

An Investigation of the Cattle Louse Problem¹

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ABSTRACT

In a study on gains in weight versus louse infestations, 30 of the lousiest feeder heifers in a feed lot containing approximately 3,000 were selected. Two lots of 10 each were sprayed with insecticides for louse control, and the third was sprayed with water. After 42 days gains in weight of the treated lots were not significantly different from those of the control lot. Before treatment, louse infestations averaged light to moderate on all lots; 37 days after treatment, infestations in the control lot averaged very light to light, and only four lice were found in the two treated lots.

A Hereford steer, very heavily infested with *Haematopinus eurysternus* (Nitzsch), under close observation for 4½ months, developed severe anemia, and would have died in the absence of louse control. When the lice were destroyed he improved markedly in gains in weight and feed efficiency. Rancher sur-

veys, cattle buyer records, and population studies on slaughter cattle, indicated that infestations of this magnitude, although they occur regularly throughout Montana, do not ordinarily affect more than 1% or 2% of the cattle. Infestations on the rest of the population are probably of minor economic significance. Louse population studies on the freshly removed hides of 3,188 slaughter cattle indicated that in Montana, Herefords are most frequently and most heavily infested, and that Angus are least so; that *H. eurysternus* is economically the most important species, followed in order by *Linognathus vituli* (L.), *Solenoptes capillatus* End., and *Damalinia bovis* (L.); and that different breeds of age classes of cattle tend to be infested differently by the four different species of lice. From an economic standpoint, louse control measures are probably justified on 5%, or fewer, of the cattle in Montana.

An examination of the North American literature on cattle lice revealed that they are considered by many to be a major economic problem of the livestock industry. Kemper et al. (1948) say, "Lice are among the most important and widespread external parasites of livestock in the United States. Although losses attributable to these pests have not been ascertained, they add up to a significant figure." Matthysse (1946) states that every winter cattle lice are serious pests in the northern portion of the

United States. Lowered vitality, retarded growth rates, reduced milk production, and continual irritation, have been attributed to louse infestations. Such attributions appear in the literature as undocumented generalizations; further literature search failed to reveal the research on

¹ Contribution from Montana State College, Agricultural Experiment Station, Project No. MS 925. Paper No. 570, Journal Series. Accepted for publication February 5, 1962.

which these generalizations have been based. Peterson et al. (1953) and Shemanchuk et al. (1960) demonstrated that very heavy populations of *Haematopinus eurysternus* (Nitzsch) cause severe anemia and death in cattle, but there appears to be little or no critical information available on the effects that moderate or light populations of cattle lice may have on the host.

An examination of Montana records indicated a lack of information on the relative abundance of the four species of lice known to infest Montana cattle. The purpose of this paper is (1) to report the results of weight-gain studies on lousy, versus louse-free cattle, (2) to summarize a 3-year study of cattle-lice populations in southwestern Montana, and (3) to discuss the economic importance of cattle lice in Montana.

WEIGHT-GAIN STUDIES.—On February 21, 1949, 30 open heifers, mostly Herefords, averaging 10 to 12 months in age, were selected from approximately 3,000 feeder cattle, and were divided into three groups of 10 animals each. Care was taken to select the lousiest animals available, as uniform as possible in weight and grade. On February 23, they were ear tagged, weighed, examined for lousiness, and sprayed, one group with 0.03% gamma isomer of BHC in water suspension, another with piperonyl butoxide and pyrethrins in water emulsion, and the third, control group, with plain water. Approximately 45 gallons of spray were applied to each group of 10 animals, at a pressure of 400 p. s. i. The three groups were then confined in three adjoining feed-lot pens. Each pen was fed a daily ration of 100 pounds of specially formulated grain-molasses-protein-mineral feed and 77 pounds of mixed grass hay. Group weights were taken on March 4 and April 15. Each animal was examined for lousiness on April 1.

The louse infestation on each animal was assessed on a point system (Craufurd-Benson 1941b) as follows: very light (1), light (2), moderate (3), heavy (4), and very heavy (5).

Results are summarized in table 1. On February 23, before treatment, all cattle were lousy. Infestations on 18 animals were light, 7 moderate, 5 heavy, and all three groups averaged light to moderate. *H. eurysternus*, the most abundant species, was found on 23 animals, and was the major species involved in all of the moderate and heavy infestations. *Damalinia bovis* (L.) was found on 16 animals, and *Linognathus vituli* (L.) on two. *Solenoptes capillatus* End. was not found. In the April 1 examination, 1 and 3 *H. eurysternus* were found in the piperonyl bu-

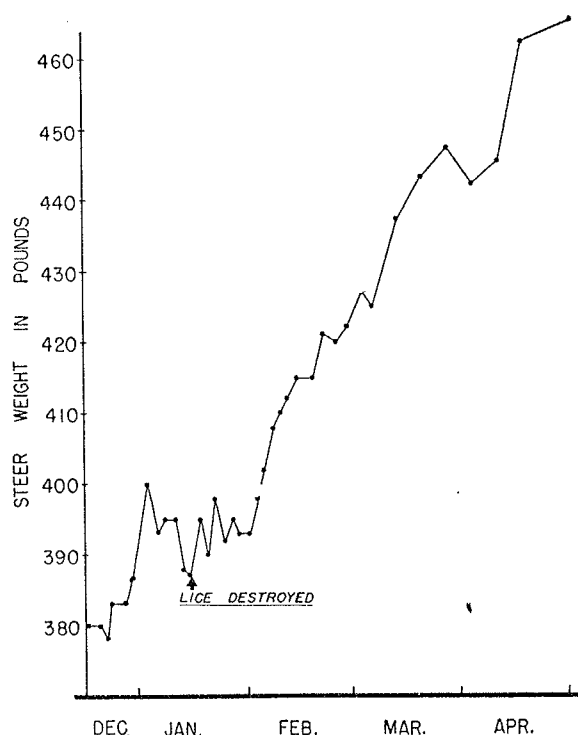


FIG. 1.—Weight chart of Hereford steer very heavily infested with *H. eurysternus*, December 15, 1953, to May 3, 1954.

toxide-pyrethrins-treated group and BHC-treated group, respectively. Nine of the 10 controls were infested at levels ranging from very light to light, *H. eurysternus* constituting more than 99% of the populations.

An examination of table 1 suggests that no significant gains in weight resulted from controlling the lice. It should be emphasized that these cattle constituted approximately the lousiest 1% of the cattle in the feed yard.

In another study I purchased, on December 15, 1953, a Hereford steer, 21 months old, very heavily infested with *H. eurysternus*, averaging more than 200 per square inch over most of the front half of the body, with lesser numbers elsewhere. He was manger fed twice daily, an average of 4 lb. of mixed legume-grass hay, plus 1½ lb. of ground barley-wheat-oats; a block of salt-mineral mix was available at all times. His weights, taken at intervals of 2 to 14 days (fig. 1), reflect at least to some extent the following events: He was wild and intractable for most of the first 10 days, and gained very little in weight. Rather suddenly he seemed to accept his new environment, and gained relatively well for 10 days. He then began to lose weight at approximately 1 pound per day, and continued to do so for 2 weeks, until the lice were destroyed on January 15. On January 6 a veterinarian's report described him as anemic. On January 15, he had symptoms of very severe anemia, and the veterinarian's report indicated that death was imminent. Dusting with derris root powder on this date virtually eliminated the lice. He immediately began to gain at a rate of about one-half pound per day, and continued at this rate for 2 weeks, by which time all external symptoms of anemia had disappeared. For the next 2 months (February and March) gains in weight

Table 1.—Effect of louse infestation on gains in weight of feeder heifers,^a Bozeman, Montana, 1949.

TREATMENT	AVERAGE LOUSE INFESTATION ^b		GROUP WEIGHT (LB.)		GAIN IN 42 DAYS (LB.)	
	2/23	4/1	3/4	4/15	Total	Average /Day
Piperonyl butoxide-pyrethrins	2.3	0.1	6,440	7,210	770	1.8
BHC	2.7	.2	6,290	6,960	670	1.6
Water	2.7	1.6	6,185	6,880	695	1.7

^a Each group composed of 10 animals treated February 23.

^b Very light (1), light (2), moderate (3), heavy (4), very heavy (5). Count of 2/23 made before treatment. Infestation for each animal was recorded; arithmetical sum and average of these individual infestations was then calculated for each group.

averaged approximately 1 pound per day, gradually declining to about one-half pound per day at end of study. On May 3, a light general infestation of *L. vituli* was present.

The feed efficiency of this animal from December 15 to February 1, the period of greatest stress, was 24 lb. of feed per pound of gain. From February 1, when all external symptoms of anemia had disappeared, to May 3, feed efficiency was 14 lb. of feed per pound of gain. Obviously a poor gainer at best, he demonstrated a marked increase in feed efficiency when freed of lice.

This infestation of lice was considered comparable to those described by Peterson et al. (1953) and Shemanchuk et al. (1960). The progress of clinical symptoms of anemia, as described by these authors, corresponds very well with the gains in weight and feed efficiency responses noted in the present study.

CATTLEMEN'S ATTITUDES TOWARDS CATTLE LICE.—From 1948 to 1960, I interviewed 99 Montana cattlemen to determine their attitudes and actions regarding louse infestations in their herds. Owners of dairy, beef, purebred, and grade cattle were included in the survey. Approximately 50% of them indicated sufficient concern with the problem to justify regular or intermittent control measures on all or most of their cattle. Attitudes varied among the rest: some felt that in some years infestations justify general control measures; others believed that only very heavily infested individual animals need be treated; still others felt that louse infestations are of minor significance, and that only very rarely need the grower be concerned with a heavily infested individual. The consensus was that in the complete absence of control measures, the death loss resulting from very heavy infestations of *H. eurysternus* would probably be about 1%. A local buyer of slaughter cattle, gathering data for the writer on this aspect of the problem, indicated that fewer than 1% of the cattle sold at the Bozeman livestock sales yard are potentially in this category.

POPULATION STUDIES.—From January 21, 1956, through January 31, 1959, 1 to 3 times every week, at a slaughter house in Bozeman, Montana, I took the hides, as they were removed from freshly killed cattle, spread them out individually, and examined them thoroughly for the presence of lice. Magnitudes of infestation were recorded numerically as previously described. The data (table 2) indicate that at least 56% of the cattle slaughtered in this area were louse infested; nearly 55% had very light or light infestations, and less than 2% had moderate to heavy infestations. Lice were found on approximately 70% of the Herefords examined, 50% of the Shorthorns, 44% of the Holsteins, and only 10% of the Angus. Most of the moderate to heavy infestations were found on Herefords.

Haematopinus eurysternus was found on 49% of the louse-infested Herefords, on 20% of the louse-infested, predominantly black cattle (Angus, Holstein, and Hereford-Angus and Hereford-Holstein crossbreds), and on only 3% of the infested calves. Hereford bulls were most frequently infested (63%). In all categories except calves, more than 90% of the lice involved in moderate and heavy infestations consisted of this species. Frequency of infestation appeared to increase as the cattle became older. This phenomenon was noticed in North Dakota (Munro & Telford 1943) and in Australia (Roberts 1938). The species occurred on most regions of the body, but was found in greatest concentrations on the neck, shoulders, and brisket.

Linognathus vituli was found on 86% of louse-infested calves, on 22% of infested Angus, and on approximately 50% of other infested cattle. This species constituted 100% of the moderate and heavy infestations in calves, and appeared to decrease in frequency of occurrence and severity of infestation as cattle became older. This was noticed in New Mexico (Kemper et al. 1948), North Dakota (Munro & Telford 1943), and Australia (Roberts 1938). No specific body regions seemed to be preferred.

Table 2.—Louse infestations observed on freshly removed hides of slaughtered Montana cattle, January 21, 1956, to January 31, 1959.

BREED ^a	NUMBER OF ANIMALS		PER CENT OF ANIMALS INFESTED AT LEVELS ^b					PER CENT OF INFESTED ANIMALS INFESTED WITH SPECIES SHOWN ^c							
	Exam-ined	Infested	0	1	2	3	4	H.	L.	S.	D.	1 sp.	2 spp.	3 spp.	4 spp.
Angus	339	37	89	<11	<1			27	22	3	59	89	11		
Miscellaneous ^d	170	65	62	35	2	1		31	58	26	14	75	20	5	
Holstein	240	105	56	39	5			17	57	30	38	65	28	5	2
Black white-face ^e	237	121	48	47	4	<1		20	45	50	21	69	26	3	1
Shorthorn	132	68	48	47	4	1		47	46	18	26	69	25	6	
Calves ^f	598	359	40	52	6	2		3	86	14	17	80	18	2	
Hereford cows	400	268	33	56	9	<2	<1	51	50	35	23	54	33	12	1
Hereford bulls	213	151	29	53	12	5	1	63	45	21	13	63	34	2	1
Hereford 2-yr.-old cows	643	463	28	61	9	1	1	45	60	48	16	48	37	13	2
Hereford 2-yr.-old steers	216	160	26	64	8	2		44	52	36	32	53	34	9	4
Total	3,188	1,797													
Average			44	48	6	1	<1	35	59	32	21	62	29	7	1

^a Except where otherwise stated, the breed designation includes animals estimated to be 18 months old or older.

^b No lice found (0), very light (1), light (2), moderate (3), heavy (4).

^c H, *Haematopinus eurysternus*; L, *Linognathus vituli*; S, *Solenopotes capillatus*; D, *Damalinia bovis*.

^d Includes Brown Swiss, Jersey, Guernsey, Ayrshire, and sundry cross-breeds.

^e Includes for the most part, Hereford-Angus and Hereford-Holstein cross-breeds.

^f Includes all animals, all breeds, estimated to be 18 months or less of age.

Solenoptes capillatus was observed on only 3% of the louse-infested Angus as compared with 32% of all infested cattle. It was not a contributor to moderate or heavy infestations. In a total of 582 recorded infestations the species was apparently confined in 575 instances to the face, head, and neck of the animal. In the other seven instances it was observed in spots over the rest of the body (1 Holstein cow, 3 2-year old Hereford cows, 2 Hereford bulls, and 1 Brown Swiss bull). This preference for the face and neck has been previously recorded in the U. S. A. (Bishop 1921), Australia (Anonymous 1956), and Great Britain (Craufurd-Benson 1941b).

Damalinia bovis was found on 59% of louse-infested Angus as compared with 21% of all infested cattle. No specific body regions seemed to be favored. Gojmerac et al. (1959) reported that in Wisconsin the species was more abundant on Holsteins than on Jerseys, Brown Swiss and Guernseys; Shull (1932) reported that Holsteins were more heavily infested than Jerseys of the same herd. The data collected in the Montana study appear to substantiate these conclusions: 32% of the 73 Brown Swiss, Jerseys, and Guernseys examined were infested with lice, compared with 44% of the 240 Holsteins examined. In the infested group 22% of the Brown Swiss, Jerseys, and Guernseys were infested with *D. bovis*, versus 38% of the Holsteins.

RELATIVE IMPORTANCE OF THE DIFFERENT SPECIES.—*H. eurysternus* is the most important species in Montana. Although its frequency of infestation is considerably lower than that of second place *L. vituli*, populations occasionally become very high, causing anemia and death of the host. None of the other three species commonly occurring in the State is known to have reached populations of such magnitude. *S. capillatus* is probably third in importance and *D. bovis*, fourth. Limited data and observations in the literature indicate that a similar order of importance probably occurs in much of Colorado, New Mexico, Northwest Oklahoma, North Dakota, North and West Texas, parts of Western Canada, Australia, and Great Britain (Anonymous 1956, Craufurd-Benson 1941a and 1941b, Kemper et al. 1948, Munro & Telford 1943, Roberts 1938 and 1947, Shemanchuk et al. 1960, Smith & Richards 1955, Snipes 1948). In contrast, data from Arkansas, Mississippi, Oklahoma, and South Carolina indicate that in the South and Southeast, *S. capillatus* is probably first in importance, *L. vituli* second, *D. bovis* third, and that *H. eurysternus* is rather rare (Gressette & Goodwin 1956, Howell, D. E. personal communication, Lancaster 1957, Neel 1956). In New York, Matthyse (1946) lists *D. bovis* first, *L. vituli* second, *S. capillatus* third and *H. eurysternus* fourth in importance, but he indicates that in local areas *S. capillatus* may be first in importance. In the vicinity of Ithaca, New York, Lancaster (1951) rates *S. capillatus* first, *L. vituli* second, and *D. bovis* third, but an examination of his data suggests that the apparent discrepancy between his and Matthyse's findings may result from a slightly different interpretation of data collected by these two investigators. Limited data from Oregon (Hoffman 1954a, 1954b) indicate that *L. vituli* and *D. bovis* may be the most abundant species there.

SEASONAL POPULATION FLUCTUATIONS.—The population data collected from January 1956 through January

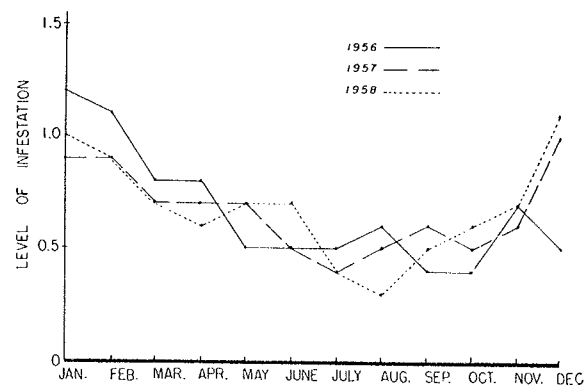


Fig. 2.—Average infestations of lice recorded on slaughter cattle at Bozeman, Montana, January 1956 through December 1958. Very light (1), light (2), moderate (3).

1959 were manipulated in the following manner. For each month of the study the individual numerical evaluations of infestation were totaled, and an average infestation for the month was calculated by dividing this number by the total number of cattle hides examined during the month. If the 3 years' data are indicative of average conditions the following population trends are indicated in Montana (fig. 2). Infestations increase rapidly during November and December, and reach a peak in late December or early January. They then begin a gradual decline, reaching a low point by July 31. Then little change occurs until the rapid buildup begins again in November.

DISCUSSION.—Judging from the data collected in this study, I conclude that cattle lice are, on the average, of minor economic importance in Montana cattle, and that control measures are probably of little or no economic benefit on more than 95% of the cattle in the State. Unfortunately justification for this conclusion is weakened somewhat by the fact that most of the population data (collected as they were, on slaughter cattle) include data not only from cattle that had never been subjected to louse control measures, but also from undetermined numbers of those that had been treated at one time or another. On the other hand the conclusion is supported by the following information. As previously mentioned, occasional cattle (usually 1% or 2% of a herd) are susceptible to very heavy infestations of *H. eurysternus*, infestations which will unquestionably destroy many of these colloquially designated "carriers," if timely control measures are not taken. Carriers are notorious for their ability to become rapidly reinfested with life-threatening populations after control measures have been taken, and sometimes require as many as three treatments per year to keep them alive and healthy. When carriers become very heavily infested, and before symptoms of anemia become apparent, they are readily recognizable in a herd; their hair, especially in the brisket area, assumes a dirty, greasy appearance; and lice and their eggs, crowded together by the thousands, are visible from a considerable distance.

The owners of two herds of Herefords (totaling approximately 600 animals) in southwestern Montana use lice control measures only on their carriers, when infestations become readily recognizable as described above. During 1960 and 1961 they administered a total of five

Table 3.—Summary of louse infestations observed in mid-January 1961, in six herds of southwestern Montana cattle.^a

HERD NUMBER	TOTAL NUMBER OF ANIMALS WITH INFESTATION				
	None	Very Light	Light	Moderate	Heavy
1	16	59	15	9	1
2	4	79	11	5	1
3	9	80	4	7	
4	4	82	9	4	1
5	12	69	8	10	1
6	16	58	16	9	1
Total	61	427	63	44	5

^a 100 cattle from each herd were examined. In herds No. 1 and 2, only carriers are treated as required; cattle in herds No. 4-6 are all treated every year in the fall for louse control.

louse treatments, 1 per 240 animals per year. In the same area four owners, whose holdings total approximately 1,000 Herefords, treat their entire herds once every year in the fall to control lice. During 1960 and 1961, they administered in addition a total of 16 treatments to carriers (one per 125 animals per year). In mid-January, 1961, I thoroughly examined (in a squeeze chute) the head, neck, brisket, sides and topline, on each of 100 adult cattle, chosen at random from each of the six herds. Infestations were summarized as follows (table 3): 10% apparently uninfested, 71% very light, 11% light, 7% moderate, and less than 1% heavy; no significant differences were noted between herds. Detailed records were not made on the species of lice involved, but *H. eurysternus* occurred most frequently and in the greatest numbers.

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Reprinted from the
JOURNAL OF ECONOMIC ENTOMOLOGY
Vol 55, No. 5, October, 1962
pp. 684-688