

## OVERBERG RESEARCH PROJECTS. XIII. A COMPARISON OF THE EFFICACY OF ALBENDAZOLE DRENCH AND AN ALBENDAZOLE SLOW-RELEASE CAPSULE AGAINST NEMATODE PARASITES IN SHEEP

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### ABSTRACT

The anthelmintic efficacy of albendazole intra-ruminal slow-release capsules (SRC) and albendazole drench against field strains of 5 genera of nematode parasites of sheep, were compared. The SRC reduced the number of L<sub>4</sub> and adult *Nematodirus* by 64,1% and 58,3% and the albendazole drench by 98,1% and 99,1%, respectively. Neither formulation was more than 89,5% effective against either the L<sub>4</sub> or adult stage of *Teladorsagia*. The efficacy of both formulations against the adult stages of *Haemonchus*, *Trichostrongylus* and *Oesophagostomum* ranged from 95,9 to 99,9%

**Key words:** Efficacy, albendazole, intra-ruminal slow-release capsule, nematodes, sheep

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Laby<sup>4</sup> developed an intra-ruminal slow-release capsule designed to deliver albendazole intra-ruminally at a continuous daily rate of approximately 0,5 mg kg<sup>-1</sup> to sheep with a body mass of 65 kg. This albendazole intra-ruminal slow-release capsule (SRC) was >90% effective against the common parasites of sheep in Australia and effectively controlled these parasites for a period of approximately 90 d<sup>2</sup>. The SRC, therefore, has very promising protective potential under conditions where sheep are exposed to severe continuous parasitic challenge. A non-parametric evaluation of the efficacy<sup>3,5</sup> of the SRC as well as the commercial drench of albendazole against field strains of nematode parasites of sheep, will not only provide the opportunity to compare the efficacy ratings of these 2 formulations against field strains of

nematodes with one another, but also to compare these efficacy ratings with those obtained by other workers who tested similar formulations of the same compound against field<sup>2</sup> and laboratory<sup>8</sup> strains of nematodes in sheep.

For this purpose, 28 crossbred Merino-yearling wethers kept on the Tygerhoek Experimental Farm for the preceding 6 months and 8, 7 month-old sheep of a similar type and sex, purchased on a nearby farm, were selected. On 14 November 1989 these animals were eartagged, vaccinated against blue tongue and enterotoxaemia, treated with ivermectin at 0,2 mg kg<sup>-1</sup> and placed on a 2 ha spray-irrigated grass/lucerne pasture on the Tygerhoek Experimental Farm (34° 10'S, 19° 55'E). The trial was conducted according to the experimental design (Table 1).

The processing of the gastro-intestinal organs for the recovery of nematode parasites and the counting and identification of these parasites were carried out according to procedures previously described in detail<sup>6</sup>.

The median, mean and range of nematode parasites recovered from the sheep in the different groups and the efficacy ratings determined by both the conventional and the non-parametric<sup>3</sup> methods

Table 1: Experimental design

**12 Dec 1989:** Select 33 sheep with positive faecal worm egg counts and a live mass of 35 to 65 kg from a group of 36 animals. Divide animals randomly with the aid of random tables, in 3 groups of 9 (Group 1), 12 (Group 2) and 12 (Group 3) animals.

**18 Dec 1989:** Dose each sheep in Group 3 with an albendazole intra-ruminal slow-release capsule (Captec Proftril, SmithKline Beecham).

**3 Jan 1990:** Dose all sheep in Group 2 with albendazole (Valbazen, SmithKline Beecham) at 3,8 mg kg<sup>-1</sup> live mass. Slaughter one sheep from Group 1. Remove all sheep from the pasture, place in concrete-floored pen and feed lucerne hay.

**8 Jan 1990:** Slaughter 8 sheep (Group 1) and process.

**9 Jan 1990:** Slaughter 12 sheep (Group 2) and process.

**10 Jan 1990:** Slaughter 12 sheep (Group 3) and process.

for the albendazole drench as well as the SRC, are presented in Table 2.

The SRC reduced the L<sub>4</sub> and adult populations of *Nematodirus* in the present trial by 64,1 and 58,3%, respectively. This is in sharp contrast with reductions of 98,1 and 99,1% respectively, obtained with the albendazole drench in the present trial. Van Schalkwyk et al<sup>8</sup> recorded a 100% removal of *Nematodirus* with the albendazole drench. The time of 22 d allowed between application of the SRC and necropsy of the animals in the present trial, might have been too short for the SRC to reach its full potential efficacy. However, Barton et al<sup>2</sup> recorded peaks of the metabolites of albendazole (albendazole sulphone and albendazole sulphoxide) in sheep within 10 d. Moreover, these workers recovered L<sub>4</sub> and adult *Nematodirus* from sheep 30 and 101 d after the application of the

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Table 2: Median, mean, range and reduction of the number of nematodes recovered from control sheep (Group 1), sheep dosed with albendazole (Group 2) and sheep dosed with an albendazole intra-ruminal slow-release capsule (Group 3)

	<i>H. contortus</i>		<i>N. abnormalis</i> and <i>N. spathiger</i>		<i>Strongyloides papillosus</i>	<i>Teladorsagia</i>		<i>Trichostrongylus colubriformis</i>	<i>Oesophagostomum venulosum</i>	
	L4	Ad	L4	Ad	Ad	L4	Ad	Ad	Ad	
<b>Group 1</b>										
Median	0	1333	37	225	182	494	7022	2566	32	
Mean	39	1827	273	508	288	1977	9257	6893	56	
Range	0-188	0-4300	0-1433	0-2310	0-1112	0-12566	2293-19033	144-26688	0-206	
<b>Group 2</b>										
Mean	0	75	5	4	3	355	1136	2	0	
Range	0-0	0-849	0-20	0-45	0-15	0-1551	88-3655	0-24	0-1	
% Reduction*	100	95,9	98,1	99,1	98,8	82,1	87,7	99,9	99,9	
NPM <sup>3++</sup>	A	A	B	A	A	C	B	A	A	
<b>Group 3</b>										
Mean	0	29	98	212	246	209	2466	0	6	
Range	0-0	0-100	0-466	0-2147	0-840	0-984	340-5316	0-0	0-51	
% Reduction*	100	98,4	64,1	58,3	14,7	89,5	73,4	100	89,1	
NPM <sup>3++</sup>	A	A	X	B	X	C	C	A	A	

+NPM Rating<sup>3</sup>: A = > 80% effective in > 80% of treated animals  
 B = > 60% effective in > 60% of treated animals  
 C = > 50% effective in > 50% of treated animals  
 X = Ineffective

\*% Reduction = Percentage reduction compared to Group 1

\**Teladorsagia* = *Teladorsagia circumcincta*  
 = *Teladorsagia davtiani*  
 = *Teladorsagia trifurcata*

SRC. Evidently, the SRC is not as effective as the albendazole drench against *Nematodirus* in sheep.

The efficacy of albendazole drench against a laboratory strain of *Teladorsagia* in South Africa<sup>8</sup> as well as the efficacy of the SRC against a field strain of *Teladorsagia* in Australia<sup>2</sup> was superior to the efficacy of either formulation of albendazole against the field strain of *Teladorsagia* in the present trial. Anderson et al<sup>1</sup> found that the SRC, even at albendazole releasing rates of 0,9 mg kg<sup>-1</sup> day<sup>-1</sup>, did not reduce the numbers of a benzimidazole-resistant population of *Teladorsagia* in sheep significantly. The comparatively low efficacy ratings obtained against *Teladorsagia* with both formulations of albendazole in the present trial, may be an indication of a degree of benzimidazole resistance present in the strain.

Very high efficacy ratings were recorded with both formulations of albendazole against *H. contortus*, *Trichostrongylus* spp and *O. venulosum* in

the present trial. Reinecke & Louw reported the severe pathogenicity of *H. contortus* and *Trichostrongylus* spp in sheep grazing on irrigated pastures in the southern Cape Province<sup>7</sup>. Sensibly incorporated in a helminth control programme, the SRC could provide continuous anthelmintic protection against nematodiasis, especially where either the known epidemiology of the nematodes present or conditions of severe parasitic challenge from the pasture, call for a protective approach in helminth control.

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