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HYPERKERATOSIS INVESTIGATIONS
Georgia Coastal Plain Experiment Station
and
United States Bureau of Animal Industry
Cooperating
August-December 1952

At the Knoxville meeting we proposed to test chlorinated diphenyls, creosotes suspected of causing trouble, greases of the type used in the Wisconsin pellets machine and to continue study of the fractions from the petroleum cracking process in cooperation with the National Cancer Institute. The following is an account of our work in the three month period after the Knoxville meeting. We terminated our project on December 1, 1952.

Chlorinated diphenyls

Samples of Aroclor 1042* and 1068* were obtained through the courtesy of the Monsanto Chemical Company and fed to calves mixed with peanut oil. Ten doses, each containing 0.05 grams of the compound were given on successive days, Sunday excluded.

This total dose of 0.5 gram produced no symptoms and was repeated with a daily dose of 0.5 grams. This total dose of 5.0 grams produced no symptoms and was repeated using 5.0 grams as the daily dose. This total dose of 50.0 grams also failed to produce symptoms and this phase of the study was concluded. Plasma vitamin A levels remained in the normal range during and after the trials.

Creosote trial

Only one specimen of creosote that was suspected of being involved in a field case (Van Cise) was available for study. This was fed to a calf at the rate of 10 cc per day mixed with an equal quantity of peanut oil for a total of 78 days excluding Sundays, or 670 cc of creosote. No symptoms developed. Plasma vitamin A levels remained in the normal range.

Greases and Oils

An extreme pressure (EP) grease (Texaco EP 1) made by the company which manufactured the lubricants for the machines used to make the pellets involved in the Wisconsin outbreaks was fed to a calf. Ten grams per day was given in a gelatin capsule for 112 successive days exclusive of Sundays, for a total of 960 grams of grease. No symptoms developed. Plasma vitamin A levels remained in the normal range.

An EP oil, Texaco EP 90 was fed to a calf in a gelatin capsule at the rate of 15 cc per day, exclusive of Sundays until 855 cc had been administered The calf remained normal.

Petroleum Cracking Process Fractions

It was desired to study the carcinogenic and hyperkeratogenic properties of two fractions. One of these called clarified slurry oil is used

*Reference to Aroclor 1042 and 1068 is, undoubtedly, an error and should have been Aroclor 1242 and 1268 P.G.B

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principally "to reduce the viscosity of the asphaltic residium obtained in the distillation of the crude (petroleum) to an acceptable level for use in oil burners. (Steam generation on ocean-going vessels and in steam and power generation in the large boiler installations in industrial plants and power houses.)"

The first calf (L34) which was given topical or local applications of slurry oil by paintings three times a week for 66 days, was reported at the Knoxville meeting. There was hyperkeratosis and thickening of the skin as found by clinical and post-mprtem examinations. The previously unreported histopathological findings of two pathologists in different laboratories are attached for calf L34.

Another calf (L38) was painted on an area 6" x 8" in diameter with slurry oil three times per week. Skin thickening was evident in four days and progressed to a very marked hyperkeratosis probably indistinguishable clinically from naturally occurring cases of X-disease. Painting was stopped several times during the 141 days between the start of the trial and the death of the animal. Fifty-one applications were made during this time. Symptoms of depression, diarrhea, anorhexia, lachrymation, and weakness were evident at the time the painting was stopped and prior to death. Autopsy lesions included elevations on the mucosa of the esophagus, very extensive hyperkeratosis of the skin, reddening of the mucosa of the abomasum and small intestine and a fibrotic liver. There were no mucous cysts or other lesions noted. Plasma vitamin A at death was 22.8 gamma per 100 milliliter. The histopathological findings are attached.

A calf painted regularly with bunker C fuel developed extensive hyperkeratosis but no other symptoms or lesions. Plasma vitamin A remained in the high-normal range.

The first calf given slurry oil orally was reported at the Knoxville meeting. A second calf, (S42), was given a daily oral dose of 5 cc of slurry oil in an equal amount of peanut oil for a total of 345 cc of slurry oil. This was administered over a period of 81 days. It was necessary to stop doseage several times when the animal became depressed, went off feed and lachrymated excessively. There were no proliferations or other lesions suggestive of X-disease. The only lesions suggestive of carcinoma were blister-like elevations of the wall of the rumen. Some appeared to contain a fluid whereas others were more firm. There was an ulcer at the pyloric orifice in the mucosa of the abomasum. The histopathological findings are attached.

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