romney hoggets were enrolled. Hoggets were blocked by day -10 Faecal Egg Count (FEC) and randomly allocated into three groups containing twelve animals. Wool staple length ranged between 97-156mm. FEC's were taken on days -10, 0, 7, and on

day 12. The eight animals per group with the highest day 0 and day 7 FECs were humanely slaughtered.

Eprinomectin/Levamisole Spot-On was highly effective against all adult and immature gastrointestinal strongyles identified at the trial site including those with resistance to levamisole. The efficacy of Eprinomectin/Levamisole Spot-On for *Teladorsagia circumcincta*, *Teladorsagia trifurcata*, *Trichostrongylus axei* and *Trichuris ovis* was statistically significant from the Levicare Hi-Mineral group ($p < 0.05$).

Eprinomectin/Levamisole Spot-On was highly effective against a wide variety of worm species including species resistant to levamisole.

GEOMETRIC MEAN TOTAL WORM COUNT TREATMENT GROUPS

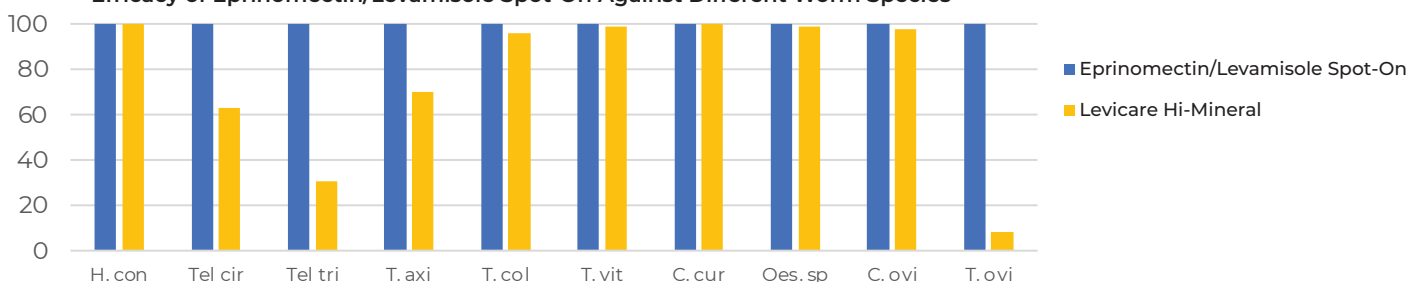
	<i>H. con</i>	<i>Tel. cir</i>	<i>Tel. tri</i>	<i>T. axi</i>	<i>T. col</i>	<i>T. vit</i>	<i>C. cur</i>	<i>Oes. spp</i>	<i>C. ovi</i>	<i>T. ovi</i>
Eprinomectin/Levamisole Spot-On	0	0	0	0	0	00	0	0	0	0
Levicare Hi-Mineral	0	317.6	149.6	157.5	9.02	5.25	0	0.82	0.82	15.7
Negative Controls	28.1	861.9	216	526.2	236.1	776.8	147.1	73.4	35.6	17.2

GEOMETRIC MEAN EFFICACY %

	<i>H. con</i>	<i>Tel. cir</i>	<i>Tel. tri</i>	<i>T. axi</i>	<i>T. col</i>	<i>T. vit</i>	<i>C. cur</i>	<i>Oes. spp</i>	<i>C. ovi</i>	<i>T. ovi</i>
Eprinomectin/Levamisole Spot-On	100	100*	100*	100*	100	100	100	100	100	100*
Levicare Hi-Mineral	100	63.2	30.7	70.1	96.2	99.3	100	98.9	97.7	8.7

* Group significantly different from the Levicare Hi-Mineral group ($p > 0.05$)

Efficacy of Eprinomectin/Levamisole Spot-On Against Different Worm Species



*Teladorsagia circumcincta (Tel. cir)*

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Levicare Hi-Mineral	68	340	374	204	408	306	1054	442
Controls	280	200	640	11560	760	520	2720	680

Teladorsagia trifurcata (Tel. tri)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Levicare Hi-Mineral	32	160	176	96	192	144	496	208
Controls	70	50	160	2890	190	130	680	170

Haemonchus contortus (H. con)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Levicare Hi-Mineral	0	0	0	0	0	0	0	0
Controls	50	0	0	100	50	150	50	250

Trichostrongylus axei (T. axi)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Levicare Hi-Mineral	100	300	150	400	50	550	50	150
Controls	200	350	400	950	450	750	1450	450

Trichostrongylus colubriformis (T. col)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Levicare Hi-Mineral	351	0	0	0	351	0	819	0
Controls	745	0	5592	806	61	224	1582	133

Trichostrongylus vitrinus (T. vit)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Levicare Hi-Mineral	99	0	0	0	99	0	231	0
Controls	2905	0	21808	3145	239	876	6186	517

Cooperia curticei (C. cur)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Levicare Hi-Mineral	0	50	2700	1600	0	2900	400	900
Controls	3650	0	27400	3950	300	1100	7750	650

Oesophagostomum spp (Oes. spp)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Levicare Hi-Mineral	0	0	0	10	0	0	0	10
Controls	130	80	40	70	50	280	100	20

Chabertia ovina (C. ovi)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Levicare Hi-Mineral	0	10	0	10	0	0	0	0
Controls	40	10	20	40	20	20	170	110

Trichuris ovis (T. ovi)

Eprinomectin/Levamisole Spot-On	0	0	0	0	0	0	0	0
Levicare Hi-Mineral	30	0	30	20	0	50	140	40
Controls	20	10	10	30	20	20	10	30