EFFICACY OF RONNEL AS A POUR-ON AND COUMAPHOS AS A DUST FOR CONTROL OF CATTLE LICE[1]

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Abstract

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A pour-on formulation of ronnel and 1% coumaphos dust were tested for control of cattle lice under southern Ontario feedlot conditions. Moderate to heavy populations of the cattle biting louse *Bovicola bovis* and light populations of the sucking lice *Linognathus vituli* and *Haematopinus eurysternus* were present on the treated cattle. The ronnel and coumaphos dust gave excellent reduction of lice populations for 43 and 35 days, respectively.

Introduction

Four species of lice can be serious pests of cattle during the winter and spring throughout the north temperate region of North America. Three of these are sucking lice, the long-nosed cattle louse *Linognathus vituli* (L.), the short-nosed cattle louse *Haematopinus eurysternus* (Nitzsch), and the little blue louse *Solenopotes capillatus* Enderlein. The other is the biting louse *Bovicola bovis* (L.). The first comprehensive study of the biology and control of these species of cattle lice in North America was presented by Matthysse (1946). In the only recent Ontario survey, Teskey (1960) indicated lice were present on 43 of 70 herds examined. His study agreed with that of Matthysse (1946) for New York in showing that the most abundant species was *B. bovis* followed, in order of occurrence, by *L. vituli*, *S. capillatus*, and *H. eurysternus*.

While lice are the most important and widespread external parasites of livestock in winter (Matthysse 1946; Kemper *et al.* 1948), the species of greatest importance may differ depending on region and associated weather conditions. Serious anemia in cattle heavily infested with *H. eurysternus* was reported by Peterson *et al.* (1953) in New Mexico and Shemanchuck *et al.* (1960) in Alberta. Scharff (1962) reported that only 1–2% of the animals of most herds were susceptible to heavy lice infestations and that there was no economic loss in lightly infested animals. In British Columbia, Rich (1966) reported that *L. vituli* was the most common louse on calves, but that most infestations were light and not of economic importance.

Many insecticides have been evaluated and used for control of cattle lice during the last 30 years. The systemic insecticides used for cattle grub control give some reduction of cattle lice, especially the sucking lice (De Foliart *et al.* 1958; Lancaster 1962; Shemanchuk *et al.* 1963; Khan 1964; Rich and Khan 1964; Knapp 1965; Rich 1966; Matthysse *et al.* 1967). Haufe (1962) and Khan (1964) listed 11 and 12 insecticides respectively, excluding the systemics, for cattle lice control in Canada. These included five chlorinated hydrocarbons, four organophosphorous compounds, two botanicals, and one carbamate. The Ontario Ministry of Agriculture and Food (1974) recommended seven insecticides, as dusts or sprays, for control of lice on beef cattle, and five insecticides for use on dairy herds. While these recommendations are followed by dairy producers, most beef producers rely on systemics for cattle grub control or other insecticides used in backrubbers for louse control on beef cattle. In the winters of 1971–72–73, beef producers reported unsatisfactory louse control with the cattle grub systemics and a build-up of sucking lice populations from January through March when cattle cannot be treated with cattle grub systemics.

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Materials and Methods

Two insecticides not currently registered for louse control in Canada were tested for this purpose in 1974. The materials tested were a formulation of ronnel[2] used as a pour-on for systemic control of cattle lice (McGregor 1973), and 1% coumaphos[3] dust in a ready-to-use shaker can. Tests were conducted on experimental steers housed at the Ontario Ministry of Agriculture and Food's Elora Beef Research Station near Elora, Ont. Test animals had not been previously treated for cattle grubs or lice. In each test, animals were housed in pens of four animals each. All animals in each pen received the same treatment with no movement of animals between pens.

Ronnel test. Steers used in this test weighed 400–500 lb and were part of a feeding trial examining the effects of diets fed under three environmental conditions. The environmental conditions were:

(1) Cold, conventional environment—roofed, solid floor, outside pens;
(2) Warm environment—pens with slatted floors in a heated barn;
(3) Cold, slatted floor environment—roofed, slatted floor, outside pens.

Twelve animals from each of the housing situations were treated and a duplicate set was used as untreated controls.

Animals were weighed and louse counts made immediately before treatment on 5 February. Ronnel was diluted, 1 part insecticide to 4 parts water, and applied as a pour-on along the back at the rate of 1 oz (1.42 g AI) per 100 lb body weight. Post-treatment louse counts were made at 28 days and 43 days.

Coumaphos test. Forty steers, weighing 450–700 lb, housed in a roofed, slatted floor, cold environment were used in these tests. Twenty-four animals were treated with 1% Co-Ral and 16 used as untreated checks. Animals were weighed and lice counts made on 25 February, immediately before treatment. The 1% coumaphos dust was applied directly from the shaker can at the rate of 1–2 oz (.28–.56 g AI) of dust per animal. The shaker can was weighed before and after each application to determine the amount of dust used. Post-treatment lice counts were made at 7, 22, and 35 days.

Louse counts. Lice counts were made at three sites on each animal: on or around the tailhead, topline of back, midway between the shoulders and hip, and between or on the shoulders. A standard electrical animal clipper was used to clip the hair at each site and all the lice present in a 2 in. × 2 in. area were counted. Post-treatment lice counts were made in freshly clipped areas adjacent to the previous count sites since lice moved from clipped to unclipped areas. Samples of lice were collected from some animals for identification.

Results

Three species of lice were collected and identified. The cattle biting louse *B. bovis* comprised 90% of the total population with *H. eurysternus* and *L. vituli* present in low numbers. Biting lice were most abundant on the shoulders while the sucking lice were more abundant on the tailhead. Biting lice infestations were moderate to heavy, 50–100 lice per 12 sq. in., but the sucking lice infestations were very light to light, 1–10 lice per 12 sq. in.

Ronnel test. Excellent louse reduction was obtained on the treated animals with ronnel for 43 days (Table I). A *t*-test indicated no difference ($P = 0.01$) between lice

[2]Korlan 2. Systemic insecticide for lice control. O,O-dimethyl 0-2,4,5-trichlorophenyl phosphorothioate. Dow Chemical of Canada Ltd., Sarnia, Ont.
[3]Co-Ral. O-(3-chloro-4-methyl-2-oxo-2H-1-benzopyran-7-yl). O,O-diethyl phosphorothioate. Chemagro Corp., Shawnee Mission, Kans. (now Bayvet Corporation).

populations on the two groups of animals immediately before treatment on 5 February. A paired *t*-test indicated a decrease ($P = 0.01$) in lice populations on the untreated animals at 28 and 43 days post-treatment, but no decrease in populations between the last two count periods. The lice populations on the treated animals were reduced by over 99% when compared with populations for untreated animals on the two post-treatment dates.

Coumaphos. The amount of 1% dust applied per animal ranged from 1.02 to 2.43 oz per head with an average rate of 1.43 oz. Only one animal was treated with over 2.0 oz. The 1% coumaphos dust gave excellent reduction of lice up to 5 weeks post-treatment (Table II). The percentage reduction at the three post-treatment count dates was over 98% compared with the populations on untreated animals on the same dates. A *t*-test showed no differences ($P = 0.01$) in the original lice populations on the treated and untreated groups of animals. A paired *t*-test indicated no difference ($P = 0.01$) in lice populations on the untreated animals at pre-treatment and post-treatment counts at 7 and 22 days, but indicated that the populations had dropped significantly from the pre-treatment count by 35 days.

Discussion

Approximately 90% of the lice found on 112 feeder steers were the biting louse *Bovicola bovis*. Most of the animals had moderate to heavy biting louse infestations (50–100 lice per 12 sq. in.), but very light to light (1–10 lice per 12 sq. in.) sucking lice infestations. It has been reported (Peterson *et al.* 1953; Shemanchuk *et al.* 1960) that heavy infestations of sucking lice can cause severe anemia and economic loss in cattle, but that light infestations do not (Scharff 1962; Rich 1966). However there are no reports assessing the economic loss caused by heavy infestations of biting lice although it is known that they cause cattle to rub and lick with a resulting loss of hair. Because of the independent feeding trials with different rations, it was not possible to examine our test animals for weight gain differences, but the untreated cattle did have loss of hair due to rubbing.

Ronnel used as a pour-on and 1% coumaphos dust applied from a shaker can give excellent reduction of cattle lice for 43 and 35 days post-treatment respectively. Post-treatment louse counts were discontinued at these times because the natural spring decline of lice populations was evident and there was no significant louse reinfestations on the treated animals. These lice control tests were initiated when lice populations were at or slightly past their peak and do not adequately indicate if treatment with these products in December or earlier would have prevented the build-up of large lice populations.

In Ontario many beef producers are concerned with the control of lice in January, February, and March when lice populations on cattle are highest. The results of these trials indicate that one treatment with ronnel pour-on solution made in the January–March period, would give control of lice for the remainder of the louse season. The coumaphos provided excellent louse reduction for 35 days from 25 February. If a similar period of reduction could be expected from application in January, then two applications would give adequate louse reduction for the remainder of the season.

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Table I. Number of lice per 12 sq. in. of each animal on pre- and post-treatment count dates. Treatment with ronnel on February 5 immediately after pre-treatment counts

Count period	36 untreated animals			36 treated animals			% reduction from untreated
	Lice per 12 sq. in.			Lice per 12 sq. in.			
	Av./head	Total	Range	Av./head	Total	Range	
Pre-treatment Feb. 5	131.5	4,733[a]	0–200	140.2	5,048[a]	1–300	
1st post-treatment count Mar. 5 (28 days)	56.2	2,024[b]	0–175	0.3	10	0–3	99.5
2nd post-treatment count Mar. 20 (43 days)	35.0	1,252[b]	0–150	0.2	8	0–1	99.4

[a]A t-test showed no significant difference at the $P = 0.01$ level in louse populations on the two groups of animals on February 5.
[b]Paired t-test showed there is a significant decrease, at the $P = 0.01$ level, in louse populations on the untreated animals on March 5 and March 20 as compared with February 5, but no significant decrease between March 5 and March 20.

Table II. Number of lice per 12 sq. in. of each animal on pre- and post-treatment count dates. Treatment with 1% coumaphos dust on February 25 immediately after pre-treatment counts

	16 untreated animals			24 treated animals			
	Lice per 12 sq. in.			Lice per 12 sq. in.			% reduction from untreated
Count period	Av./head	Total	Range	Av./head	Total	Range	
Pre-treatment Feb. 25	66.1	1,057[a,b]	17–185	71.7	1,721[a]	13–210	
7-day post-treatment March 4	73.8	1,180[b]	4–175	0.25	6	0–3	99.5
22-day post-treatment March 18	64.1	1,026[b]	10–201	0.33	8	0–2	99.2
35-day post-treatment April 1	31.7	507[c]	2–75	0.38	9	0–1	98.2

[a]No significant difference, at the $P = 0.01$ level, of louse populations on the two groups of animals before treatment began.
[b]No significant difference, at the $P = 0.01$ level, in louse populations.
[c]A significant difference, at the $P = 0.01$ level, of louse populations at the 35-day count as compared with previous counts.

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