NUTRITION STUDIES OF FOODSTUFFS USED IN THE PUERTO RICAN DIETARY

VI. THE VITAMIN A CONTENT OF PASTEURIZED MILK AND NATIVE CHEESE *

By D. H. Cook and Joseph H. Axtmayer,
From the Department of Chemistry of the School of Tropical Medicine of the University of Puerto Rico under the auspices of Columbia University

Milk and cheese, although not conspicuously high in their vitamin A content, are nevertheless excellent sources of this dietary factor if we consider the extent to which they should be used in a correctly balanced dietary. These two foodstuffs are not consumed by the people of Puerto Rico as extensively as they should be due to the fact that the production is limited and the price prohibitive to a large majority of the poorer classes. The amount of milk produced is so small that large quantities of dried, condensed and evaporated milk are imported yearly.

The vitamin A content of the cheese, and therefore of the milk from which it is made, depends in large part upon the ration which the cows receive. There is reason to believe that the vitamin A content of these products is very uniform throughout the year owing to the conditions of this tropical country where the cattle are allowed to graze at all seasons, receiving in some cases only a limited amount of feed imported from other countries.

The milk assayed in this experiment was bought from a pasteurizing plant which obtains its supply from a large portion of the island, thus serving to give us a fairly accurate composite sample of the milk produced in the various dairies. A fresh sample was used every day. The cheese was bought at a local market and was made from whole milk.

EXPERIMENTAL

The vitamin A contents were determined by the method of Sherman and Munsell(1). Albino rats, at the age of twenty-eight or twenty-nine days and weighing from 35 to

* This research was made possible by a grant from the Rockefeller Foundation.
Submitted for publication April, 1933.

55 grams, reared from mothers which received a ration consisting of one-third whole milk powder, two-thirds whole wheat flour, and one per cent of the weight of the latter as NaCl and $CaCO_3$ supplemented with weekly additions of fresh lean beef, were placed on a basal ration containing no vitamin A, though adequate in all other respects. The rats were kept in individual metal screen cages with raised bottoms. The basal ration, prepared as directed, had the following composition: purified casein, 18; Osborne and Mendel salt mixture, 4; dry baker's yeast, 10, and corn starch, 68 per cent. This diet was supplemented during the latter half of the experimental period by the addition of 1.00 cubic centimeter of viosterol, 250 D, to each kilo of diet. The oil was taken up by chloroform, this solution being spread upon the casein and then thoroughly mixed, the chloroform being allowed to evaporate before adding the other ingredients of the diet. All rats received this basal diet and distilled water until their weights either became stationary or declined, thus showing that they had been depleted of their stores of vitamin A. Some were continued as "negative controls" while others received, in addition, measured volumes or weighed portions of the milk and cheese as the only sources of vitamin A. A unit of vitamin A is taken as that amount which when fed daily suffices to support a gain of 3 grams per week during the experimental period in a standard test rat as described above.

TABLE I

Supplement	Number of Animals	Average Initial Weights (Grams)	Average Net Gain (Grams)	Average Survival Periods (Days)	Average Basal Diet Intake (Grams)
Cheese					
0.1 gram	8	104.6	40.7	55.1	499
0.05 gram	9	96.4	23.2	56	402
Milk					
0.5 cc.	11	124.3	22.2	53.7	498.4
1.0 cc.	12	108.3	58.6	56	580
1.5 cc.	14	110.5	62.5	56	560.5
2.02 cc.	12	114.6	85.8	56	665.5
Controls	23	107.2	—27.7	25.2	138

The results obtained in these experiments check with the values found in texts published recently. If the price of the milk could be reduced to the point where even the poor classes

might avail themselves of this item necessary in all well balanced dietaries, the people would be receiving not only an adequate supply of vitamin A but other necessary factors such as calcium and protein. The need of a greater supply of cheap milk for the island is felt to be a problem of great importance. That this is recognized is evidenced by the maintainance of milk stations for infant feeding partially financed by philanthropic institutions in the North. Due to the present economic situation much of this valuable work has had to be abandoned and therefore the burden of supplying milk for the people must be assumed by the local agencies.

CONCLUSIONS

The vitamin A content of pasteurized milk and whole milk cheese has been found to be 2 units per cubic centimeter for the former and 20 units per gram for the latter.

BIBLIOGRAPHY

1. Sherman, H. C. and Munsell, H. E:. J. Am. C. S. 47: 1693. 1925.

RESUMEN

El contenido vitamínico A de la leche pasteurizada y del queso de la tierra fué determinado por el método de Sherman y Munsell basado en el crecimiento de los ratones que se usan como reactivo. Este es conocido también por el método biológico. La Tabla I resume toda las data analíticas obtenidas durante el curso de los experimentos. Se encontró que la leche contiene dos unidades por centímetro cúbico y el queso veinte unidades por cada gramo.