THE DISTRIBUTION OF VITAMIN A IN SOME CORN MILLING PRODUCTS

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(Abstract)

Whole yellow corn and each of the nine products representing an almost complete recovery of whole yellow corn by the wet milling process were tested for their Vitamin A content. By the use of these milling products it was demonstrated that most of the Vitamin A is concentrated in the pigmented gluten or high protein constituent of the endosperm. A small amount of Vitamin A was found in the crude corn oil.

Previous work by Steenbock and Coward shows that a much smaller amount of whole yellow corn supplies sufficient Vitamin A to secure a healthy condition in Vitamin A depleted rats when Vitamin D is furnished in the basal ration. These same workers, using the hand-dissected yellow-corn kernel along with a diet supplying Vitamin D, found that Vitamin A is concentrated in the endosperm of the kernel.

In the present investigation, the corn milling products were fed in definite amounts daily to Vitamin A depleted rats. The study included the use of approximately 125 rats of the albino variety. The animals used were bred on a diet low in Vitamin A. When four weeks old, they were placed in individual raised-bottom cages and given a Vitamin A free diet. Vitamin D was furnished by irradiation of the basal food and the Vitamins B and G by 0.5 gm. of brewer's yeast daily. With the depleted animals here used, ophthalmia was developed 25 to 30 days after the beginning of the experimental period. The eye symptoms almost invariably preceded cessation of growth, and were taken as a sign of Vitamin A depletion. When the ophthalmia was persistent, the test food was added to the diet in definite amounts. A quantitative as well as qualitative study of the milling products was made. The Vitamin A value of the test food was judged chiefly by the minimal amount necessary for the ultimate cure of the eyes. A resumption of body growth was also observed.

Whole yellow corn was found to be a rich source of Vitamin A. Eleven per cent in the diet insured permanent cure of ophthalmia and normal growth. Gluten feed was found to be of about the same potency as the whole corn in curative quality. Three of the four milling products that constitute the gluten feed, namely steep water, real slop, and grits, failed in every instance to cure the eyes. Gluten, the fourth constituent, was found, on the other hand, to be extremely high in Vitamin A content, an amount as small as five per cent of the diet curing ophthalmia and producing normal growth. This finding corroborates that of Steenbock and Coward that Vitamin A is concentrated in the endosperm of the yellow maize kernel since the gluten is a part of the endosperm.

Corn germs, the source of the corn oil, were found practically devoid of curing quality, and the germ meal was found totally devoid of Vitamin A. The crude corn oil as pressed from the corn germs was found to be relatively rich in Vitamin A content. Refined corn oil was entirely lacking in curative qualities.

In this study are presented other examples of the interesting but accidental association of Vitamin A with yellow pigmentation, i. e., the concentration of Vitamin A in the yellow-pigmented gluten and in the yellow crude corn oil, both milling products of the yellow maize kernel.

The products here studied, because of the character of the milling process, offer a particularly valuable source of study of the nature of association of Vitamin A with the structural parts of the corn kernel.