

OSU
Collection

Cattle Grub Control

with

Systemic Insecticides

By

D. E. Howell, Robert T. Taylor,
and William E. Allison

Department of Entomology



Bulletin No. B-513

August, 1958

ACKNOWLEDGEMENTS

This report was made possible by the splendid cooperative effort of many people. Particular thanks are extended to W. F. Pippin, O. C. Schomberg, and V. H. Zeve, entomology students; to Drs. Doyle Chambers, A. B. Nelson, and L. S. Pope of the Animal Husbandry department, Dr. J. Q. Lynd of the Agronomy department, Dwight Stevens, superintendent of the Fort Reno Station, E. H. McIlvain, superintendent of the U. S. Southern Great Plains Field Station, Dr. C. C. Pearson, Veterinary Research Station, Pawhuska, Charles Coddling of Foraker, and to the large number of individuals who helped in working and caring for the cattle.

We wish to thank the Dow Chemical Company, the American Cyanamid Company, and the Chemargo Chemical Corporation for providing the systemic insecticides and some financial assistance.

Cattle Grub Control

with

Systemic Insecticides

By D. E. Howell, Robert T. Taylor, and William E. Allison*

The common cattle grub, *Hypoderma lineatum* (DeVill.), is one of the most damaging insects affecting the cattle industry. It causes losses estimated at \$350 million annually in the United States. These losses result from reduced weight gains and milk production and from damaged hides and carcasses that require cut-outs of damaged areas.

Control of the cattle grub has been particularly difficult, as larvae grow and develop inside the animal's body and cannot be reached by commonly used insecticides. However, in recent years new insecticides which are carried in the bloodstream have been developed. These insecticides, called systemics, offer new possibilities for control. This bulletin reports results of an extensive study to determine the value of systemic insecticides for grub control.

Methods and Materials

Approximately 2,800 head of cattle were used during the study, and tests were replicated to insure proper evaluation of results. Four animal systemic insecticides were tested: (1) Dow ET-57 (Trolene), (2) Dowco 109, (3) American Cyanamid 12-880 (Dimethoate), and Bayer 21-199 (CO-RAL). Dow ET-57 was tested for three years; each of the others was tested only one year.

In addition to testing the effectiveness of the insecticides, various methods of administering the treatments were studied. In the first test (1955-56), Dow ET-57 was administered as a drench. In 1956-57, it was given by three methods: (1) drench, (2) capsule, and (3) bolus. In 1957-58 trials, Dow ET-57 and Dowco 109 were each administered as:

* The senior author is head of the Department of Entomology. Taylor and Allison are former graduate students in that Department.

(1) feed additives, (2) sprays, and (3) boluses. In the latter test, American Cyanamid 12-880 was given as a bolus and Bayer 21-199 was used as a spray. Table I shows the dosages and method of treatment for each trial. The treatments were made in either October or November each year.

A standard equine balling gun was used for administering the systemics in the bolus and capsule forms, and a 12-ounce drench gun was used for liquid formulations. A 50-gallon capacity, 4-gallon per minute, portable power sprayer was operated at a pressure of approximately 225 pounds per square inch to apply the spray formulation. Two types of spray applications were made—one as a top-line cover only and the other as a complete cover. The systemic as a feed additive was mixed with the daily ration.¹

The effectiveness of grub control was determined by comparing the number of grubs found in treated and untreated animals in the same group. The number of grubs present was determined by monthly counts made while the animals were in chutes where they could be examined thoroughly.

Results, 1955-56 Tests

The 1955-56 tests were of a preliminary nature. Animals used for the tests were undergoing a winter-gains study at the Lake Carl Blackwell range unit west of Stillwater. Results indicated that Dow ET-57 used as a drench provided approximately 78 percent control. No evidence of toxicity was noted. Results are reported in Table I.

Results, 1956-57 Tests

In 1956-57 the tests were conducted at Stillwater, Fort Supply, Fort Reno, Lake Carl Blackwell, Coalgate, and the Coddling Ranch at Foraker. Results are reported in Table I. A summary of results indicated that 82 percent control of grubs was obtained with Dow ET-57 on animals under two years of age when the insecticide was administered at the rate of 100 mg./kg. Method of treatment had no particular influence on the degree of control obtained.

¹ When used as a feed additive insecticide was incorporated into bran at the ratio of 9 to 1 and the mixture was then added to the rest of the ration. The dosages are referred to in number of milligrams per kilogram of bodyweight. For easy reference in the text, dosages are noted simply as, mg./kg. Example: The insecticide was administered at the rate of 100 mg./kg. One hundred milligrams for each kilogram of bodyweight is equivalent to approximately 1/6 ounce per 100 pounds of animal weight.

At Stillwater, ET-57 was given as a drench and as a capsule. Both methods gave good control and no particular difference was noted in their ability to control grubs. The drenched animals showed some signs of minor scouring and sluggishness. Neither of these symptoms were noted in animals treated with capsules.

At Fort Reno, 185 animals were treated with an ET-57 drench and 185 animals remained untreated to serve as controls. Results indicated that grub control ranged from 75 percent in mature cows to well over 80 percent in bull calves.

Treatment at the Coddling ranch, consisting of bolus, capsule, and drench, gave an average of 82 percent control among animals under two years of age and 75 percent control in animals over two years old. This experiment which was conducted as part of a private enterprise, indicates that Dow ET-57 can be an effective tool for grub control in the hands of the cattle producer.

Results, 1957-58

Insecticides in Bolus Form

The effectiveness of three insecticides in bolus form was shown in tests at Coalgate, Woodward, and Fort Supply. Results are reported in Table I. At Coalgate, boluses of Dowco 109 gave reductions in grub populations of 98, 97, and 97 percent after one, two and three months, respectively. Animals treated with American Cyanamid 12-880 showed reductions of 74, 74 and 49 percent for the same periods. Dow ET-57 gave reductions of 74, 74 and 49 percent.

At Woodward grub populations were checked every 30 days for the first four months. Animals treated with American Cyanamid 12-880 showed reductions in grub population of 88, 80, 41, and 18 percent. Those treated with Dowco 109 showed reductions of 96, 96, 87, and 46 percent.

At Fort Supply, animals treated with Dow ET-57 showed reductions of 94, 96, 93 and 99 percent respectively, for the four months the counts were made. This compared with reductions of 85, 92, 75, and 57 percent for the steers treated with Dowco 109.

Dow ET-57 and Dowco 109 as Feed Additives

Control of grubs ranged from poor to exceptionally good when insecticides were added to the feed. Results are reported in Table I. The

degree of control was affected by dosages and length of treatment. There was some indication that results were influenced by the type of feed to which the insecticide was added.

Dowco 109 gave good control when administered in the concentrate ration at the rate of 5 mg./kg. daily for three days or 15 mg./kg. for one day.

Dow ET-57 was fed in the daily silage ration of 60 head of two-year-old steers. Thirty head received 2.5 mg./kg. for six days, and 30 additional head received 5 mg./kg. for three days. The animals that received the 5 mg./kg. dosage averaged about 1.4 fewer grubs per animal during the three-month test than the other group. Results indicated that neither dosage was effective for grub control. Apparently the systemic did not reach a concentration high enough to be lethal to the grub.

In another test, Dow ET-57 was incorporated into the protein supplement (cottonseed meal) ration of 12 yearlings at the rate of 5 mg./kg. per day for 25 days and 12 head at the rate of 2.5 mg./kg. per day for 50 days. There was essentially no difference in the grub controlling ability of the two dosages. Another group of 18 head of yearlings received 5 mg./kg. in the concentrate ration for 25 days and 16 head received 10 mg./kg. for 12 days.

Grub control averaged 86 percent for the 5 mg./kg. treatment and 88 percent for the 10 mg./kg. treatment. The average grub control was approximately 22 percent higher in the yearlings that received the insecticide in the concentrate ration than in the group that received the systemic in the protein supplement.

The method of adding the insecticide to the ration may have influenced the results. The feed additive was added daily to the concentrate rations, whereas it was mixed with the protein supplement in 25-day lots and fed to the animals at a predetermined rate. The extensive contact of the systemic with the cottonseed meal may possibly have resulted in some decomposition. More data is needed before any definite conclusions can be made about the interaction of the feed and the systemic.

Dow ET-57 Spray

In the spray test with Dow ET-57, 31 head of nine-year-old cows were sprayed with a top-line spray and 31 head were sprayed with a complete-cover spray. Both groups of animals received the same amount of

actual insecticide, (See Table I for amount). Neither treatment gave satisfactory control. A higher concentration might give more effective control. From the economic standpoint, however, it might not be as practical to increase the dosage as to try another formulation or another systemic.

Dowco 109 and Bayer 21-199 Sprays

Dowco 109 gave 95 percent control of grubs when applied as a spray to yearlings and 77 percent control when administered to cows ranging from two to nine years of age. There was essentially no difference between top-line and complete-cover sprays. See Table I.

Bayer 21-199 gave approximately 76 percent control of cattle grubs when applied to yearlings as a spray and 84 percent control when applied as a spray to older animals. The yearlings treated with Bayer 21-199 were predominately range animals with long hair coats. The pressure used may not have driven the insecticide through the hair to the skin, which may account for the lesser degree of control with Bayer 21-199 than with Dowco 109.

Influence of Insecticides on Weight Gains

There was no important difference in weight changes among animals receiving insecticides and those not receiving them. In 1956-57 tests, weights were recorded for animals given Dow ET-57 as a capsule and as a drench.

In 1957-58 tests, weights were recorded for animals treated with boluses of Dowco 109, Dow ET-57, and American Cyanamid 12-880. Three months after treatment at Coalgate, animals receiving Dowco 109 had gained an average of 13 pounds. Those treated with Dow ET-57 had gained 4 pounds each, while those treated with American Cyanamid 12-880 had lost an average of 6 pounds. The control animals lost an average of 1 pound each during the three-month period.

At Woodward at the end of four months, animals treated with American Cyanamid 12-880 showed gains of 33 pounds each. Those treated with Dowco 109 gained 23 pounds, while the controls gained an average of 26 pounds.

At Fort Supply, the control animals gained an average of 35 pounds during the 4-month period following treatment. Animals treated with Dow ET-57 gained 33 pounds each while those treated with Dowco 109 gained 27 pounds each.

Summary

The common cattle grub, *Hypoderma lineatum* (DeVill.), is one of the major insect pests of the cattle industry in Oklahoma. It is especially harmful to producers of fat steers, since the steers are often "docked" at market if sold during the grub season. To determine the efficiency of four animal systemics, Dowco 109, Dow ET-57 (Trolene), Bayer 21-199 (CO-RAL), and American Cyanamid 12-880 (Dimethoate), for the control of this pest, an extensive study was conducted using approximately 2,800 head of cattle during three grub seasons. The systemics were administered as capsules, drenches, boluses, top-line and complete-cover sprays, and as feed additives fed at various levels for different periods of time.

Dowco 109

Dowco 109 gave 96 percent control of cattle grubs when administered as a feed additive to yearlings, 81 percent control when administered as a bolus to yearlings, 85 percent control when given as a bolus to cows, 95 percent control when applied as a spray to yearlings, and 77 percent control when administered as a spray to cows ranging from two to nine years of age.

Bayer 21-199

Bayer 21-199 gave approximately 76 percent control of cattle grubs when applied to yearlings as a spray and 84 percent control when applied as a spray to older animals. The lower control obtained among yearlings is probably due to the fact that they were predominantly range animals with long hair coats, and the pressure used may not have driven the insecticide through the hair to the skin.

American Cyanamid 12-880

Yearlings treated with American Cyanamid 12-880 boluses averaged only 64 percent grub control, while the cows averaged 79 percent control. It is probable that the poorer control on the yearlings was due to the large number of grubs found two and three months after treatment.

Dow ET-57

Yearlings treated with boluses of Dow ET-57 showed 74 percent grub control and mature cows showed 87 percent control. The last grub count was made when the population was very low, and at that time

there was little difference between the treated and control animals. This decidedly lowered the average control for the yearling group. Dow ET-57 sprays did not give effective control.

The Dow ET-57 feed additive was effective when fed at the rate of 5 mg./kg. per day for 25 days and 10 mg./kg. per day for 12 days in the concentrate ration. It did not give satisfactory control when fed in a silage ration at lower concentrations or when incorporated into the protein supplement portion of the ration.

Weight Gains

Weight gains were essentially equal for control animals and those receiving insecticides.

Table I.—Summary of Animal Systemic Insecticide Studies, 1955-1958

Formulation	Method of Administering	Dosage	Treat-ment Period	No. of Cattle Treated	Percent Control				Age and Type of Cattle
					Nov.	Dec.	Jan.	Feb.	
1955-56									
Dow ET-57									
25% wettable powder	Drench	100 mg./kg.	1 day	100					Steers-2 yrs.
1956-57									
Dow ET-57									
25% wettable powder	Drench	100 mg./kg.	1 day	20	75	100	85		Yearlings
Pure chemical	Capsule	100 mg./kg.	1 day	20	84	100	100		Yearlings
Pure chemical	Capsule	100 mg./kg.	1 day	88	91	91	94		Cows-5 yrs.
Pure chemical	Capsule	100 mg./kg.	1 day	84	84	94	100		Yearlings
25% wettable powder	Drench	100 mg./kg.	1 day	151	71	59	32		Cows-9 yrs.
25% wettable powder	Drench	100 mg./kg.	1 day	96	86	78	57		Cows--5 yrs.
25% wettable powder	Drench	100 mg./kg.	1 day	33	86	72	15		Heifers-2 yrs.
25% wettable powder	Drench	100 mg./kg.	1 day	37	91	67	60		Yearlings
25% wettable powder	Drench	100 mg./kg.	1 day	49	96	96	51		Yearling Bulls
25% wettable powder	Drench	100 mg./kg.	1 day	100	66	58	50		Cows-3 yrs.
25% wettable powder	Drench	100 mg./kg.	1 day	79	79	78	83		Cows-5 yrs.
25% wettable powder	Drench	100 mg./kg.	1 day	80	85	73	39		Calves weaning
Bolus	Bolus	100 mg./kg.	1 day	127		73			Mixed Cows
Pure chemical	Capsule	100 mg./kg.	1 day	124		81			Cows
Bolus	Bolus	100 mg./kg.	1 day	120		67			Cows
25% wettable powder	Drench	100 mg./kg.	1 day	78		88			Heifers
Bolus	Bolus	100 mg./kg.	1 day	197		89			Heifers
1957-58									
Dowco 109									
6.36 gm. bolus	Bolus	½ bolus	1 day	50	92	95	84	52	Yearlings
6.36 gm. bolus	Bolus	1 bolus	1 day	33	98	82	75		Mature cows
10% feed additive	Low level feeding	5 mg./kg.	3 days	15			94	93	Weaners
10% feed additive	High level feeding	15 mg./kg.	1 day	12			98	97	Weaners
10% feed additive	High level feeding	15 mg./kg.	1 day	70		97	99	99	Yearlings
25% wettable powder	Complete cover spray	0.75% (4 qts)	1 day	21		96	99	100	Yearlings
25% wettable powder	Complete cover spray	0.75% (4 qts)	1 day	15			83		Mixed cows
25% wettable powder	Top line spray	1.5% (2 qts)	1 day	32		94	97	98	Yearlings

Table. I—Continued

Formulation	Method of Administering	Dosage	Treatment Period	No. of Cattle Treated	Percent Control				Age and Type of Cattle
					Nov.	Dec.	Jan.	Feb.	
50% wt./vol. emulsifiable concentrate	} Complete cover spray	0.75% (4 qts)	1 day	21	94	98	93	Yearlings	
		0.75% (4 qts)	1 day	16		74	81	Cows-3 yrs.	
		0.75% (4 qts)	1 day	15	95	70		Cows-5 yrs.	
		0.75% (4 qts)	1 day	33		69		Mixed cows	
50% wt./vol. emulsifiable concentrate	} Top line spray	1.5% (2 qts)	1 day	32	97	98	79	Yearlings	
		1.5% (2 qts)	1 day	18	62	52	79	Cows-2 yrs.	
		1.5% (2 qts)	1 day	55		81	98	Mixed cows	
American Cyanamid 12-880									
2.5 and 1.25 gm. bolus	Bolus	15 mg./kg.	1 day	30	79	77	51	18	Yearlings
	Bolus	15 mg./kg.	1 day	14	96	85	56		Mixed cows
Dow ET-57									
15 gm. bolus	Bolus	110 mg./kg.	1 day	30	86	88	66	57	Yearlings
15 gm. bolus	Bolus	110 mg./kg.	1 day	19	77	92	91		Mixed cows
10% feed additive	Low level feeding	2½ mg./kg.	50 days	12		53	76		Yearlings
10% feed additive	Low level feeding	5 mg./kg.	25 days	12		51	76		Yearlings
10% feed additive	Low level feeding	5 mg./kg.	25 days	18		80		92	Yearlings
10% feed additive	Low level feeding	10 mg./kg.	12 days	16		81		94	Yearlings
10% feed additive	Low level feeding	2½ mg./kg.	6 days	30		0	0	28	Steers-2 yrs.
10% feed additive	Low level feeding	5 mg./kg.	3 days	30		2	2	51	Steers-2 yrs.
25% wettable powder	Complete cover spray	0.75% (4 qts)	1 day	31		0	31		Cows-9 yrs.
25% wettable powder	Top line spray	1.5% (2 qts)	1 day	31		36	36		Cows-9 yrs.
Bayer 21-199									
25% wettable powder	Complete cover spray	0.37% (4 qts)	1 day	19		89	93	57	Yearlings
25% wettable powder	Complete cover spray	0.37% (4 qts)	1 day	16		81	70		Cows-5 yrs.
25% wettable powder	Complete cover spray	0.37% (4 qts)	1 day	52			84	98	Mixed cows
25% wettable powder	Top line spray	0.75% (2 qts)	1 day	29		72	72	75	Weaners
25% wettable powder	Top line spray	0.75% (2 qts)	1 day	32		91	94	86	Yearlings
25% wettable powder	Top line spray	0.75% (2 qts)	1 day	23		76	67	43	Yearlings
25% wettable powder	Top line spray	0.75% (2 qts)	1 day	17		83	77		Cows-5 yrs.
25% wettable powder	Top line spray	0.75% (2 qts)	1 day	54		80	99		Mixed cows

Cattle Grub Control

