LXI. NOTE ON THE NON-PROTEIN NITROGEN IN GOAT'S MILK.

BY WILLIAM TAYLOR (*Carnegie Research Scholar*),

The Rowett Institute, Aberdeen.

(*Received June 28th, 1922.*)

As a result of an investigation into the factors controlling the percentage composition of milk, during which a goat was fed on various diets each of which was abnormally high in some one of the three energy-yielding constituents of the food, it was found that irrespective of the nature of the diet the percentages of protein, fat, lactose and ash all tended to vary with the daily volume of milk secreted, the percentages of protein, fat and ash tending to vary inversely and the percentage of lactose directly with the daily volume [Taylor and Husband, 1922]. So far as these constituents are concerned, therefore, the percentage composition of milk depends upon its rate of secretion rather than upon the percentage composition of the diet.

In the case of non-protein nitrogen no relationship could be traced between the percentage and the daily volume of the milk. The results of the following experiment show that the percentage of this constituent depends upon the nature of the diet.

EXPERIMENTAL.

A goat was fed on various diets of constant composition for periods varying from 8 to 16 days, and the total protein, caseinogen and albumin plus globulin contained in the milk were estimated daily. The figure for non-protein nitrogen was obtained from the difference between the percentage of total protein and the sum of the percentages of caseinogen, albumin and globulin. The figure for non-protein nitrogen is expressed in terms of milk protein, as the non-protein nitrogen was included in the estimation of total nitrogen from which the total protein was calculated.

The urine was collected and a daily estimation of the total excretion of urinary nitrogen was also carried out.

The following table shows, for each dietary period, the average daily total quantity of nitrogen in the urine and the average percentage of non-protein nitrogenous substances in the milk. The periods are arranged in the table according to the level of nitrogen excreted in the urine.

The table shows a definite correlation between the daily output of nitrogen in the urine and the percentage of non-protein nitrogen in the milk.

Average daily excretion of urinary nitrogen g.	Average percentage of non-protein nitrogenous substances in the milk per cent.	Nature of diet	Duration of experimental period Days
26.8	0.39	High protein	16
22.5	0.37	"	12
9.6	0.22	Potatoes "	8
9.4	0.22	Grass	14
4.3	0.20	High fat	14
4.1	0.20	"	14
2.3	0.16	High carbohydrate	13

DISCUSSION OF RESULTS.

It has been shown that the non-protein nitrogenous substances in milk consist of amino-acids, creatine, creatinine, uric acid, and urea, the last named being present in greatest amount [Denis, Fritz Talbot and Minot, 1919]. The concentration of these in the blood seems to determine both the amount excreted in the urine and the percentage present in the milk. The mammary gland acts to some extent as an excretory organ, waste non-protein nitrogenous substances filtering through from the blood to the milk. The percentage in which these are found in milk seems to be determined by the degree of concentration in the blood of the end products of protein metabolism.

CONCLUSIONS.

1. In a lactating animal there is a correlation between the daily output of nitrogen in the urine and the percentage of non-protein nitrogen in the milk, both apparently being determined by the amount of protein in the food.
2. The mammary gland acts as an excretory organ passing through from the blood to the milk end products of protein metabolism.

REFERENCES.

- Denis, Fritz Talbot and Minot (1919). *J. Biol. Chem.* **39**, 47.
Taylor and Husband (1922). *J. Agr. Sci.* **12**, 111.