

THE NEW INSECTICIDES IN FLY CONTROL

By

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During the summer of 1946 experiments were conducted to determine the effectiveness of three of the new insecticides in controlling flies. Each of the insecticides was used at .5% concentrations (1 lb. of actual DDT, DDD or 666 per 25 gallons of water) and applied as sprays to buildings and livestock of the N.D.A.C. Experiment Station. The sprays were applied with a 25-gallon Dobbins Estate Power Sprayer at a pressure of 150 pounds giving a coarse spray which thoroughly moistened the surfaces treated. All inside surfaces were sprayed as well as the outside walls to a height of 7 feet.

Prior to spraying any building, the electricity was shut off by pulling the main switch or removing the fuse,—the object being to lessen the danger of the operator receiving an electrical shock if spray came in contact with bare connections or faulty wiring.

Three collecting or check surfaces of one square yard each were installed in each barn and dead insects were collected from the check surfaces at periodic intervals. Counts were made of all insects, but only the numbers of house flies, *Musca domestica* (L.) and stable flies, *Stomoxys calcitrans* (L.) are listed in the accompanying table. Occasionally there were more flies lying dead in darkened areas away from the windows than in the sample square yard collecting frames which were placed near the windows. Flies which were affected by the insecticides flew in uncertain irregular ways and did not make consistent efforts to reach the light.

The number of dead flies on the check surfaces is not to be considered an index of the comparative effectiveness of the insecticides, because flies were most abundant in the hog and dairy barns; hence, greater numbers were killed in these buildings. The continuing death of flies demonstrated the lasting effect of the sprays. The relative efficiency of the sprays was well illustrated by a comparison of fly counts made in the treated and untreated buildings, and on the treated and untreated livestock. The fly counts on livestock represent the number of flies on one side at any time, as field animals did not permit a close enough approach to be observed with binoculars.

Effects of Materials at .5% Concentration

1. Gesarol (20% DDT Emulsion): This emulsion was used in the sheep barn. Sixty gallons were used and two and one-half hours were required for treatment. The herdsman's office was not treated at the time of the first application. However, at his request it was treated on the second application, August 15. On August 26 he

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reported that for the first time he could rest a few minutes after lunch without being constantly annoyed by flies. On September 2 there still were very few flies in the barn.

2. Hexachlorocyclohexane, Benzene Hexachloride, or 666 (50%

Wettable Powder): This insecticide was applied to the hog barn where there were more flies than in other buildings. The results of this spray were the most spectacular, as there were fewer flies in the hog barn than in the other buildings following treatments. Sixty gallons of spray were used and three hours were required for treatment. Although it gave the best results, its objectionable, persistent "earthy-musty" odor would detract from its use in dairy barns or near food products. Clothing, worn while this spraying was being done, retained the characteristic odor after being sent to the laundry. Gloves and coveralls, not laundered, retained a distinct odor six months after contamination. This spray can be used to good advantage in hog, beef, and sheep barns, or around garbage dumps where the odor would not be objectionable.

On August 29, 17 hogs and their pens were thoroughly drenched with the spray. They apparently suffered no ill effects, but the backs of three of the animals lost some hair, which loss might be attributed to the effects of the spray.

Before treating the inside of the barn, there was an average of five flies on one side per hog. Following treatment there were 1.5, 2, and 0 flies per hog, two, three and four days respectively. Two weeks later there were 5 flies per hog as compared to an average of 121 flies per animal on a farm where no control measures had been applied and under conditions closely resembling the NDAC hog barn.

Before treatment of the hogs in the field, there was an average of 23 flies per animal. There were 7, 2, and 3 flies per hog two, three, and four days respectively following treatment. Two weeks later, September 12, there were 1.75 flies per hog as compared with 11 flies per hog on untreated animals on a farm nearby. Cold weather and decreasing fly population prevented further comparative investigations. The number of flies on the sides and ceiling of a pen were reduced from 10 flies before treatment to 4, 3, and 2 flies on two, three and four days respectively following treatment. Two weeks later there was an average of 3 flies per pen, while comparable surfaces of an untreated hog barn about one mile distant had 86 flies resting on it.

Six beef bulls were thoroughly drenched on August 29 to determine if any harmful effects resulted from the spray. There was an average of 36 flies per animal before spraying and 15, 13, and 16 flies at two, three, and four days respectively after treatment. There were no ill effects observed on the animals following the spray application.

3. Dichlorodiphenyldichlorethane or DDD (50% Wettable Powder): Ninety gallons of the spray were used and three and one-half hours were required to treat the beef barn. Twenty-two gallons and one and one-half hours were required to treat 23 young steers and heifers and 11 full grown steers of the beef herd. Prior to treatment there was an average of 40 biting flies on the shoulders and lower parts of the legs at any one time. There were 6.5, 1.25 and 5 flies at two, three and four days respectively following treatment.

August 29, biting flies were abundant and annoying beef bulls which had been treated with DDD on August 15th. There was an average of 36 flies on one side per animal.

4. Deenate 25-R (25% DDT Emulsion): Thirty gallons of spray were used in spraying the bull barn and five of the bulls which were kept in the barn. Two and one-half hours were required to do the spraying. The fly population was reduced in the barn and the dead flies recorded. On July 29 a young bull gained access to the passageway where the square yard collecting traps were kept and knocked them down. Later, on August 13, the traps were again disturbed by bringing in hay to the lofts. Therefore, the results of the first spray cannot be evaluated. Six weeks following the second application, many flies were dying and the population was still greatly reduced as compared to that before spraying.

5. Deenate 50-W (50% DDT Wettable Powder): Sixty gallons of spray were used and it required two and one-half hours to treat the dairy barn. For one month following the first application, and for five weeks following the second application, many flies were being killed, as indicated in the accompanying table. A month following applications the number of flies killed was reduced and an increase in the overall population was observed.

On August 29 the dairy cattle were examined as they came from the pasture. They showed an average of 12-15 flies on one side per animal prior to treatment. Inside the dairy barn, during the time of milking, there were 9 flies per cow near the doors and passageways, and from 1-3 in the interior of the barn. These flies came in with the cows from pasture, as nearly all flies brought in on the previous afternoon had been killed by the residual action of the spray already in the barn. The cows were sprayed with the DDT after milking. Forty-two gallons of spray and one and one-fourth hours were required to treat 37 cows. Two days later there was an average of 6-7 flies on the cows coming from pasture, and but 1 fly per cow in the barn during milking time. Three days later which was cloudy and cold, there were very few flies on the cows coming into the barn, and not a fly was observed on the cows being milked in the feeding lanes. On the same day, a check on an unsprayed herd revealed 10 flies per cow at any time.

Before the application of the DDT residual spray, the herdsmen were required to apply "fly spray" to the cows each day before

milking. Following the application of the DDT, however, the daily use of "fly spray" was discontinued because it was no longer required.

Commenting on this, Mr. J. E. Haine, Dairy Herdsman of NDAC Experiment Station for the past twenty years, related that "prior to the use of residual sprays, the flies became very abundant. On cool mornings late in the fall the flies were so thick that a solid black circle of them would form around the lights. After the cows were let in, we would have to spray their legs because of so many biting flies. Since we began using DDT in 1944, the fly populations have been greatly lessened. This year has seen the most noticeable decrease in fly population." (Undoubtedly due to the more complete coverage of barns and livestock with experimental sprays.)

"The bulls confined in the barn used to fight flies. Now they are quiet and chew their cud as in winter. It is a pleasure to go in there now and see them so contented."

"Formerly the cows had to be driven into the barn. They could hear the buzzing and were not willing to enter. Now they crowd in front of the gate, eager and ready to come in. Many are the same cows which were here before the experimental sprays and they have learned the pleasure and contentment of a fly-free dairy barn. We now have no trouble with flies dropping into pails of milk. We previously had such trouble when the old "fly spray" was applied before each milking."

6. Rhothane (25% DDD Emulsion): Fifty-nine gallons of the spray were used and two hours were required to treat the sheep pens. This spray was furnished for experimental use on August 15. Five weeks following application, it was still killing flies and continued to do so until cold weather eliminated the fly population.

A field beef herd which was examined before treatment showed an average of 75-100 flies per animal. Although the day was windy, the animals were continually moving their heads and switching their tails to drive the flies away. Twenty gallons of spray and one hour were required to treat 20 head on August 29. Three days later there was an average of 1 fly per animal. An untreated herd in the vicinity showed an average of 62 flies per animal at this time. Cold weather thereafter reduced the fly population and prevented further comparable checks on field herds to determine the lasting effects of the insecticide.

The Use of Fly Traps

Flytraps were maintained in the vicinity of the NDAC Experiment Station buildings treated with the residual or "lasting" insecticides and on nearby farms where treatments had not been applied. While useful in reducing housefly populations, they were not effective in capturing blood sucking flies such as the stable fly.

**Table 1. Number of Dead Flies Per Three Square Yards Following Spray Applications
July 19 and August 18, 1946**

Insecticide	Building	Dates Collected											Per cent Stable Flies (Balance House Flies)
		7-20	7-21	7-22	7-29	8-5	8-13	8-26	9-2	9-10	9-17	9-23	
Gesarol 20% DDT Emulsion	Sheep Barn	13	7	9	103	54	28	30	49	27	24	24	17.4
Hexachlorocyclohexane 50% Wettable Powder	Hog Barn	167	68	54	1243	995	195	35	34	18	31	39	8.9
Rhothane WP-50 50% DDD Wettable Powder	Beef Barn	36	5	7	218	211	122	36	54	43	44	40	17.8
Deenate 25-R 25% DDT Emulsion	Bull Barn	4	4	7	*	92	*	145	70	58	77	68	41.7
Deenate 50-W 50% DDT Wettable Powder	Dairy Barn	60	34	42	199	114	59	301	294	221	255	227	34.3
Rhothane 25% DDD Emulsion	Sheep Pens	**	**	**	**	**	**	178	81	78	60	88	24.1

*Accidentally disturbed.

**Material not available until August 15th.

Sources of Insecticides:

Geigy Company, Incorporated, New York 8, New York. Gesarol. 20% DDT Emulsion
E. I. DuPont deNemours, Wilmington 98, Delaware., through the courtesy of Agricultural Supply Company, Grand Forks,
North Dakota. Deenate 25-R 25% DDT Emulsion, Hexachlorocyclohexane, and Deenate 50-W 50% DDT Wettable
Powder.

Rohm and Haas Company, Philadelphia 5, Pennsylvania. Rhothane WP-50 50% DDD Wettable Powder and Rhothane
25% DDD Emulsion.

Conclusions

The insecticides, **DDT**, **DDD** and **666**, resulted in satisfactory fly control at .5% concentrations of actual toxic agent upon application to buildings and livestock.

Stable flies in and around buildings cannot be captured by fly traps but can be effectively controlled by the timely applications of residual or "lasting" insecticides as shown in Table 1.

For the control of house flies and stable flies spraying should be started in late June or early July when the flies begin to get troublesome under North Dakota conditions. An additional application will be required in about 5 weeks to buildings. For livestock more frequent applications may be necessary.

At the concentration of .5% for the insecticides used, no apparent injury was caused to the treated livestock. Under no circumstances should emulsion concentrates be applied directly to the livestock. Both the stock emulsions and wettable powders *must be diluted* to the desired concentrations with water. When using a wettable powder in a sprayer which is not equipped with an agitator, as the small knapsack type, the sprayer should be shaken occasionally to keep the particles in suspension. Wettable powders are not solutions and the active killing ingredients have a tendency to settle to the bottom.

A survey¹ conducted by Knapp and Aanestad showed that summer fly spraying with DDT aids greatly in the control of cattle lice.

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