

The Value of DDT for the Control of the Common Chicken Louse¹

D. C. WARREN

Kansas Agricultural Experiment Station

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THE sensational results obtained by military authorities in the use of DDT (Dichloro-diphenyl-trichloroethane) for the control of the human louse led the writer to investigate its value in the control of the chicken body louse (*Eomenacanthus stramineus*). The reported persistency of the killing power of this new chemical gave promise of its being superior to the commonly used sodium fluoride.

The only published results regarding the use of DDT for the control of chicken lice were issued by Telford (1944) in which he compared the efficacy of DDT, sodium fluoride and nicotine dust. From observations, continued a maximum of 52 hours after treatment, he concluded that DDT was as effective as sodium fluoride against the common body louse and shaft louse of the chicken.

During the summer and fall of 1944² birds heavily infested with the chicken body louse, *Eomenacanthus stramineus*, and to a less extent the shaft louse, *Menopon gallinae*, were segregated and used in this experiment. For obtaining records, hens were kept in small individual cages (laying batteries) with a floor of widely spaced wires. Pieces of glass (15×18 inches) were placed a few inches below the wire floors to catch the lice

which dropped from the bodies of the treated birds. In order to study the residual effects of the treatments, it was necessary to develop a method of reinfesting birds with lice. Various methods of accomplishing reinfestation were tried but the most successful was that of placing the bird to be reinfested in the same compartment overnight with a heavily infested one. The space was so crowded that plumages of the two birds were constantly in contact. To further expedite the transfer of lice the abdomens of the two birds also were held in close contact for a few minutes. Although the method of reinfestation was somewhat crude, it seemed adequate for purposes of this experiment. No very satisfactory methods of determining the degree of infestation were devised.

Many of the lice dropping from DDT treated birds during the first few hours after treatment were alive but died within the next few hours. Both DDT and sodium fluoride were applied with the aid of small salt shakers to the abdomen, back, thighs, wings and neck of the birds since the dosage could thus be made more uniform than by the pinch method.

The first test made was a comparison of sodium fluoride and "Gesarol A3" dust³ (3 percent DDT). Nine lousy hens were treated with the former and 11 with

¹ Contribution No. 163, Department of Poultry Husbandry.

² G. W. Adams assisted in collecting some of the data reported in this paper.

³ All DDT preparations were furnished by the J. G. Geigy Company, Inc., N. Y., and in cooperation with the Crop Protection Institute.

the latter. During the first 18 hours after treatment the mean number of lice killed and collected on the glass beneath the cages was 86 per bird for the sodium fluoride and 62 for the DDT. In view of the inaccuracy in determining both the original infestation and the number of lice actually killed, many undoubtedly remaining enmeshed in the plumage, the difference between these two values prob-

going experiment were employed in a reinfestation test to determine the residual protective effect of the chemicals. Evidence was obtained that either chemical afforded the bird some protection for periods of 13 to 25 days after treatment. The mean numbers of lice dropping from reinfested birds in the first 18 hours were 22 for birds originally treated with sodium fluoride and 10 for birds treated

TABLE 1.—*Reinfestation experiment.*

Ten birds treated with 5 percent DDT					
Bird number	Estimated original infestation	Number of lice killed in first 24 hours after treatment	Estimation of number of living lice on birds 24 hours after treatment	Number of lice killed in first 9 hours after reinfestation	Number of lice found on bird (killed by retreatment) at 18 to 24 days after reinfestation
1	Very light	73	None	27	104
2	Medium	376	None	0	22
3	Heavy	1,419	Few	16	363
4	Heavy	414	None	3	405
5	Medium	490	Few	13	391
6	Heavy	733	Some	9	614
7	Heavy	1,239	Some	8	1,314
8	Medium	219	None	30	966
9	Heavy	83	None	44	397
10	Heavy	89	None	18	105
Eight birds treated with 10 percent DDT					
11	Heavy	541	Few	5	344
12	Heavy	729	Few	33	779
13	Heavy	222	Few	31	None
14	Medium	391	None	4	327
15	Heavy	1,194	None	33	658
16	Heavy	193	None	21	1
17	Heavy	326	None	11	2
18	Heavy	376	None	35	None

ably has no significance. Of significance, however, is the fact that not one of the nine sodium fluoride treated birds was found to carry living lice 24 hours after treatment while four of the eleven "Gesarol A3" (DDT) treated birds were still carrying living lice in their plumage 16 to 60 days following treatment.

Four of the sodium fluoride and five of the DDT treated birds used in the fore-

with DDT. None of the sodium fluoride treated birds was found to carry any living lice beyond three days following reinfestation, while two of the five birds originally treated with DDT showed infestation throughout the examination period of 35 days.

In another experiment, conducted under more nearly farm conditions, a group of 20 birds heavily infested with lice were

kept in a small house. The male and eleven of the hens were left untreated while six hens were treated with 3 percent DDT and three with sodium fluoride. An examination of the treated birds two days after treatment revealed living lice on only one sodium fluoride treated bird. A second examination made one month later showed all treated birds to carry some living shaft lice but none of the three sodium fluoride treated birds had any living body lice while four of the six DDT treated birds carried living body lice at the vent. The controls all showed infestation at this time.

In another experiment, carried out under conditions where opportunity for reinfestation was not afforded, all 91 infested birds in a pen were treated, 45 with DDT (3 percent) and 46 with sodium fluoride. Application was made by the pinch method at the vent, each thigh, the saddle, and the neck. An examination made 30 days later showed lice on only one bird, a DDT treated individual.

After completing the foregoing experiment, it was suggested that stronger mixtures of DDT might give better results. Prepared mixtures of 5 to 10 percent DDT (Neocid A5 and Neocid A10) were obtained from the manufacturer and applied to birds as indicated in the accompanying table. The major objective was to determine the persistency of the killing effects of 5 and 10 percent DDT. The procedure was as follows—Birds were treated with the two strengths of DDT and their relative killing efficiency measured by the number of lice falling from the birds during the first 24 hours after treatment (Column 3 accompanying table) and by estimation of the degree of infestation at the end of that period (Column 4). The variation in number of lice killed (Column 3) is probably primarily an expression of differences in

degree of the original infestation. It is of interest to note that living lice were found on some birds 24 hours after treatment with both concentrations of DDT.

To test the residual effects of DDT all the birds in this experiment were reinfested at periods of from 17 to 20 days after treatment with DDT. The numbers of dead lice (Column 5) dropping from the reinfested birds in the first nine hours after reinfestation show that the two strengths of DDT still had a residual killing effect for a period of two to three weeks. The instances where very few lice were dropped may either mean that the DDT had little remaining killing power or that the reinfestation technique was faulty. There was evidence from the tabulated data (Column 5) that the DDT retained some killing strength at the time of reinfestation, but a further test was made to determine whether the lice could become reestablished on the bird following reinfestation. This test was made by giving each bird in the experiment a heavy dusting with 10 percent DDT at from 18 to 24 days after reinfestation. The purpose of this heavy treatment with DDT was to kill and count all the lice accumulated on the bird following the original treatment. The lice recorded in Column 6 (accompanying table) as being killed in the 24 hours after the second treatment are the adult or immature lice surviving the original treatment or those transferred as a result of the reinfestation technique. It is seen that most of the birds found to be relatively free of lice at the end of the experiment (showing none or few lice killed by the second treatment) were in the group originally treated with 10 percent DDT. It is true, however, that with treatments of both 5 and 10 percent DDT birds were found with heavy reinfestations of lice.

CONCLUSIONS

The results of this experiment indicated that DDT in concentrations up to 10 percent and in the form available to the writer does not afford the chicken any better protection than is provided by the standard sodium fluoride. A 3 percent concentration was not so effective as sodium fluoride. The DDT did not protect

the bird from reinfestation after 2 or 3 weeks which is the approximate life cycle of the chicken body louse. Where all birds of the flock were treated, both 3 percent DDT and sodium fluoride seemed to give fairly effective control of lice.

REFERENCE

Telford, H. S., 1944. Chicken louse control. *Soap and Sanitary Chemicals* 20: 113.