

THE EFFECT OF DDT ON THE SPERM PRODUCTION OF THE DOMESTIC FOWL

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SINCE the end of World War II, DDT (1, 1, 1-trichloro-2, 2-bis[b-chlorophenyl]ethane) and other chlorinated hydrocarbons have come into widespread use, and it has been suggested by some that these insecticides may be responsible in part for bird population decreases noticed in certain areas. With regard to the possible effects of insecticides on the reproductive activities of birds, it must be remembered that what is found to be true in the laboratory bird, whose environment is under some control, may not hold for other species under natural conditions.

The effect of DDT on laying hens has been investigated by Rubin *et al.* (1947), who have shown that different levels of DDT in the diet of laying hens caused reduced egg production and hatchability. The experiment described below is a preliminary investigation, intended to determine whether or not DDT in the diet of a laboratory bird can result in lessened production of sperm.

Seven healthy, mature, white leghorn cockerels were used. These were divided into Group A consisting of four birds and Group B consisting of three birds. Both groups were kept under identical living conditions and were at all times provided with water and feed. For 20 days both groups received a commercial poultry ration.

At the end of the 20-day period of normal feeding, Group A was put on a diet containing 0.3 per cent DDT by weight and Group B was put on a 0.1 per cent DDT by weight. DDT crystals were added to the previously normal ration to obtain the 0.1 and 0.3 per cent DDT rations.

With few exceptions, semen was collected from each bird every other day at approximately 19:00. The method of collection was that described by Burrows and Quinn (1937). The sperm concentration of the sample was determined by the use of a hemocytometer as described by Farris (1950).

Two birds from each group (A-1, A-2, B-1, B-3) died within eight days after being put on the experimental diet, and none of these showed a marked decrease in sperm production. Another bird, B-2, lived for 20 days on the 0.1 per cent DDT ration and showed no significant decrease in sperm production. The last two attempts to obtain semen from bird B-2 were unsuccessful. Bird A-3 showed no decrease in sperm production but did develop minor DDT toxicity symptoms after 12 days of feeding on the 0.3 per cent DDT ration.

The remaining bird, A-4, showed a drastic decrease in sperm output

(Figure 1) and also displayed minor DDT toxicity symptoms consisting of barely visible muscular twitches after being on the 0.3 per cent DDT ration for 12 days. When birds A-3 and A-4 developed these toxicity symptoms, they were removed from the 0.3 per cent DDT ration and given a normal ration for 30 days, during which time the sperm output of A-3 continued to be normal and that of A-4 soon returned to normal. Also, during this period of normal feeding, all visible DDT toxicity symptoms disappeared. At the end of this 30-day period, both birds were again subjected to the 0.3 per cent DDT ration. Thirteen days after their return to the 0.3 per cent DDT ration, both birds developed very mild DDT toxicity symptoms. Bird A-3 and bird A-4 died 20 and 18 days, respectively, after their return to the 0.3 per cent DDT ration. A drastic reduction in sperm production was noted for each bird prior to its death (Figure 1). All birds used evidenced characteristic DDT toxicity symptoms prior to their death.

Histologic sections were prepared from the testes of two birds (B-3 and A-4).

Bird B-3 died within eight days on a diet containing 0.1 per cent DDT. No decrease in sperm production was noticed, and no significant change in the testes was observed.

Bird A-4 was put on a diet containing 0.3 per cent DDT two different times, and each time a great decrease in sperm production was noted. Histological examination of this bird's testes revealed a marked increase in connective tissue with some aggregates of lymphoid cells. Marked degeneration and necrosis of the spermatogenic cells were also observed.

Rosenberg and Adler (1950) report no histopathologic changes in lung and liver tissue of young chicks that were fed diets containing 0.25 per cent DDT and 0.5 per cent DDT.

Some decreases in bird population have been noted in areas where DDT and other chlorinated hydrocarbons are widely used. Whether there is a direct relation between these decreases and the spraying of insecticides over large areas of land is uncertain. That DDT can affect the reproductive activities of birds has been demonstrated by Rubin *et al.* (1947), who found that DDT in the diet of laying hens can result in reduced egg production and hatchability. Also, my own data, as presented above, appear to suggest that DDT in the diet of the domestic fowl can greatly reduce sperm production, although at the levels used, toxicity symptoms appeared within a few days after the sperm production began to decrease.

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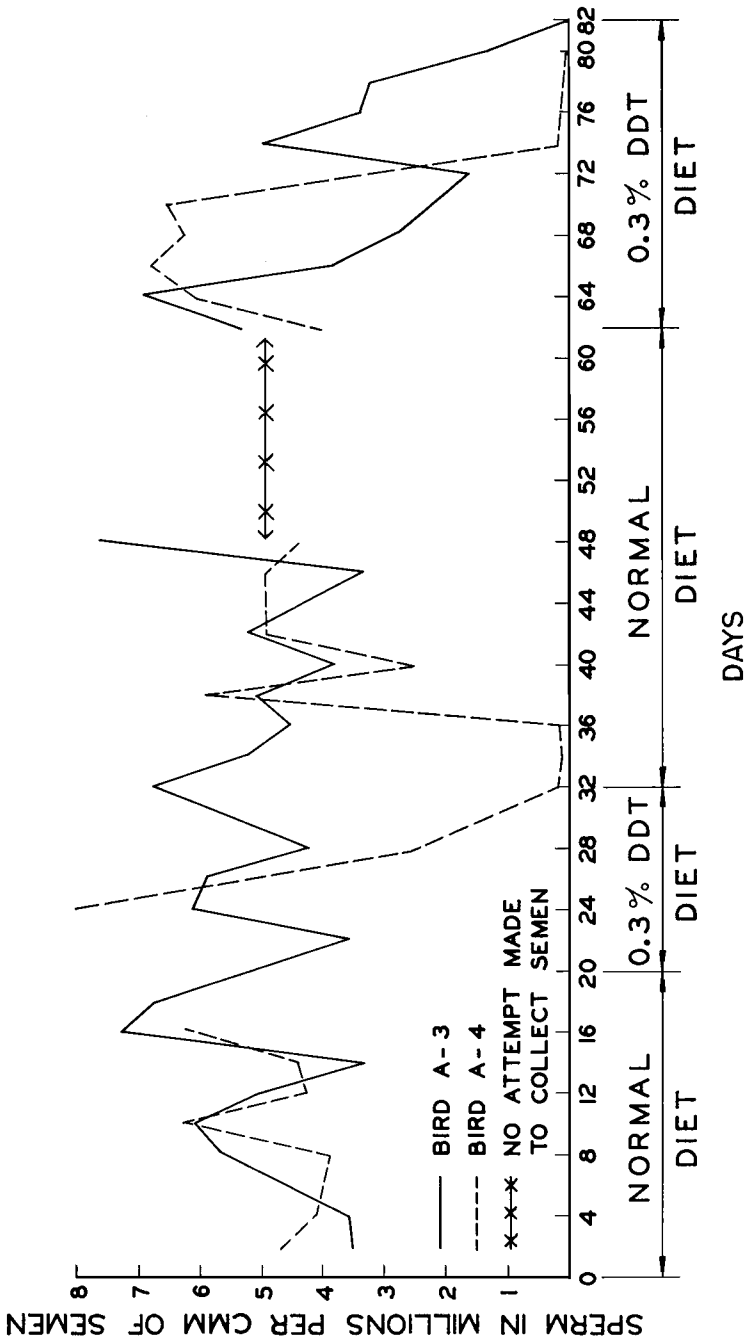


Figure 1.

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