

SHORT CONTRIBUTION

THE EFFECT OF WEATHERING ON THE TOXICITY OF BAITS TREATED WITH SODIUM FLUOROACETATE*

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Although sodium fluoroacetate ("1080") is a poison useful for the control of rabbits it has two serious defects: one is its chemical stability due to the virtual indestructibility of the C-F linkage; and the other is that it is very poisonous for domestic stock. Consequently baits treated with "1080" must be covered or removed after a poisoning or, where that is not practicable, stock must be kept out of the poisoned paddocks until the baits are innocuous. Apart from the results of an unpublished study by Mr. D. Gooding of the Department of Agriculture in Western Australia on the effect of artificial rainfall on the "1080" content of poisoned oats, there is no information about the rate of decrease of "1080" in baits exposed to average weathering conditions. The following tests were made to determine the point.

The baits used were unhusked oats and fresh carrots. Sodium fluoroacetate was added to chopped carrot at the rate of 0.3 mg/g wet weight and to oats at the rate of 0.3 mg/g dry weight. (These proportions are comparable to those used in ordinary "1080"-poisoning practice.) The baits lay exposed to the weather, on the freshly mown surface of an open paddock at "Gungahlin" near Canberra, from November 18, 1958 to January 20, 1959.

The "1080" was assayed by subcutaneous injections of extracts of the baits into immature mice of 15 g weight. The number of deaths brought about by doses of 0.4 ml and 0.2 ml of the extract was then compared with the number brought about by injection of standard doses of 0.2 and 0.1 mg of sodium fluoroacetate. Eight mice were injected at each dose level and the potency was calculated according to the method of Marks and Pak (1935)‡ for insulin assay.

Adult mice are insensitive to small amounts of "1080", but those of 15 g weight can be made sensitive if they are fasted 17 hours beforehand and kept at 4°C for the duration of the test. By this method 0.05 mg of "1080" can be detected. Control mice fasted and injected with water were unaffected by cold at 4°C.

The extracts were prepared by macerating, in a Waring blender, 12 g of oven-dried carrot or 50 g of oven-dried oats with 100 ml of distilled water. The bait was re-extracted with a further 50 ml of distilled water; each blending was squeezed

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‡ MARKS, H. P., and PAK, C. C. (1935).—Evaluation of the new international standard insulin by the rabbit and mouse methods of assay. Quarterly Bulletin of the Health Organization of the League of Nations. Vol. 5, Extract 35.

out through fine muslin and the combined extracts centrifuged. The volume was reduced at 80°C, the concentrate made up to a final volume of 20 ml and centrifuged. This procedure gave about an 80 per cent. recovery.

The results are summarized in Figure 1. From this it is seen that both oats and carrot retained their initial potency over a period of 9 days of dry, sunny weather even though the carrot had been sun-dried to a hard black detritus. After a fall of 1½ in. of rain, however, carrot turned to a mouldy black mush in which very little "1080" could be detected. Oats, on the other hand, retained about half of the initial potency, and showed no further change up to the seventh week, in spite of two more falls, each of 0.9 in. of rain. No activity at all could be found in the carrot after the third week of exposure.

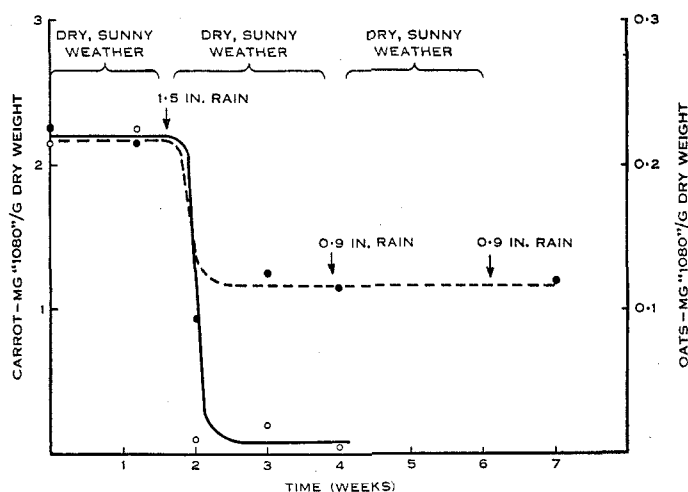


Fig. 1.—Concentration of sodium fluoroacetate in carrot and oats, as a function of time, when exposed to alternate sunshine and rain.

●—●, oats; ○—○, carrot.

As a check on the mouse-assay method, some of the oats were fed to rabbits at the third, fourth, and seventh week, or extract equivalent to 30 g of oats was given *per os*. In all tests the rabbits died with the symptoms of "1080" poisoning.

The static level of "1080" in the oats suggested that the poison was not on the surface but was actually imbibed by the grain. As a matter of interest a sample of 38 g was taken at the eighth week of exposure and husked. The 11 g of husks and 27 g of grain obtained were extracted and tested in the usual way. Curiously, all the "1080" appeared to be in the husks and none was detectable in the grain. Somehow a substantial amount of the "1080" becomes adsorbed on, or absorbed into, the husk so that it is impervious to the leaching action of rain.

Gooding (personal communication) found that oats treated with "1080" and subjected to artificial rain (water sprinkler) within 24 hours of the time of mixing in the poison lost nearly all the "1080" in 2 hours. The "rain-equivalent" of the 2-hours' sprinkling varied, in his four experiments, from about ¼ in. to about 3 in.

The conditions of Gooding's experiments and of the present work are not comparable, but the discrepancy in the two sets of results shows that it is very hard to say how long "1080"-treated oats must weather before they are innocuous.

The results of the Canberra experiments suggest that where it is not practicable to cover or remove baits, and when rain may be expected, carrot is the bait of choice if one wants to return stock to the treated paddocks as quickly as possible.