An Albino Rat Demonstration of Mineral and Vitamin Deficiencies in a Common Human Diet

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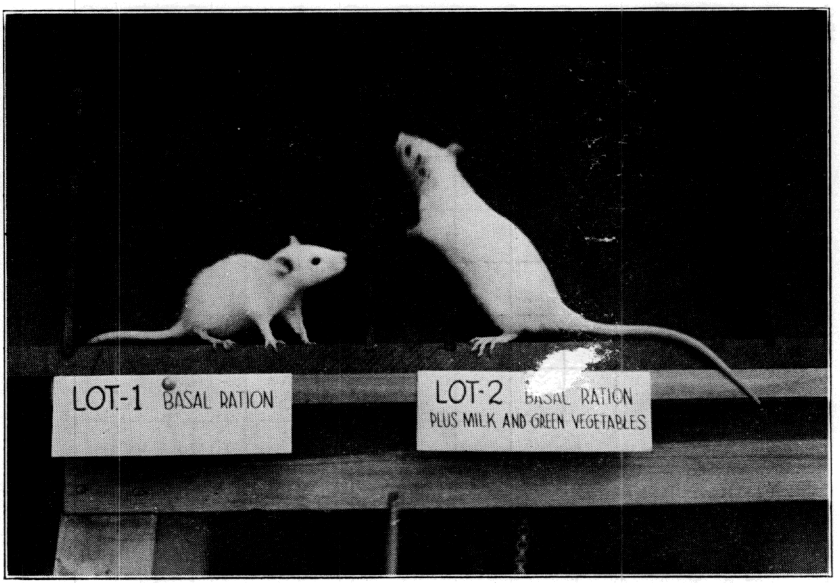
This demonstration with albino rates was designed to show the failure of a common, poorly selected diet of human foods to produce proper growth and well-being in young growing animals; but that supplemented with milk and green vegetables as sources of the essential minerals and vitamins, it resulted in very much improved growth and condition.

Demonstration—Four rats of albino and mixed ancestry from the same litter and of very nearly the same weight were separated into two lots, a



male and female in each lot, and started on the demonstration rations at the age of 26 days.

Lot 1 received a basal ration composed of a mixture of the following human foods: lean meat 20%, peeled boiled potatoes 20%, white bread (made without milk) 20%, canned corn 15%, sugar 15%, corn starch 9%, and salt 1%.

Lot 2 received a ration consisting of 75% of the basal, 22% of dried skim milk and 3% of butter. Green vegetables, such as lettuce, spinach or carrot tops, were fed three times a week.

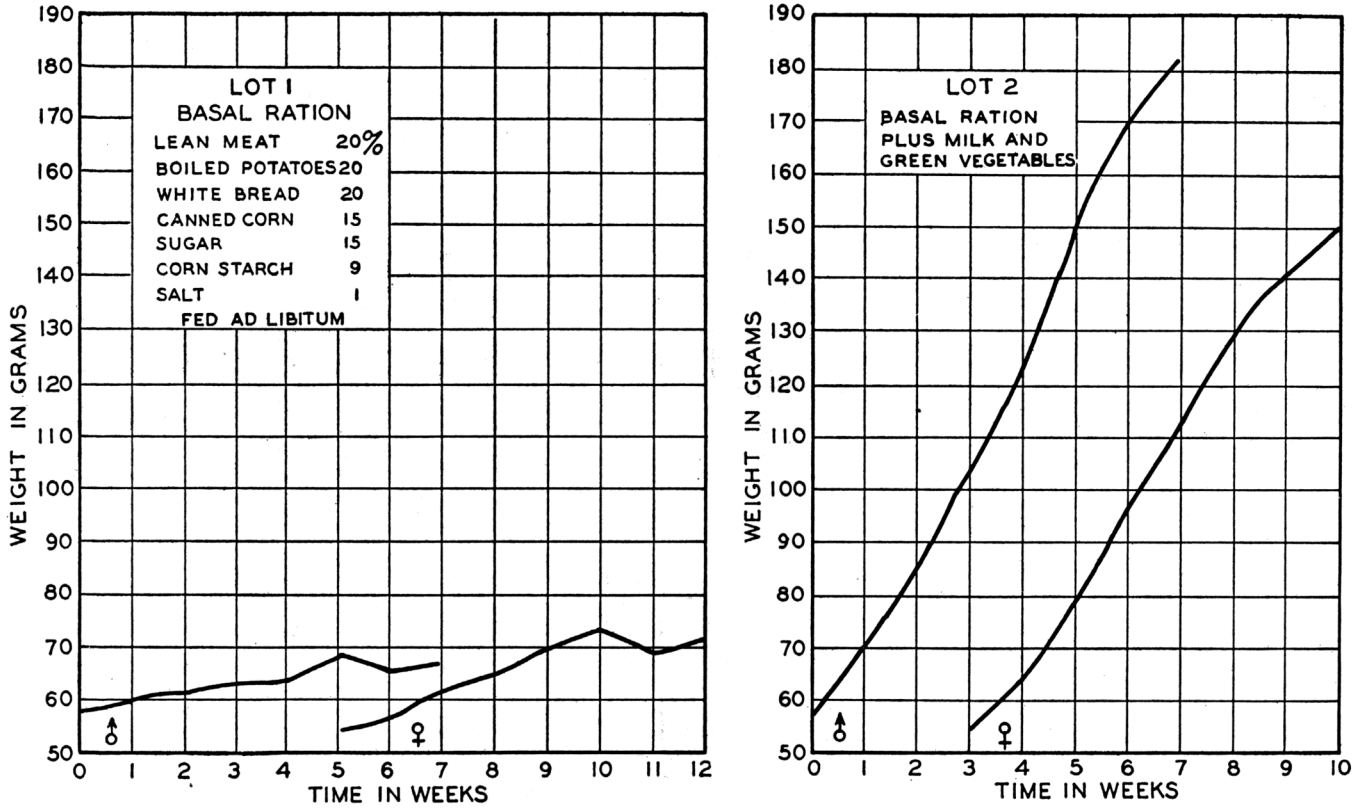


Chart I.—The Dietary Importance of Milk and Green Vegetables.

In order to simplify the feeding and insure uniform and reproduceable results the meat, potatoes, bread and canned corn, were dried before being weighed out and incorporated in the rations.

The cages used for the demonstration consisted of common glass battery jars with half-inch mesh screen for floors and covers.

Results—The results in growth are shown in Chart 1. In the seven weeks on the demonstration ration, Lot 1 gained an average of 12 grams, whereas in the same period Lot 2 gained an average of 110 grams. The lack of minerals in the basal ration is shown by the poor skeletal development and squatty posture. In previous demonstrations with these rations, which were carried on for longer periods of time, a failure of reproduction, an ophthalmia due to a lack of vitamin A, and defective nervous control have been observed. A lack of color in the eyes indicative of anemia is common. On the other hand, the rats in Lot 2 show normal growth exceeding Donaldson's standards for rats, excellent bone development, normal reproduction and good physical condition.

The deficiency in the basal ration is multiple in nature, both minerals and vitamins being involved. The protein content of the basal ration, 15.7 per cent is adequate for normal growth, and the additional protein supplied by the dried skim milk could be responsible for only a small part of the benefits produced. Both rations were fed ad libitum; therefore there could have been no lack of carbohydrates to supply energy. Apparently the principal deficiency is that of minerals, since in previous demonstrations of this nature the addition to the ration of green vegetables and butterfat failed to overcome more than a small part of the deficiencies.

Conclusions—This demonstration, because of its simplicity, the ease with which it can be reproduced, the very marked and conclusive differences between lots and the practical nature of the diets used, teaches a lesson in nutrition easily comprehended by children and adults alike, and offers a chance for community service by the chemistry teacher or industrial chemist.