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Effect of Delayed Milking Upon Composition of Cow's Milk.*

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Several workers have reported upon the effect of incomplete or delayed milkings upon the fat content of the milk, but the complete picture as to what happens to milk in the udder after resorption commences has not been reported. This investigation deals with a study of the changes that take place in milk after resorption of milk begins at various intervals between milkings.

The milks used for analysis in this report were secured from the delayed milkings of the previous report, therefore representing milks retained in the udder for 24, 36, and 120 hour intervals as well as the normal 12 hour interval. The determinations made and methods used are: (1) lactose according to Bierman and Doan,[1] (2) protein according to Kjeldahl-Gunning-Arnold, (3) fat according to Mojonnier,[2] (4) total solids according to Mojonnier,[2] (5) ash according to official method, (6) phosphorus according to Briggs,[3] (7) calcium according to Kramer-Tisdall,[4] and (8) pH by potentiometer. Lactose and pH were determined on the fresh milk within one hour after drawn. In a few cases lactose was calculated by difference between total solids and sum total of the other ingredients.

The influence of delayed milkings upon the composition of the delayed milk is determined by comparison of the analysis of such milks with similar analysis of a 5-day preliminary period and with normal milkings from the left gland milked at 12-hour intervals. The experiment was repeated twice on each of 2 cows.

In Figure 1 the results are shown graphically by averaging the data secured in 2 trials on one cow, E93, which is typical. The preceding paper reveals that there is an increase in the amount of milk produced for the 24 and 36 hour periods, then a marked decrease for the 120 hour period, indicating marked resorption of the milk

* The data used in this paper are taken mainly from a thesis presented by T. V. Rigor in partial fulfillment for the Ph.D. degree.

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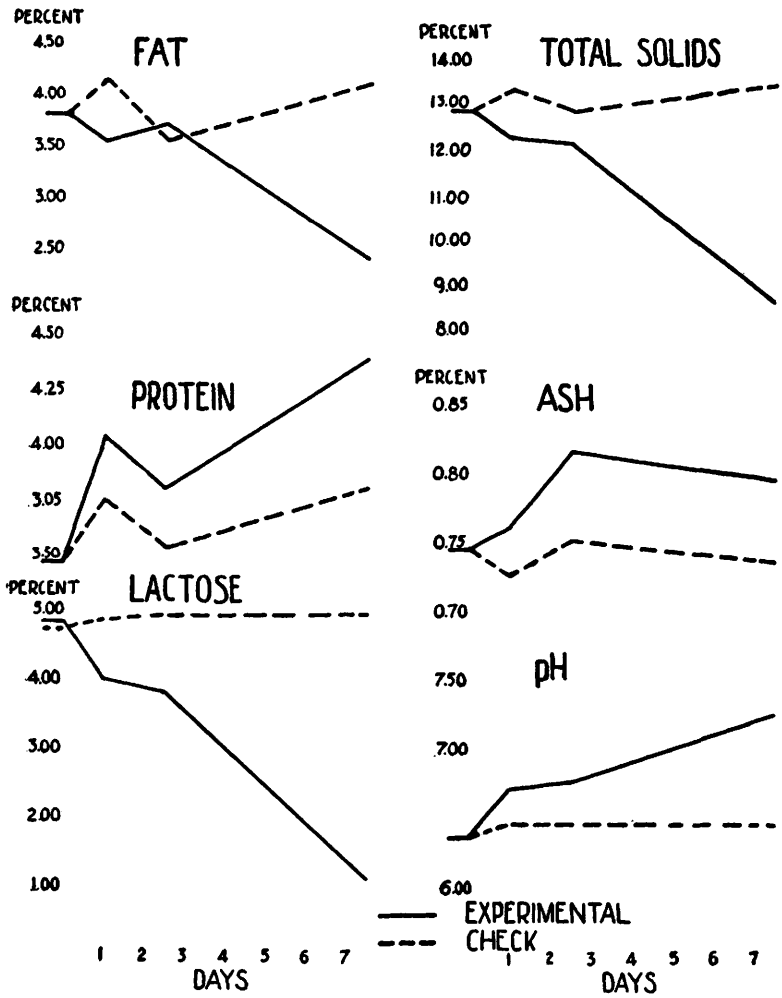

FIG. 1. Effect of Delayed Milking.
The short line on the left is the average of 2 five-day preliminary milkings. The points following represent the results of delayed milkings based upon 2 periods each of 24, 36, and 120 hour intervals.

had taken place in that time. Retention of the milk for 24 and 36 hours had little influence upon the fat content, but 120 hours caused a marked decrease in fat content.

Protein content of the milk increased with the length of period the milk was retained and the character of the protein was markedly influenced. (This phase is now being studied.) The addition of a little formaldehyde to the milk caused a solid gel to form.

The most striking effect of retention of milk in the udder is upon the lactose content. Lactose rapidly diminished from nearly a nor-

mal of 5% to less than 1% for milk retained 120 hours. Total solids diminished with retention mainly because of the decrease in fat and lactose.

Total ash increased, reaching the maximum in 36 hours. Calcium and phosphorus, however, decreased, reaching the minimum after 120 hours, which was slightly more than one-half of the normal. There was a large increase in chlorides, presumably sodium chloride. This increase in chloride content and decrease in lactose is taken as an indication that the milk is coming into equilibrium with the blood as far as the solutes are concerned.

The pH increased from 6.4 to over 7.3 for milk retained 120 hours. Just why the pH should be higher for retained milk than for the blood is problematical.

Conclusions. After milk has been permitted to accumulate in the udder to reach the maximum pressure, resorption takes place, which greatly alters the composition of the udder contents. Lactose and fats first diminish with an increase in total protein. Ash increases due to an increase in chlorides, taken to be sodium chloride, and there is a decrease in both calcium and phosphorus. The pH is increased to above that of normal blood. The character of the protein is also changed.

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Osmotic Pressure and Milk Secretion.*

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Previous work[1, 2] has shown that physical pressure exerts a marked influence upon the rate and character of milk secretion and indicates that osmotic pressure may play an important rôle in milk secretion. It is well known that milk is isotonic, but that it is not

* The data used in this paper are taken mainly from a thesis presented by T. V. Rigor in partial fulfillment for the Ph.D. degree.

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