

VI. WEIGHT CHANGES DURING GESTATION AND LACTATION IN GUINEA PIGS

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The effect of gestation upon lactation in dairy cows has been studied by Ragsdale, Turner and Brody.¹ These investigators found a reduced rate of milk secretion when during lactation the period of pregnancy exceeds about five months. It is suggested that this reduction of milk flow is caused in part at least by the demand of the foetus for nutrients to support its life processes. Stapel² has studied the effects of gestation and parturition on the body of the cow, dealing with the body temperature, pulse, respiration, urine and percussion.

Anatomical and physiological changes which occur during gestation and lactation in the maternal individual are numerous and are not clearly understood. However, it is agreed that not only is the generative system affected but body changes are also evident. The causes for the original stimulus for the changes which occur during pregnancy and lactation are not fully known.

It is believed that the presence of the placenta may modify the normal metabolism in various ways, but the way in which the maternal organism reacts to the presence of a rapidly growing tissue, the foetus, is of interest to both the physiologist and the chemist. The developing foetus imposes heavily on the energy and the metabolism of the mother. Although the food and energy requirements of the embryo are heavy the mother may show a striking increase in weight during the period of pregnancy.

In these observations, female guinea pigs of different ages were used. They were being used for other studies at the same time and could not be used exclusively for this study. Therefore, weights of premature foetuses could not be obtained.

It is agreed that the secretion of milk causes a considerable drain on the system of an organism. If an average daily secretion of milk by a 900 pound cow be taken at 8 quarts this would be equivalent to 1.7% of her body weight and in the course of a lactation period of 300 days it would be five times the weight of the cow. Ordinarily, the guinea pig does not show evidences of producing a large quantity of milk. However, if a guinea pig

¹Ragsdale, A. C., C. W. Turner and S. Brody, 1924. *The Effect of Gestation upon Lactation in the Dairy Cow.* Jour. Dairy Science, 7: 24-30.

²Stapel, P., 1912. Inaug. Diss. Univ. Bern pp. 53. Cited from Exp. Sta. Rec. 28: 885.

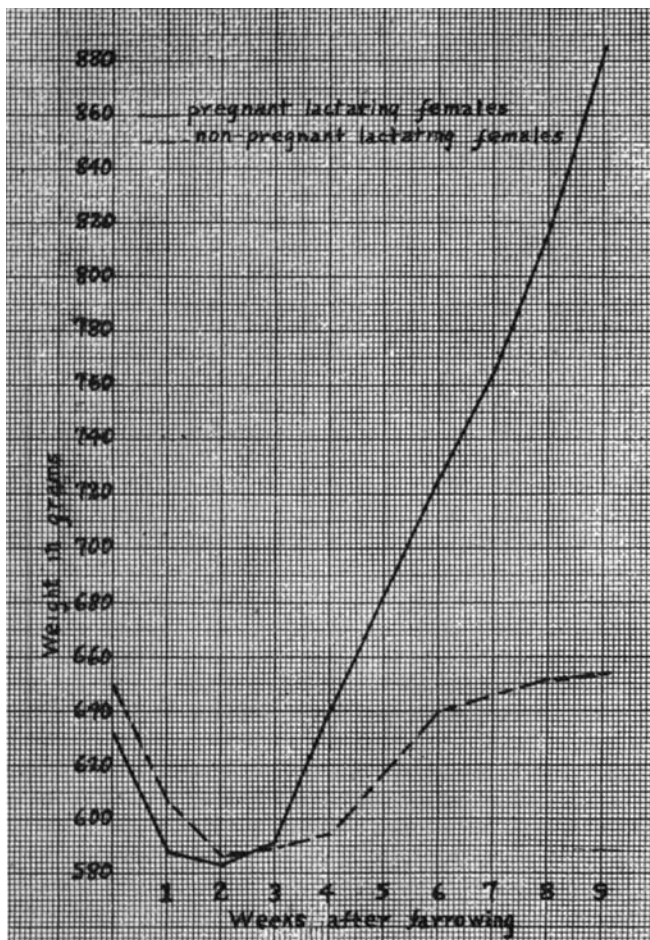


PLATE II

Representative Curves Showing Weekly Weight Changes in pregnant lactating and non-pregnant lactating guinea pigs.

weighting 650 grams should secrete 1.7% of her body weight daily this would equal the secretion of 11 c.c. of milk, and would be the same ratio of production for her body weight as 8 quarts would be for a 900 pound cow. During a lactation period of 30 days the guinea pig would secrete the equivalent of half her body weight. As far as is known to the writer no one has determined the amount of milk produced by a guinea pig during any given period. In the course of these observations on laboratory stock during the last year, it was noticed that there was a marked loss of weight in lactating females. This led to observations and weekly weights thruout lactation and gestation on the animals which could be used for this purpose have been made. The stock has been well fed twice daily on a mixture of grain, with a good grade of alfalfa hay and some form of green food supplied on alternate days. The grain ration contained 1% to 60% protein tankage. Salt (NaCl) has been supplied in the form of pressed cubes. The stock has remained healthy thruout the entire time. Since no cases of pneumonia or vitamin deficiency have been observed, it is considered that the stock has been in good condition during this period.

Although the amount of milk secreted by the lactating guinea pig is not known, these observations would indicate that the amount of milk secreted is of importance. For this study, the females were divided into groups of 10 head each. All young were removed from their dam on the thirtieth day. Unfortunately, the young could not be removed from females in large numbers immediately after farrowing to observe this influence, because all the stock was used in another experiment.

The females were weighed every 7 days from the time of farrowing young until they farrowed a second time. Care was exercised to get the weights at the earliest possible convenience after parturition. It is believed that all weights used in the study were obtained within 8 days after parturition. In all cases where it was possible weights were taken just before farrowing. This proved to be a difficult task, however, because of the difficulty in determining when the females were going to deliver. The average weights of the females in the different groups immediately after parturition varied from 450 to 720 grams. This range was largely due to a difference in age of the stock.

Influence of Lactation

In all cases of lactating non-pregnant females there was a marked loss of weight for the first week, but after this there was considerable variation. Three groups were used to observe the influence of age on weight changes. The first was a group

7 months old when farrowing their first litter. In this group there was a loss in weight until the end of the fourth week. While during the fifth week a slight gain was made and during the sixth a gain of 60 grams was noted. During the next three weeks a total gain of 30 grams was made and the average weight at the end of the ninth week was 50 grams greater than at delivery. This should be expected because guinea pigs grow thruout the first year. The second group was 8 months old and during the first week an average loss of 75 grams was observed. This was the heaviest loss that occurred in these observations. After the first week they showed a gradual and regular gain until the end of the ninth week at which time they averaged 30 grams heavier than they were at delivery. The third group was 12 month old and over at the time of farrowing for this study. They averaged 650 grams at delivery and showed a loss for two weeks which totaled 75 grams, for the second period of two weeks they only maintained their weight. Beginning with the fifth week they showed a gradual gain until at the end of the ninth week they had regained their lost weight and weighed 653 grams.

Three groups were used to observe if the number of young nursing caused any noticeable difference in loss of weight. In the first group 2 young were nursed, in the second 3 and in the third 5. In all three groups a loss occurred for the first two weeks, those suckling 3 young showed a slight loss during the third week while the other two made a gain from the second week. The group suckling 2 young showed an average loss of 5 grams from the third to the fourth week and again a loss of 10 grams from the sixth to the seventh week and then gained until at the end of the ninth week all three groups weighed practically the same.

There was no significant difference in the losses of weight where a different number of young were suckled. However, the total loss in the group suckling five young was slightly greater than in the groups suckling two and three.

Influence of Pregnancy

Eight groups were used in these observations, and all were mated immediately after farrowing. The first four were divided according to age as follows: first, females five months old at delivery, second, females six months old at delivery, third, females seven months old at delivery, fourth females fifteen to twenty-four months old at delivery. The five month old group did not show any loss in weight, but an average gain of eight grams was noted for the first week. At the end of the fourth

week they had gained an average of sixty grams, after the fourth week they gained an average of twenty-five grams per week. This gain was very regular. The six months group showed an average gain of thirty grams per week until the end of the ninth week. This loss is greater than expected on a basis of the changes in the five months and seven months groups.

In the seven months group a loss of twenty grams per head occurred for the first week, and during the following two weeks they maintained their weight and began to gain with the third week. A gain of thirty grams per week was observed until delivery. The fifteen to twenty-four months group showed a loss of thirty grams per head for the first week and held their weight for the second week. After the second week they gained thirty-three grams per week until they delivered young.

The second four groups were used to observe the influence of the number of young suckling on weight changes. The first group was made up of females suckling only one young. They showed an average loss of six grams for the first week and then gained until the end of the third week and from the third to the fourth week there was a loss of fifteen grams per head. This cannot be explained from the data at hand. After the fourth week an average gain of twenty-nine grams per week was made until the end of the gestation period. Another group was composed of females suckling two young. They showed a loss of forty-five grams for the first two weeks and then gained ten grams per head for the third week, from this period they gained steadily at the rate of forty grams per week. The third group was suckling three young per female. They lost thirty-five grams per head for the first week and gained an average of seven grams the second week. From the beginning of the second week they gained regularly an average of thirty grams per week to delivery. The last group contained females suckling four young. They lost an average of forty-five grams the first week and five grams the second. After this they gained steadily at the rate of forty-one grams per head weekly until the end of gestation.

The total weights of the young at time of delivery was less in all cases than weight loss of the female. This difference varied from 15 to 185 grams. In the majority of cases the difference was from 40 to 85 grams. This can be partly accounted for by placenta. Unfortunately, we were unable to get weights on the placentas. In all except a few cases the placenta had been eaten by the females before it was discovered that they had farrowed.