VITAMIN CONTENT OF MANY FOODS MEASURED BY TESTS WITH RATS

Foods may be grouped according to their importance as sources of energy, protein, or minerals. By selecting from these different groups it is possible to assure a reasonably balanced diet. There is another important factor to consider, however, that is, the vitamin content. What foods contain the different vitamins? And how much loss of vitamin content occurs in the preparation of those foods for use? To answer these questions, both for housewife and for dietitian, the nutrition laboratory of the Bureau of Home Economics is carrying on extensive investigations.

Earlier laboratory studies show that animals can not live on a diet of chemically pure foods. These studies led to the discovery of vitamins, substances present in small amounts in most of the natural foods. It is now known that there are at least six of these vitamins and that five are essential to the health of human beings. They seem to act as regulators of certain body processes and if any one of them is missing from the diet a characteristic diseased condition develops. Pellagra, for example, is the result of such a dietary deficiency. This disease may be corrected, as well as prevented, by including in the diet certain foods known to contain the pellagra-preventive factor.

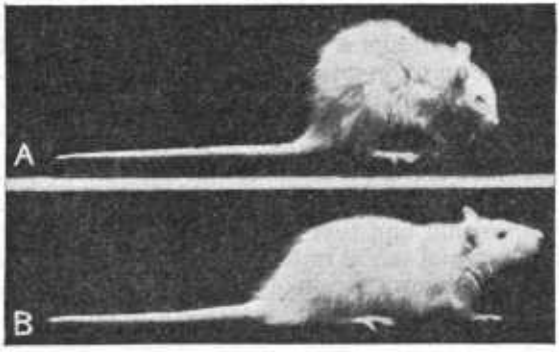

FIGURE 216.—A, Young rat as he appeared after two months on a diet lacking vitamin A; B, his brother, after receiving the same diet for six weeks, was then given butter as a source of vitamin A for two weeks. Photographs taken at the same time.

When a rat is deprived of vitamin A it soon stops growing and after several weeks, during which time it has become listless, thin, and anemic, the appearance of eye lesions is noted. These become progressively worse as time goes on. Sooner or later the animal dies, and autopsy reveals the presence of infection not apparent from observation of the live animal. Pus sacs are found in the glands of the tongue, mouth, and neck, as well as in the ears. If vitamin A is added to the diet of such an animal before the disease has progressed too far, i. e., before the tissues have been permanently injured, recovery is rapid and apparently complete. (Fig. 216.)

As soon as the importance of vitamins was discovered, chemists and nutritionists began to search out the foods containing them in most considerable quantities. Not until recently, however, have any of these factors been isolated in pure form so that they could be identified chemically. This meant that the usual chemical methods could not be used in measuring them and other methods had to be devised for this purpose.

Measuring Vitamin Values

It had been found that when an animal like the rat is kept on a diet that is deficient in one vitamin there is a quantitative relation between

the amount of that factor present and the rate of decline of the animal. Or conversely, if the animal has been kept on a deficient diet until the characteristic diseased condition has developed, and then is fed a food rich in the missing vitamin, the rate of recovery depends upon the amount of the vitamin in the added food. (Fig. 217.) By describing as a unit the amount of a vitamin that will produce a given effect in a "standardized" rat, it is possible to determine the relative vitamin values of any food that the rat will eat. We have such values for vitamin A and vitamin C, and a few for vitamin B. Some of those for the more common foods are given in Table 15.

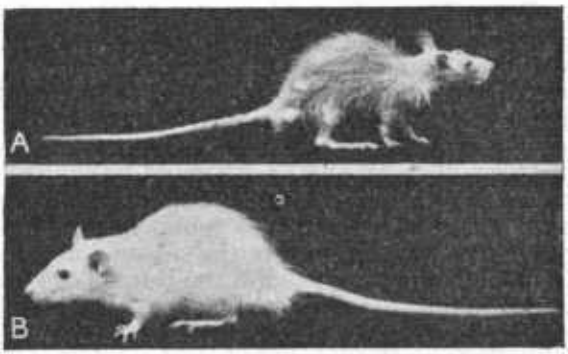

FIGURE 217.—A, Photograph of a young rat kept for 24 weeks on a diet lacking vitamin G; B, same rat six weeks later during which time it was given a diet rich in vitamin G

TABLE 15.—*Values of vitamins A and C in some common foods*

Edible portion	Units per ounce		Edible portion	Units per ounce	
	Vitamin A	Vitamin C		Vitamin A	Vitamin C
Apples	15	3	Liver	2,800	
Bananas	100	5	Milk (whole)	65	1
Beans, string	150	5	Oranges	20	15
Cabbage	10	20	Peas, raw	175	15
Carrots	940	2	Peas, canned	175	10
Eggplant	20	2	Potatoes	10	3
Eggs	550	(1)	Sweetpotatoes	85	3
Escarole	6,000	3	Spinach	1,400	25
Grapes	20	2	Tomatoes	170	15
Lemons	(1)	15	Turnips	5	4
Lettuce	50	2			

[1] Practically none.

As yet we can not say what are the body requirements for the different vitamins. One authority on nutrition says that an adult needs at least 4,500 units of vitamin A per 3,000 calories, while another designates 45 units of vitamin C as optimum. By reference to Table 15 it is easy to see how to calculate what foods to eat to supply the needed vitamin A (escarole, liver, spinach, carrots, and eggs head the list), or what may be used in place of orange juice to supply vitamin C (spinach, cabbage, tomatoes, lemons, fresh peas).

Information of this kind, as rapidly as it can be determined and brought together from all the laboratories now engaged in such researches, is being published in department circulars, news articles, and radio talks.

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