FEEDING TESTS WITH GALLIC ACID ESTER ANTIOXIDANTS

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INTRODUCTION

Bittenbender (1950) at this Laboratory prepared a number of antioxidants from gallic acid for use in fish oils. The project was a wartime one and resulted from a demand for an efficient antioxidant which could be added to salt-cured herring when shipped to the tropics, or which could be added to oils for preservation of vitamin A when they had to be stored for long periods of time under adverse conditions.

Three antioxidants which appeared to be particularly promising were given a feeding test to determine possible toxicity. GMSG was a glyceryl monostearate monogallate. KHMD was a glyceryl monogallate mono acid in which the fatty acid contained from 8 to 14 carbon atoms, with an average of 12 carbon atoms. KMGP was a glyceryl monogallate dipalmitate. The other antioxidants prepared by Bittenbender could not be tested at the time due to limitations in the number of animals and cage space available.

EXPERIMENT AND OBSERVATIONS

Male rats of two College Park strains were allotted to the experiment at an average initial weight of 50 grams, and an average initial age of about 3.5 weeks. The rats were housed individually in wire screen cages fitted with screen floors. Live weight and food consumption data were taken at weekly intervals. The diet consisted of casein, 15; lactalbumin, 5; cottonseed oil containing antioxidant, 10; lard, 5; brewer's dried yeast, 5; wheat germ, 2; salt mixture, U.S.P. XII, No. 2 for vitamin A or D assay, 4; cod liver oil, 2; and an equal mixture of cornstarch dextrin and sucrose, 52 parts by weight.

Table 1 - Length of Life on Test of Male Rats Fed Various Antioxidants

Diet Designation	Time Interval to Death in Weeks
Control	36, 42, 43, 52, 54, 75, 88, 106, 113, 118
GMSG	17, 34, 56, 64, 82, 83, 98, 101, 106, 121
KHMD	15, 34, 39, 39, 57, 64, 74, 85, 86, 96
KMGP	13, 20, 42, 44, 62, 92, 102, 113, 124, 127

Table 2 - Data on Average Maximum Weight and Food Consumption Per Week Per Rat for Groups Fed Various Antioxidants

Diet Designation	Maximum Weight	Standard Error	Food Consumed Per Week
	Grams	Grams	Grams
Control	510	27.3	80.3
GMSG	574	34.1	84.8
KHMD	488	49.1	79.1
KMGP	494	54.1	88.7

The antioxidants were added to the test oils at the rate of 0.1 percent gallic acid equivalent. In these feeding tests the antioxidant was added to the cottonseed oil at five times this rate, or 0.5 percent gallic acid equivalent. Only a single level was fed. The tests were begun in 1944.

The data in Tables 1 and 2 indicate that statistically there are no significant differences in the average length of life in weeks, maximum live weight

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attained, or weekly food consumption per rat for the groups fed the diets containing no antioxidant and the three antioxidants mentioned previously. Observations at necropsy disclosed no lesions which could be attributed to the feeding of the antioxidants.

CONCLUSIONS

The results of this test indicate no chronic toxicity of these gallic acid derivatives when fed at a level of 0.5 percent gallic acid equivalent in the cottonseed oil. This is equivalent to 0.05 percent in the total diet.

LITERATURE CITED

BITTENBENDER, C. B.
1950. Gallic acid ester antioxidants for fish oils. Commercial Fisheries Review, vol. 12, no. 2, pp. 1-18.

FRIED SMELT

2 pounds smelt	1 egg
1 teaspoon salt	1 tablespoon milk or water
1/8 teaspoon pepper	1 cup bread crumbs

Sprinkle smelt with salt and pepper. Beat egg slightly, and blend in the milk. Dip fish in the egg and roll in crumbs.

Place fish in a heavy frying pan which contains about 1/8 inch melted fat, hot but not smoking. Fry at a moderate heat. When fish is brown on one side, turn carefully and brown the other side. Cooking time about 10 minutes depending on the thickness of the fish. Drain on absorbent paper. Serve immediately on a hot platter, plain or with a sauce. Serves 6.

A Fish and Wildlife Service tested recipe. This is one in the series of recipes using fishery products tested and developed in the Service's test kitchens.