

REPORT ON THE VALUE OF ISODRIN AND ENDRIN AS POTENTIAL
PROTECTING AGENTS AGAINST BLOWFLY STRIKE IN SHEEP.

R. DU TOIT and O. G. H. FIEDLER, Onderstepoort Laboratory.

Following the release of the two synthetic chlorinated hydrocarbon insecticides, Aldrin and Dieldrin, several years ago, two new compounds Isodrin (compound 711) and Endrin (compound 369) have been made available recently by the same manufacturers*. In that these two compounds are stereoisomers of the former, the chemical formulae are identical. Isodrin is the endo-endo isomer of Hexachloro-hexahydro-dimethanonaphthalene whereas Aldrin is the endo-exo isomer. Endrin is the endo-endo isomer of Hexachloro-epoxy-octohydro-dimethanonaphthalene while Dieldrin is the endo-exo isomer.

Due to the fact that both Aldrin and Dieldrin have proved very effective in protecting sheep against blowfly strike, Fiedler and du Toit (1951), and du Toit and Fiedler (1953), similar tests with Isodrin and Endrin have been conducted on Merino sheep in order to compare the larvicidal action of the different isomers.

Larvae were subjected to the biological assay method of Fiedler and du Toit (1951), serial dilutions of Isodrin and Endrin being applied through the range of 1000—0·0064 p.p.m. of the active principles. Both compounds were used as wettable powders suspended in horse serum. The minimum concentrations of insecticide in p.p.m. in the nutritional medium found necessary to kill or to affect newly hatched larvae over given periods of time are shown in Table 1.

From the table it is seen that using the lowest concentration capable of destroying or affecting the larvae in a given period of time as an index of the relative efficiency of the compounds, Isodrin is more effective than its isomer Aldrin and is somewhat superior to the highly effective Dieldrin. Endrin is not only the least effective of the four compounds tested but failed to achieve a 100 per cent kill within 72 hours in a concentration below 16 p.p.m. In this respect it has been found to possess approximately the same degree of efficiency as Chlordane.

To test the value of Isodrin and Endrin as a larvicide on the wool of living sheep as well as to determine the duration of protection against strike, areas about 12 inches in diameter on the rump of two groups each of five Merino sheep with wool from one to two inches in length were saturated with a suspension containing 0·5 per cent of the compound. The results of the in-vitro bio-assay method as well as protection from artificial strike were used as a means of comparison.

Endrin afforded full protection for a period of 12 to 17 weeks, (average 15·2 weeks) and partial protection for 19 to 25 week (average 21·3 weeks). This compound is markedly inferior to Aldrin and Dieldrin and possesses about the same diffusion power as Chlordane.

* Messrs. Julius Hyman & Co., Denver, Col. U.S.A.

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TABLE I.

The minimum concentrations of insecticide in p.p.m. in the nutritional medium required to kill or to affect newly hatched *L. cuprina* larvae in time specified.

	Time (hr.)					
	1	3	6	24	48	72
Isodrin—						
K.....	—	—	64	4	4	1
A.....	250	16	1	1	0.25	0.25
Endrin—						
K.....	—	—	250	64	16	16
A.....	250	16	16	4	4	4
Aldrin—						
K.....	—	1,000	1,000	16	16	4
A.....	—	250	64	4	4	1
Dieldrin—						
K.....	—	1,000	250	16	4	1
A.....	—	64	16	0.25	0.25	0.25

(K = 100% mortality, A = affected or showing partial kill).

Isodrin showed a more prolonged residual effect in the wool. Full protection with a concentration equivalent to 4 p.p.m. of the active ingredient, was still present at skin level 22 weeks after treatment.

A thorough inspection of all sheep at this date revealed a peculiar bleaching effect on the wool in the treated area which had not been noticed previously after the use of other insecticides. The treated portion of the wool appeared white and fluffy, like cotton wool. The natural sheen and the crimp had disappeared (Figure 1). No damage to the fibre itself, however, was detectable microscopically.

Analysis of the wool grease content in treated and untreated parts of the same fleece showed a considerably smaller percentage of grease in the treated and bleached zone. The wool grease content of two wool samples* on a percentage basis, taken from the rump region of one sheep (No. 84961) treated with Isodrin, was as follows:—

	Untreated Area.	Treated Area.
A.—Top portion of the fibre, consisting of old wool present at time of treatment.....	12.6	7.8
B.—Bottom portion of the fibre, new growth wool after treatment.....	16.2	16.6

* The determination of the wool grease content was carried out by Mr. J. A. Minné, Section of Toxicology, Onderstepoort.

The change in colour was particularly marked in wool treated with Isodrin, and slightly less pronounced in sheep treated with Endrin.

The experiments were discontinued after this highly undesirable reaction had been noted.

As it was not possible to determine from the above experiments whether the discoloration of the wool fibres was due to the compound itself or to a wetting or dispersing agent in the suspension, a special Isodrin wettable powder at equal strength (10 per cent active ingredient) was prepared locally*. For this purpose a belloid was used which, from past experience, had been shown to have no effect upon the fleece. Recrystallized Isodrin, with a purity of 97·5 per cent, was used for this formulation for comparison with the original preparation used in the previous tests. Both types of wettable powder were applied at a dilution of 0·5 per cent a.i. to the rump region of Merino sheep. Four weeks later the treated wool of all the animals in both groups was visibly affected. The change in colour in the group treated with the locally prepared compound was not quite as pronounced as that on the sheep to which the original formulation had been applied but the change was sufficient to have a marked influence on the market value of the fleece.

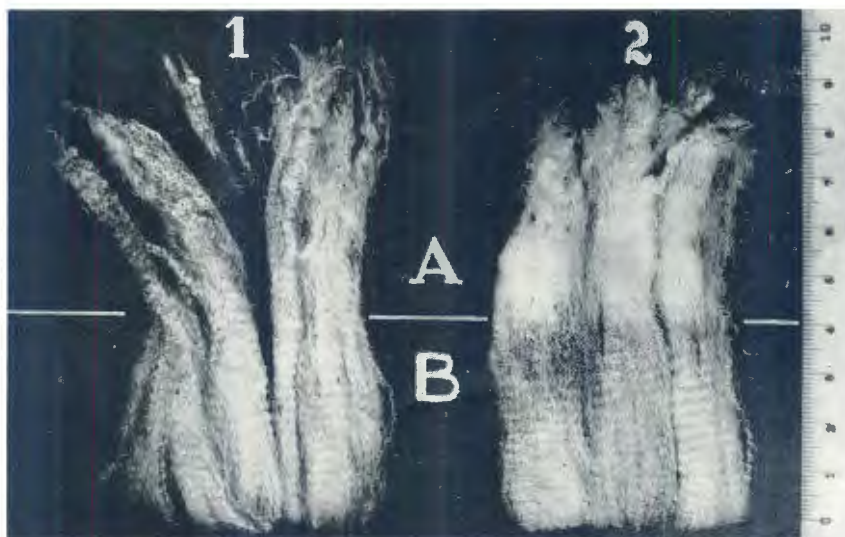


FIG. 1.—Wool samples of sheep No. 84961 taken from the untreated rump area (1) and from the area treated with Isodrin wettable powder 21 weeks previously (2). Top portion of the fibre (A), consisting of old wool present at time of treatment, and bottom portion of the fibre (B), new growth wool since treatment. Note bleaching in 2A.

It is apparent that the alteration in the appearance of the wool was due to the effect of the insecticide and not to the other constituents of the formulations. Since the purified recrystallized Isodrin had a less harmful effect it is apparent that impurities in the technical Isodrin intensify the undesirable action of the active ingredient.

* We are indebted to Messrs. Klipfontein Organic Products Corporation for compounding the wettable powder.

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SUMMARY.

Two new synthetic chlorinated hydrocarbon insecticides Isodrin and Endrin have been tested for their larvicidal effect against *L. cuprina* and for the duration of the period they afford protection against artificial strike. These properties compare favourably with those of similar products tested previously. However, a deleterious bleaching effect upon the wool, probably due to saponification of the wool grease accompanied by structural changes in the staple precludes their use for obvious economic reasons.

REFERENCES.

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