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Cable-type Backrubbers for Horn Fly Control on Cattle

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FOR HORN FLY CONTROL ON CATTLE

ENTOMOLOGY DEPARTMENT
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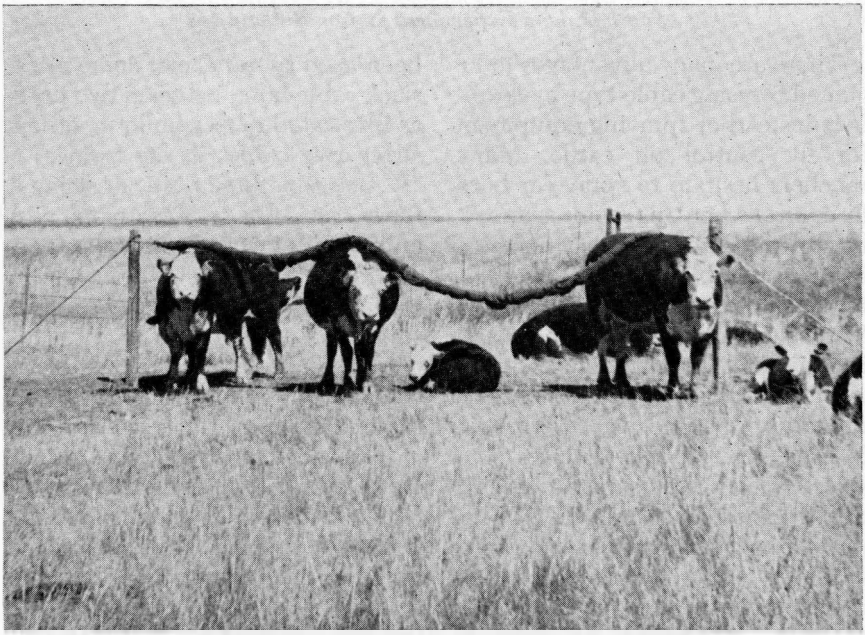

Fig. 1. A cable-type backrubber unit in operation

Cable-type Backrubbers for Horn Fly Control on Cattle

WM. M. ROGOFF[1]

Cable-type backrubbers, soaked with a 5 percent oil solution of DDT, have been in use for the control of horn flies[2] on range cattle since about 1946. Their use has been spreading steadily despite the small amount of publicity given them by state and federal research agencies and by commercial organizations. Certain information concerning this method of insecticide application has been released by the South Dakota State College Agricultural Experiment Station in the annual reports of 1950 and 1951.

Research data now indicate that the use of backrubbers as described in this bulletin will result in effective control of horn flies on cattle. Two seasons of careful observations have failed to reveal any objectionable skin irritation resulting from this method of insecticide application. Chemical analyses of fat from cattle using cable-type backrubbers for an entire season show about one-eighth the amount of DDT that has been found in the fat of cattle which were sprayed three times according to standard recommendations.

[1]Associate Entomologist.

[2]*Siphona irritans* (L.)

There are many advantages to be gained by using cable-type backrubbers instead of spraying equipment for fly control on cattle. Many ranchers hesitate to spray for horn fly control when this requires rounding up the cattle and driving them for considerable distances to holding pens to permit efficient spraying. With backrubbers, horn fly control is attained without the necessity of a round-up. This elimination of the round-up avoids disturbing the feeding herd. It also requires considerably less labor on the part of the stockman. In addition, the backrubber method of treatment uses a smaller quantity of insecticide than does spraying, and no investment in spraying equipment or holding pens is required to control horn flies.

Location, Construction, and Maintenance

Backrubber units should be located at watering places, salt licks, feed racks, or wherever cattle loaf during the day. There is no need to set the unit across a path nor to use any coercion to get the animals to use the units. The natural curiosity of the cattle seems to be sufficient to cause them to go to the units, and their normal habit of rubbing their heads, backs, sides, and flanks against any suitable object is the explanation for the success of this method. One cable-type backrubber should be set up for each group of cattle· well over 100 head can be serviced by one unit.

A wide variety of plans for the construction of backrubbers have been used by ranchers. Some use a slack cable hung between two posts as illustrated in this bulletin, others string two cables in the form of a "V" between three posts, or string a fairly taut cable set low on one post and high on another. Still others prefer to wrap posts, alone or in conjunction with cables of various sorts. These are matters of individual preference, and most designs are probably similarly effective. The design chosen for experimental work at the South Dakota Agricultural Experiment Station, and recommended in this bulletin, is simple to construct and inexpensive to operate. Such a backrubber can be built in place for less than five dollars and operated for an entire season for less than another five dollars, exclusive of labor in each case. Since this design has been shown to be effective, any modifications should be in the direction of further simplification.

The cable against which the cattle rub can be made of burlap sacking wrapped around a core of barbed wire, chain, or wire rope. Experiment Station trials have indicated that one of the least expensive and most satisfactory cores is made of three strands of barbed wire wrapped either with a fourth strand of barbed wire or a strand of number 9 wire. The barbs make it easy to attach the sacks, which are then wrapped around the cable so that the barbs are well within the sacking. The completed cable, attached about 4 feet high on the posts, should hang about 18 inches from the ground at the center.

The bottoms of the burlap sacks are attached to the points of the barbed wire so that the edges overlap by a few inches. Twelve to 14 sacks are required for each unit. The sacks are then wrapped around the cable and tied in place with binder twine. If 40 or 50 lengths of twine, approximately 20 inches long, are provided in advance, the task of tying the sacks to the cable every 4 to 6 inches is accomplished in short order.

The posts to which the cable is attached should be placed about 16 feet apart. These posts should be of good quality and should be set deeply and be well tamped. A brace should be provided at each end of the unit. If the unit is to be used for many years, the posts should be set as firmly as corner posts for a fence. Satisfactory service for a season, however, can be obtained merely by setting a short brace post at an angle from the main post and guying the top of the main post to the bottom of the brace post with four strands of number 9 wire, twisted in place to the proper tautness.

Because continued use by cattle causes the cable to be bent back and forth, it would snap before the end of the season if stapled directly to the supporting posts. If attached to a stout iron ring, or to a loop formed from two strands of number 9 wire, much longer service can be expected.

The backrubber unit is completed by soaking the burlap with a suitable insecticidal solution. A 5 percent solution of DDT in fuel oil appears to be the most suitable formu-

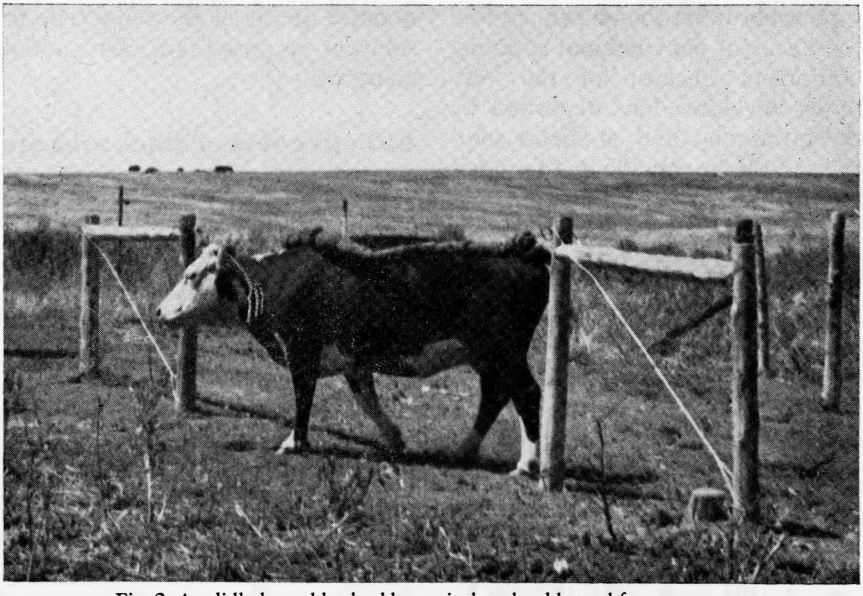

Fig. 2. A solidly braced backrubber unit that should stand for many years

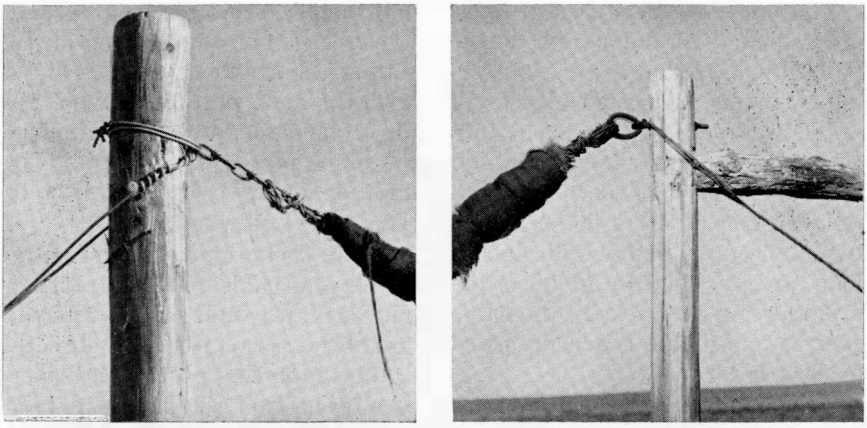

Fig. 3. Methods of attaching backrubber to post. Left: A light chain wrapped with one strand of barbed wire. Right: A barbed wire core attached to an iron ring

lation for the control of horn flies on beef cattle. For dairy cattle a similar formulation, but of methoxychlor instead of DDT, is to be preferred. The difference between these two insecticides is much less significant when applied by means of the cable-type backrubber than when applied by means of conventional spraying equipment because of the very much lower residues deposited by the former method. If direct solutions of the insecticide in oil are not obtainable, emulsifiable concentrates may be cut back to 5 percent by the addition of furnace or fuel oil. Thus 1 quart of a 25 percent emulsifiable concentrate added to 4 quarts of oil results in a 5 percent solution. There is a slight disadvantage to diluting an emulsifiable concentrate, in that the emulsifier will permit a portion of the solution in the burlap sacking to be leached by rainfall.

The insecticidal solution is applied to the backrubber simply by pouring it directly from a container such as a pitcher or a can of convenient size. Approximately 1 gallon of solution is required to soak a unit for the first time. The insecticide should be replenished at approximately 2-week intervals with about 2 quarts of the same type of solution as used for the initial charging.

Effectiveness of Backrubbers

Experiments to determine the effectiveness of cable-type backrubbers have been underway for several years. Comparisons have been made between the fly control obtained by use of backrubbers and that obtained by standard spraying techniques. Observations have been made on range animals in central South Dakota as well as on feed-lot animals in eastern South Dakota. Data have been collected for both horn flies and stable flies.[3]

[3] *Stomoxys calcitrans* (L.)

Table 1. Comparison of Fly Counts on Two Adjacent Herds, One With Access to a Backrubber and the Other Sprayed, and Three Neighboring Herds With No History of Treatment Selected at Random to Serve as a Check

Treatment	Observation Date	No. of Counts on Cattle	Flies per Side
Backrubber (5% DDT)	7/27/51	10	0.8
	7/28	10	0.6
Spray (0.5% DDT)	7/27	11	0.8
	7/28	9	0.4
Check	7/27	8	66.0
	7/28	10	100.0
	7/28	8	101.2

Table 1 presents a comparison between fly counts (mixed horn fly and stable fly populations) on five neighboring herds under feed-lot conditions in eastern South Dakota. One of these herds had access to a backrubber soaked with 5 percent DDT three days before the first observation. A second herd, separated from the first by a barbed-wire fence, was sprayed with 0.5 percent DDT (6 pounds of 75 percent wettable powder per 100 gallons of water) two days before the first observation. The other three herds (no history of treatment) were selected at random in the immediate vicinity of the first two herds. It is obvious that both the backrubber and the spray provided highly effective control, especially as compared with the check herds selected at random.

A comparison for a 24-day period between the herd with access to the backrubber and the adjacent sprayed herd just described is presented in Table 2. The data indicate that both methods provided equally effective control of horn flies and that no significant difference was apparent between their relative effectiveness against stable flies.

Comparative horn fly counts on adjacent herds of cattle having access to backrubbers charged either with 5 percent DDT solution, 5 percent methoxychlor solution, or 5 percent methoxychlor emulsion are presented in Table 3. These cattle, located in central South Dakota under range conditions, were observed on 18 separate occasions during a 3-week period in 1950. All units had been in operation at least

Table 2. Comparison of Effectiveness of Backrubber (5% DDT) vs. Spray (0.5% DDT) Relative to Horn Fly and Stable Fly Counts on Two Adjacent Herds

Observation Date	Herd A (Backrubber)			Herd B (Sprayed 7/25/51)	
	Replenishment Date	Horn Flies per Side	Stable Flies per Side	Horn Flies per Side	Stable Flies per Side
7/24/51	7/9	13.2	0.0	66.3	0.0
7/27	7/24	0.5	0.3	0.4	0.5
7/28	7/24	0.3	0.3	0.0	0.4
8/10	7/24	0.0	8.8	0.0	7.5
8/17	8/10	0.0	7.9	0.0	8.8

Table 3. Comparative Horn Fly Counts on Adjacent Herds of Cattle Having Access to Backrubbers Charged With 5% DDT Solution, 5% Methoxychlor Solution, or 5% Methoxychlor Emulsion. (18 Observation Periods, 8/21 to 9/9/50)

Treatment	No. of Counts on Cattle	Flies per Side
DDT solution	305	5.3
Methoxychlor solution	147	12.6
Methoxychlor emulsion	223	15.0

Table 4. Comparative Fly Counts on Adjacent Herds of Cattle Having Access to Backrubbers Charged With Various Insecticides and a Check Herd Reputedly Sprayed Several Times During the Season

Treatment	Concentration (Percent)	No. of Counts on Cattle	Observation Periods (Days)	Flies per Side
DDT	5.0	300	15	3.4
Methoxychlor	5.0	49	13	5.7
CS-708*	5.0	291	15	6.1
Toxaphene	5.0	300	15	8.0
Lindane	0.5	238	15	11.8
Check		144	15	41.5

*"Dilan," a commercial mixture containing one part 1,1-bis(p-chlorophenyl)-2-nitropropane and two parts 1,1-bis (p-chlorophenyl)-2-nitrobutane.

3½ weeks before the first fly counts were made. Statistical analysis of these data indicates significant superiority of DDT over either of the two methoxychlor formulations, but does not indicate superiority of the methoxychlor solution over the emulsion. The use of the oil solution under field conditions, however, was much simpler than the emulsion as the latter had a tendency to harden the burlap and make replenishment difficult.

Table 4 presents comparative fly counts, obtained in 1951 under range conditions in central South Dakota, on nine adjacent herds of cattle having access to backrubbers charged with various insecticides and a check herd not so exposed. Fly counts, obtained over a 7-week period in August and September, were not started until all units had been in operation for at least two weeks. The check herd, separated by a barbed-wire fence from animals using one of the backrubbers charged with test chemical CS-708, was not under the control of the Experiment Station. According to information received at the end of the season, this herd had been sprayed several times. Despite this treatment it is apparent from the data that all herds having access to the backrubbers had significantly fewer flies than the check herd. Statistical treatment of these data indicates that DDT was significantly superior to either toxaphene or lindane, but no other significant differences were demonstrable within the array. It should be noted that lindane was used at one-tenth the concentration of the other insecticides.

The use of emulsifiable concentrates, diluted to 5 percent with a solvent such as common furnace or

fuel oil, apparently may be used successfully on backrubber units. At the end of the 1951 season it was noted, however, that units charged with such diluted emulsifiable concentrates had large brown stains on the soil under the lowermost portion of the sagging burlap-wrapped cable, indicating a leaching by rainfall. No such stains were apparent under units charged with oil solutions.

Chemical analysis of burlap taken in the fall from a backrubber unit charged seven times during the summer of 1950 with a 5 percent oil solution of DDT revealed 5.9 mg. of DDT per gram of burlap. This suggests the possibility that once the unit has been charged a few times with insecticidal solution, the occasional addition of solvent alone may be sufficient.

Skin Irritation Investigations

At the outset of these investigations, it was suspected that the use of oil solutions on cable-type backrubbers might produce skin irritation which could offset the advantages of ease of operation and effectiveness of this method of fly control. A previous report[4] of work at the South Dakota Agricultural Experiment Station described a chronic dermatosis of cattle due to such excessive oil applications as may occur with certain types of automatic applicators, or as a result of excessive hand application of certain oils or oil solutions for external parasite control. Accordingly, a series of patch tests were performed to

[4]G. S. Harshfield and C. E. Rehfeld, "A Chronic Dermatosis of Cattle Due to Oil Applications," *Jour. Amer. Vet. Med. Assoc.*, **112:** 446-450, 1948.

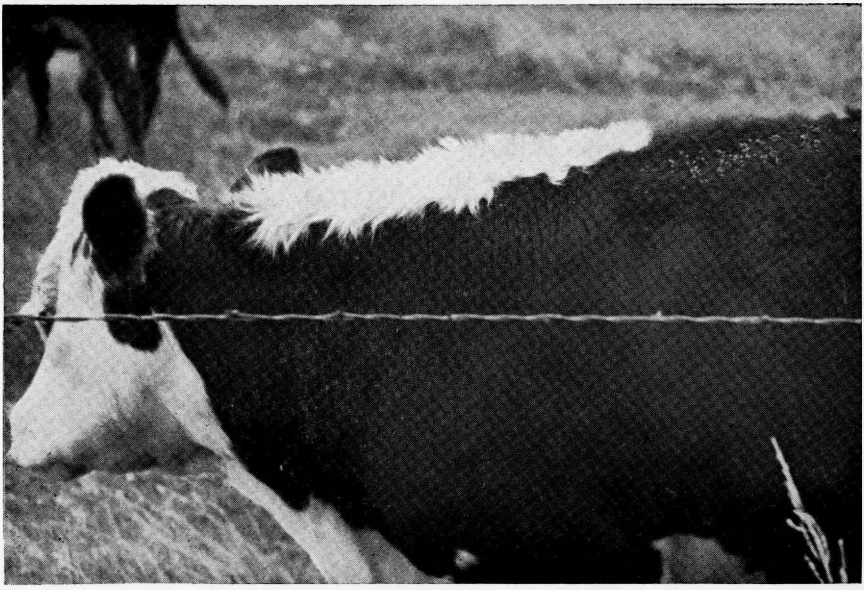

Fig. 4. A moderate infestation of horn flies

determine the nature and extent of irriation produced under conditions of maximal application.

Six patches, about 3 by 6 inches in area, were clipped on either side of the midline in the region of the shoulders, back, and loin of eight Hereford steers. These clipped areas and adjoining unclipped areas of similar size were swabbed with cotton soaked with a 5 percent solution of DDT in furnace oil. All such marked areas were thoroughly swabbed the first week, all but one the second week, all but two the third week, and so on. Severe irritation was seen in both clipped and unclipped areas. In some cases the skin became leathery and in the more severe lesions there was sufficient hardening to cause breaks to appear in the surface of the skin. No loss of hair was noted. The percentage of observations on treated unclipped areas over a 7-week period is shown in Table 5. Data from clipped areas were essentially the same as from unclipped areas. It is apparent that in this series of observations the area of the shoulders is the most susceptible one tested, followed in turn by the back and the loin. No relationship is apparent between the number of swabbings and the degree of skin irritation found.

Observations were undertaken next to determine whether similar irritation might be produced on cattle having access under field conditions to cable-type backrubbers. Animals having access to backrubbers at an Experiment Station ranch in central South Dakota were rounded up and driven through chutes where the shoulder region of each animal was felt and observed visually. During 1950, 192 such observations revealed two small lesions. Scrapings taken from these lesions were negative for parasitic mites and for ringworm. These two lesions, which might or might not have been caused by the use of the backrubbers, were sufficiently small that their presence was revealed only after careful scrutiny. Similar observations on 162 cattle in 1951 failed to reveal any skin irritation. It appears, therefore, that the amount of insecticidal solution adhering to cattle using backrubbers is insufficient to initiate acute or chronic skin irritation.

DDT Absorption Investigations

A possible disadvantage of the use of cable-type backrubbers soaked with oil solutions of insecti-

Table 5. Irritation Produced on Eight Hereford Steers. Patches Swabbed at Weekly Intervals With 5% Oil Solution of DDT. Observations Repeated Seven Times at Weekly Intervals

Area Treated	No. of Swabbings	Percent of Individual Patch Observations Showing Irritation
Right shoulder	1	73
Right back	2	59
Right loin	3	21
Left shoulder	4	80
Left back	5	57
Left loin	6	21

cide might be that excessive quantities of insecticide would be absorbed through the skin. To test this possibility, it was decided to follow the absorption of DDT since much information concerning the physiological responses of cattle to this insecticide was already known. Cattle having access to DDT-soaked backrubbers for an entire summer were followed to slaughter where approximately a pound of fat was taken from the back and a similar sample from the neighborhood of the kidneys of each animal. For the sake of comparison, similar samples were taken from cattle sprayed three times at 3-week intervals with 0.5 percent DDT suspension (8 pounds of 50 percent wettable powder per 100 gallons of water). These samples were obtained one week after the last spraying at the time the cattle were marketed for slaughter.

The results of the chemical analyses of fat taken from sprayed animals and from animals having access to DDT soaked backrubbers are shown in Table 6. It is readily apparent that far less DDT is absorbed by cattle using cable-type backrubbers than by animals sprayed three times with a DDT suspension at a standard recommended concentration. The data for sprayed animals are in close agreement with data presented by Bushland[5] of the United States Bureau of Entomology and Plant Quarantine, who detected 15 parts per million (p.p.m.) in the fat of cattle treated five times with 0.5 percent DDT and an average of 32.5 p.p.m. in the fat of 18 steers obtained in the vicinity of Kerrville, Texas after the 1949 fly season.

Discussion

The experimental data reported in this bulletin indicate that highly successful horn fly control can be attained under range or feed-lot conditions by use of home-made, cable-type backrubbers. The lack of skin irritation observed and the low DDT residues found in the fat of

[5]R. C. Bushland, H. V. Claborn, H. F. Beckman, R. D. Radeleff, and R. W. Wells, "Contamination of Meat and Milk by Chlorinated Hydrocarbon Insecticides Used for Livestock Pest Control," *Jour. Econ. Ent.*, 43:649-652, 1950.

Table 6. Comparison of DDT Residues in Fat After Spraying and After Entire Season's Use of Backrubber. Summary Based on Two Analyses per Fat Sample per Animal

Treatment	Fat Source	No. of Sprayings or Chargings	Year	No. of Cattle	DDT Residues Detected: Range p.p.m.	DDT Residues Detected: Average p.p.m.
Spray (0.5% DDT)	Back	3	1951	12	7.3–30.1	14.6
	Kidney	3	1951	12	2.8–35.8	15.3
Summation				12	2.8–35.8	14.9
Backrubber (5% DDT)	Back	7	1950	10	0.7– 3.4	1.8
	Kidney	7	1950	10	0.6– 4.0	1.6
	Back	4	1951	10	0.4– 3.8	1.6
	Kidney	4	1951	10	0.2– 1.6	0.7
	Back	6	1951	5	1.2– 4.7	3.0
	Kidney	6	1951	5	1.4– 5.2	3.6
Summation				25	0.2– 5.2	1.8

animals having access to backrubbers of this design indicate that the insecticide is deposited primarily on the surface of the hair of the cattle using the units. In actual use, cattle rub their heads, backs, sides, and flanks on the burlap-wrapped cables. It is apparent that there is sufficient movement of the flies on the cattle to bring them in contact with the extensive but incomplete depositions of the insecticide.

The solvents used for the purposes of this study were of a type that might reasonably be expected to produce skin irritation if sufficient quantities were deposited on the animals. The possibility of using refined oils or of using waxes or otherwise viscous solvents to reduce the quantity of solvent deposited on any one animal has been considered. In view of the data at hand, such precautions appear unnecessary.

The possibility of using the device under consideration for the control of other external parasites of livestock is obvious. Data presented in this bulletin show that effective control of horn flies can be accomplished. The data also indicate (though not conclusively) that stable fly control by means of cable-type backrubbers is equivalent to that attained by spraying techniques. Further observations are desirable regarding stable fly control. The use of repellents instead of, or in addition to, insecticides should also be considered. The possibility of eradicating lice or ticks by this method is small, though such observations on these pests would probably be desirable. Little likelihood exists that this method would be successful in reducing infestations of cattle grubs or of mange mites.

The advantages shown can be lost by carelessness in locating the backrubbers. They must be erected in such places that cattle have ready access to them. Usually a watering place, salt lick, feed rack, or some obvious place where the herd habitually loafs makes a desirable place for locating a backrubber unit.

The data presented here should not be construed as applicable to the several continuous-type cattle oilers now on the market.

Summary

1. Cable-type backrubbers constructed and located as described in this bulletin, and soaked with a 5 percent solution of DDT in fuel oil, provide highly effective control of horn flies under range or feed-lot conditions.

2. Backrubbers appear to provide as effective control of stable flies as do standard spraying techniques, though further observations on this point are desirable.

3. No significant skin irritation has been seen during two years of observations on animals having access to backrubbers.

4. DDT residues in fat of cattle using backrubber units for an entire season averaged 1.8 p.p.m., with a maximum of 5.2 p.p.m. Animals sprayed three times with 0.5 percent DDT averaged 14.9 p.p.m. or over eight times the level found in cattle using the backrubbers.