TRANSMISSION OF THE TOXICITY OF DDT THROUGH THE MILK OF WHITE RATS AND GOATS

To determine if DDT[1] (or its decomposition products) is eliminated in the milk of animals, a mixture of 0.1 per cent. DDT in a balanced chicken mash was fed to 3 young female rats, each with a one-day old litter. Typical tremors were noted in the mother rats between the 6th and 13th days and in their young between the 14th and 15th days. By the 18th day all were dead except one adult and one nursling, which were then placed on a normal diet and apparently recovered. Evidence was thus obtained that the toxic principle was transmitted through the mothers' milk, since the young showed toxic symptoms before weaning.

Nine adult rats fed solely on a diet of goats' milk obtained from animals receiving daily oral dosages of 1 gram of DDT per 8 to 9 pounds body weight, died within 2 to 29 days exhibiting typical DDT symptoms. While individual differences in the animals may have accounted in part for this wide range in toxicity, the length of time the goats were under treatment before the milk was administered to the rats was probably more important. Milk obtained from goats having received these dosages from 21 to 26 days was much more toxic than milk obtained from animals subjected to shorter periods of treatment. For example, 5 of the rats died between 2 to 5 days and in each instance the first milk which they received was from goats under treatment from 21 to 23 days.

In one trial, toxic goats' milk fed to a recently parturient rat produced symptoms in her on the 21st day and in the young on the 24th. In a similar trial, toxic milk fed to a female rat with a 12-day-old litter produced typical symptoms in the mother on the 2nd day and in the young on the 3rd day. Therefore, the toxic principle, which was secreted in goats' milk, was transmitted to nursing rats through the milk of the mother rat.

Milk obtained from a goat 24 hours after the oral dosages had been discontinued, when fed to 2 adult rats produced tremors on the 2nd day and death occurred in one subject on the 3rd day. The remaining rat steadily improved on the same diet and apparently recovered. A similar trial on 2 adult rats given milk 48 hours after the treatment of the same goat had been discontinued produced no toxic symptoms.

A half-grown kitten given milk from a goat, which had been under treatment for 25 days, died with typical DDT symptoms within 3 days. Young goats may be more tolerant to this milk, for no harmful effects were noted in an unweaned kid allowed to suckle *ad lib.* a goat under treatment for 27 days.

There is evidence that the toxic principle is concentrated in the fat globules of the milk, for butter, prepared from the milk of goats under similar treatment, when fed to rats produced typical tremors in the latter within 24 hours. No experiments were undertaken, however, to determine if other constituents of milk were toxic.

Frequent administration of DDT suppressed milk secretion in goats; consequently, lactation generally ceased between the 21st and 28th day of dosing. Some animals showed no toxic symptoms, and all those which received DDT recovered; yet their milk contained enough of the toxic substance to produce symptoms in rats. Since the milk apparently became more toxic after an extended period of treatment, two theories of explanation are advanced: either the toxic substance was eliminated in the milk in ever-increasing amounts or possibly similar amounts of poison were eliminated daily but became more concentrated as the milk supply diminished.

Since Smith and Stohlman[2] as well as Draize *et al.*[3] showed DDT to be absorbed through the skin of laboratory animals, the possibility of obtaining toxic milk from animals sprayed with the compound was studied. Goats were chosen in preference to cattle for the experiment largely because they are not in the habit of licking themselves, thus eliminating this risk of extraneous oral ingestion. Milk obtained from a 103-pound goat receiving 150 cc once daily of a 10 per cent. DDT emulsion as a spray and fed to rats produced no toxic symptoms in the latter in 42 days. A young kid allowed to suckle this sprayed animal for 76 consecutive days showed no ill effects.

These preliminary observations prove that with continued oral administration of DDT to goats and rats, there is eliminated in their milk a toxic substance which produces symptoms indistinguishable from DDT intoxication. The data strongly suggest the need for more intensive research on the toxicity of milk from dairy cows ingesting DDT residues either from sprayed or dusted forage plants or from licking themselves after being sprayed or dusted with this insecticide.

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[1] (1-trichloro-2,2-bis(*p*-chlorophenyl)ethane).

[2] M. I. Smith and E. F. Stohlman, *Public Health Reports*, 59(30): 984–993, 1944.

[3] John H. Draize, Arthur A. Nelson and Herbert O. Calvery, *Jour. Pharm. and Exp. Ther.*, 82(2): 159–166, 1944.