CONTROL OF LICE ON SHEEP WITH LONG WOOL

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SUMMARY

The lousicidal activity of three synthetic pyrethroids as a dip wash was evaluated. The minimum effective concentration of alphamethrin was found to be less than 2 mg/L while for cyhalothrin and cypezmethrin it exceeded 4mg/L. All treatments,as jetting fluids at 5Omg/L,failed to remove lice. A low volume 5Og/L alphamethrin backline treatment eradicated lice in sheep with 6 months wool.

Keywords : Damalinia ovis, pyrethroids, dipping, jetting, backline, lice control.

INTRODUCTION

The body louse of sheep, Damalinia ovis,is widespread throughout Australia with a Western Australian survey (Wilkinson et al 1985) indicating lice in 26% of flocks in the Kojunup shire and a south western Queensland study showing lice present on 29% of properties (Dunlop 1982). Lice cause host irritation leading to wool derangement. Economic losses are due to both decreased wool production and the costs of lice control. Less greasy and clean wool is produced (Wilkinson et al 1982; Niven and Pritchard 1985; Eliott et al 1986), with a higher percentage of fleeces downgraded due to cotting and increased yellowness (Kettle and Lukies 1982). Evaluation of the value of lost wool production and the costs of treatment and statutory control yielded an estimated loss to the national wool industry of $94m (Wise 1987).

Studies conducted to explore the possibility of lice eradication in W.A. (Wilkinson 1977, 1980, 1986; Wilkinson et a1.1982, 1985) indicated that the main deficiencies in the control programmes were the failure to detect lice in infected flocks and to eradicate the disease when identified. The main sources of new infestations were purchased sheep and strays. In recently shorn sheep, lice infections may be difficult to detect. Allied to this it was thought the practice of routine off-shears treatment disguises infestation in some flocks. It was proposed that to achieve eradication prophylactic treatment should not be recommended and intervention to control lice should only be attempted after positive diagnosis. While adoption of the Lice Detection Service offered by the AWTA improves detection (Wise 1987) a major drawback remains – the lack of suitable treatments for controlling lice in long wool.

This paper examines the efficacy of various synthetic pyrethroids applied to sheep in long wool by either of three techniques : dipping, handjetting and low volume backline application.

MATERIALS AND METHODS

Dipping and jetting studies were conducted with emulsifiable concentrate formulations of 47.5g/L cypermethrin (Robust; Robert Young Pty Ltd), 50g/L cyhalothrin (Grenade, ICI Australia Ltd) and 100g/L alphamethrin (SmithKline Animal Health Products). Backline studies were conducted with an aqueous suspension of 50g/L alphamethrin (Vanquish, SmithKline Animal Health Products).

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Sheep to be dipped were immersed in an appropriately charged 600 litre stainless steel plunge dip for 1 minute.

Hand jetting was carried out using a Finsbury pump delivering fresh fluid through a five nozzle Rega handpiece, which delivered wash at a rate of one litre per ten seconds and a pressure of 500 KPa. The handpiece was combed slowly through the wool frunthenapeof thenecktothe rump in three parallel sweeps. Twentysecondswas spenttreatingeachsheepinexperiment2 while sheep in experiment 4 were treated to saturation.

The low volume backline treatment was applied from a backpack with a Vanquish spray-on applicator delivering a 12cm band from the base of the neck to the rump on the dorsal surface of the sheep.

All sheep were weighed before and after treatment using electronic scales.

An evaluation of lice burden was made by counting all live adult and nymphal lice observed in a total of 42 ten centimetre wool partings, each made at one of seven specific sites along three parallel contours on each side of each sheep.

Experiment 1 Lice control by dipping

Six weeks after shearing, 50 four tooth merino wethers were lice counted, and randanly divided into groups of five sheep for treatment with water or 1, 2 and 4 mg/L of cypermethrin, cyhalothrin or alphamethrin. Groups were reevaluated at 1,2,4,10 and 15 weeks after treatment.

Experiment 2 Lice control by jetting

Fifteen, four tooth merino wethers with a heavy lice infestation and a mean mid side wool length of 5.5cm were lice counted and randomly divided into three groups of five, for treatment with either cypermethrin, cyhalothrin or alphamethrin, each at a rate of 50mg/L. Post treatment lice assessments were conducted at 1,2,4,6 and 15 weeks.

Experiment 3 Lice control by backline treatment

Fifteen four tooth lice infected merino wethers with six months wool were licecountedand randanlyallocatedtothreegroups. Group 1 remained untreated while groups 2 and 3 received 250mg or 500mg respectively of the alphamethrin low volume backline formulation. Reevaluations occurred 3,8,13,15,22 and 29 weeks after treatment.

Experiment 4 Field comparison of backline and jetting treatments

A field trial was undertaken at Goulburn on a mob of 442 mature Merino wethers, with a mean live weight of 48kg and carrying 10 months wool of staple length 8cm. The mob was divided randomly into four groups with lice evaluations made on10 sheep from eachgroup. Group 1 (50 sheep) was left untreated, Group 2 (170 sheep) received 20mL of an alphamethrin backline treatment, while the remaining two Groups 3 and 4 were hand jetted to saturation with either 50mg/L cyhalothrin (111 sheep), or 50mg/L alphamethrin (111 sheep).

RESULTS AND DISCUSSION

A summary of group sheep lice counts for experiments 1,2,3 and 4 is presented in tables 1, 2, 3 and 4. No signs of insecticidal toxicity were observed.

Table 1 Mean lice counts following various low rate plunge dip treatments

Treatment	Rate (mg/L)	Weeks after treatment					
		0	1	2	4	10	15
Untreated	-	30	10.6	3.8	9	11.8	110
Cypermethrin	1	27	8	0.2	14.0	55.3	175.3
	2	53	1	0	4.2	5.2	13.8
	4	39	1	0.2	2.0	0.4	1.8
Cyhalothrin	1	36	0.8	0	2.4	6.8	30.2
	2	23	3.8	1.2	2.2	1.0	10.8
	4	30	0.4	0	0	0	0.4
Alphamethrin	1	26	0.8	0.2	1.4	0.6	4.8
	2	28	3	0	0	0	0
	4	36	0.4	0.2	0	0	0

Table 2 Group mean lice counts following various hand jetting insecticide treatments at 50mg/L.

Treatment	Weeks after treatment					
	0	1	2	4	6	15
Cypermethrin	282.4	145.2	112.0	21.0	33.8	18.0
Cyhalothrin	259.8	151.6	131.0	51.0	76.4	46.0
Alphamethrin	270.0	42.2	19.4	4.2	7.0	1.2

Table 3 Mean lice counts following backline treatment with alphamethrin formulation.

Treatment (mg of active)	Weeks after treatment						
	0	3	8	13	15	22	29
0	113.6	184.8	221.8	332.8	360.2	560	*
250	154.2	1.8	0.2	1.2	0	0	0
500	153.6	0.4	0	0	0	0	0

* control sheep not counted

Table 4 Lice count following various treatments in 10 months wool. (Goulburn Trial)

Treatment	Weeks after treatment	
	0	10
Control	248.2	164.0
50mg/L cyhalothrin hand jetted	151.2	18.2
50mg/L alphamethrin hand jetted	214.8	14.6
alphamethrin backline	151.2	0

If lice control is attempted by dipping a minimum dip wash concentration of approximately 1 - 2mg/L alphamethrin would remove lice. This study indicatedthattheminimumeffectivedose of cyhalothrin and cypermethrin exceeded 4mg/L. At this rate the corrected percent lice reduction 15 weeks after treatment was 99.6% and 98.7% with cyhalothrin or cypermethrin respectively.

Hand jetting at 50mg/L with all treatments failed to remove lice. While percent reduction over pre treatment lice levels (alphamethrin - 99.5%, cypermethrin 93.6% and cyhalothrin 82.3%) indicate good lice control, none of the treatments achieved eradication of lice.

Both dose rates (250mg and 500mg) of the alphamethrin backline formulation removed lice from sheep with six months wool

The Goulburn field trial confirmed these results with eradication of lice being observed with the backline treatment, while hand jetting with alphamethrin or cyhalothrin achieved reductions of 90% and 82% respectively.

The availability of low volume backline treatment such as the one examinedprovidesameans of eradicating lice in any wool length. A long wool backline treatment does not require the manpower, plant and time associated with jetting, and does not expose lice populations to sub lethal doses of insecticide. Lice infested pregnant ewes can be allowed to complete lambing before treatment, introduced or purchased sheep can be quarantined and treated, and with multiple shearings, shorn mobs may be treated conventionally off shears while unshorn mobs may be treated with the long wool backline treatment.

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