

EFFECT OF THE ORDER OF LACTATION ON MILK AND FAT YIELD FOR EGYPTIAN COWS AND BUFFALOES WITH REFERENCE TO MAINTENANCE AND PRODUCTIVE RATION

By

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SUMMARY

A study on the relative milk and fat yield during the various lactation periods of Egyptian cows and buffaloes was undertaken. Results indicated that in both cows and buffaloes, milk and fat yield increased in the preceding lactation, reaching its maximum at the 4th period with cows and at the 5th period with buffaloes (135.5% and 143.7% respectively). Milk yield dropped down after the maximum, in the succeeding periods, the drop was quicker with buffaloes. Some individual cows or buffaloes were found to produce high yields at the 8th or the 9th lactation period. There was a reason to believe that cows might have a longer productive life of good production than buffaloes. It was also found that fat yield follows the same line as milk yield, being practically parallel to it. The investigations revealed also the fact that the yield of the majority of the dairy cattle is below the profitable one. Raising milk yield and reducing the maintenance ration to a suitable level are necessary for profitable milk production in Egypt.

INTRODUCTION

Several workers studied the effect of age, or order of lactation, on milk yield particularly with cows. They found that age had a pronounced effect on milk yield. Maximum yield was found to be during the 3rd up to the 7th lactation period (2, 3, 4). Among individual animals there were considerable variations about the period having the maximum lactation, and the decline of lactation curve during the successive lactation. It was recorded that some cows could produce profitable yield up to the 10th or more lactation period (3, 5). Therefore, a preliminary investigation was made to study the yield of milk during the different lactation periods with our Egyptian cows and buffaloes. The study of the effect of order of lactation on milk fat yield was also studied, as milk fat plays an important role for consumer and milk marketing.

EXPERIMENTAL AND METHODS

Data for milk records in this study were obtained from the Experiment Station of Animal Nutrition, Faculty of Agriculture, Giza,, including 120 lactations for 27 cows and 64 for 12 buffaloes, taken between 1936 and 1956. The data for individual animals have been already recorded (1).

The records contained the order of lactation, daily milk yield, weekly fat percentage, weekly fat yield as well as the ration offered to animals. The fat percentage was determined in a proportionate daily sample of the evening and morning milk of the middle day of the week in question. Classical Gerber method was used to the nearest 0.05%.

Animals were fed following Ghoneim's recommendations. For maintenance 0.58 and 0.51 kg. starch value /100 kg. L.W. were used for cows and buffaloes respectively. For production, 0.13 kg. and 0.17 kg. starch value were used for each pound of cow's and buffalo's milk respectively (0.29 kg. and 1.38 kg/each kg. milk), assuming the average fat percentage to be ca. 5 for cows and 7 for buffaloes.

When the duration of the lactation period was over one year, such lactation was not included in the study. This occurred when the animal did not conceive and normal lactation period was interrupted.

It was found preferable to study the relative yield for each animal during the different lactation periods in order to avoid the great variations in the yield among the individual animals.

RESULTS AND DISCUSSION

Relative milk and fat yield during different lactations

Assuming the yield of the first lactation 100, the following average results were obtained (Table 1).

TABLE 1.—The average percentage yield of successive lactation relative to the 1st lactation.

| Cows | | | | Buffaloes | | | |
|--------------------|----------------|------------|-----------|--------------------|----------------|------------|-----------|
| Order of lactation | No. of animals | Milk yield | Fat yield | order of lactation | No. of animals | Milk yield | Fat yield |
| 1 | 17 | 100.00 | 100.00 | 1 | 7 | 100.00 | 100.00 |
| 2 | 16 | 108.64 | 108.83 | 2 | 5 | 103.33 | 109.75 |
| 3 | 8 | 104.38 | 104.66 | 3 | 5 | 122.45 | 127.71 |
| 4 | 10 | 135.50 | 135.26 | 4 | 5 | 113.17 | 111.45 |
| 5 | 10 | 113.30 | 114.00 | 5 | 4 | 143.69 | 142.21 |
| 6 | 5 | 102.27 | 103.80 | 6 | 4 | 92.78 | 85.14 |
| 7 | 5 | 89.38 | 86.50 | 7 | 1 | 36.17 | 32.50 |
| 8 | — | — | — | 8 | 2 | 78.98 | 72.91 |

This indicated that the maximum yield in both milk and fat was at the 4th and 5th lactation with cows and buffaloes respectively. The respective maximum milk yield was 135.50% and 143.69% that of the

1st lactation. The milk yield appeared, generally, to increase from the 1st lactation to reach the maximum and then tended to decrease. Among the individual animals, some produced their maximum yield during the 2nd or 5th lactation with cows, while with buffaloes some obtained their maximum yield during the 3rd or 4th lactation. Some individuals continued to produce high yield during the 7th lactation (147.2% with one cow) and up to the 8th lactation with one buffalo. This may indicate that some individuals could continue to produce high milk yield up to the 7th or 8th lactation. Up to more than that was recorded by Fishwick (3).

These results indicated generally that the 1st lactation could be taken as a good index for testing milk yield during the proceeding lactations, confirming those indicated by Yapp and Nevens (6).

Concerning fat yield, the results in Table 1 were practically parallel to those with milk yield, the maximum fat yield being at the 4th lactation with cows (cows (135.26%) and at the 5th lactation with buffaloes (142.10%). The percentage fat yield during the various lactations was generally similar in magnitude to the corresponding relative milk yield in either cows or buffaloes. This indicated clearly that the change in fat percentage in milk during the successive lactations was practically negligible. The change in milk yield would be reflected in the same manner in the fat yield. These results are in harmony with those obtained by Kellner (5) who found that the fat percentage remained constant up to the 6th lactation and for years longer. The slight gradual decrease in fat percentage of cow milk during successive lactations recorded by Bartlett (2) was not exceeding 0.21 degree of percentage (being 3.95% at the 1st lactation and 3.74% at the 9th lactation).

Study of the percentage difference in milk and fat yield between each two successive lactation periods

TABLE 2.—The percentage difference in yield between each two successive lactations

| Item | Cows | | Buffaloes | |
|-----------------------------|------------|-----------|------------|-----------|
| | Milk yield | Fat yield | Milk yield | Fat yield |
| <i>difference between :</i> | | | | |
| 1st & 2nd lactation | 8.64 | 8.83 | 3.33 | 9.79 |
| 2nd & 3rd lactation | 0.79 | 1.28 | 16.81 | 15.54 |
| 3rd & 4th lactation | 21.97 | 22.71 | 6.21 | -0.48 |
| 4th & 5th lactation | -10.02 | -12.49 | 44.36 | 31.19 |
| 5th & 6th lactation | 10.22 | 14.87 | -11.42 | -16.19 |
| 6th & 7th lactation | -11.74 | -23.00 | -29.75 | -32.08 |
| 7th & 8th lactation | 7.23 | 3.84 | -35.17 | -39.00 |
| 8th & 9th lactation | -40.19 | -32.69 | — | — |

The results presented in Table II indicated clearly that the yield in milk and fat in both species increased in the preceding lactation periods up to the 4th lactation in cows and to the 5th lactation in buffaloes. At the lactation of maximum yield, a noticeable rise occurred, then a drop was found at the 5th and 6th lactation with cows and buffaloes respectively. Milk and fat yield fluctuated after that with cows during the succeeding lactations (6th up to the 9th) but the decrease was more than the increase. With buffaloes, the yield continued to decrease in each succeeding lactation period after the 5th lactation. The trend of change in fat yield was similar to that with milk yield.

As it was indicated by Ghoneim (3), the suitable productive ration for dairy cattle should be at least equal to that of the maintenance. Therefore, it was interesting to find out the suitable minimum milk yield in one year which include a whole lactation period. This could be done by calculating the whole requirements for maintenance during the year in question and dividing by the requirements for producing one pound of milk.

In this study, it was found that the average live weight of 23 cows was 400 kg. and of 30 buffaloes was 570 kg. The calculated daily maintenance requirements would be 2.32 kg. starch value for the cow and 2.92 kg. for the buffalo, the respective requirements per year being 839.5 and 1058.5 kg. Taking the average starch value for producing one pound of milk to be 0.13 kg. and 0.17 kg. in cows and buffaloes respectively, the profitable milk yield for cows should be ca. 6500 lb. and ca. 6200 lb. with buffaloes. Such yield was found to be much higher than the average yield which would not probably exceed 2000 lb. for cows and 3000 lb. for buffaloes. With the animals used in this study the range of milk yield was 1070 - 6259 lb. for cows and 1507-5455 for buffaloes. These investigations would indicate clearly that the yield of the majority of the Egyptian dairy cattle seems to be below that which ought to be profitably produced.

Considering that such profitable yield is the maximum yield during the 4th lactation with cows and the 5th with buffaloes, the yield for the heifers would be ca. 4200 lb. per cow and 3800 lb. per buffalo.

These findings showed clearly that the majority of the Egyptian dairy cattle are low producers. Investigations should be carried out to raise the milk productivity in our local breeds and to reduce the maintenance ration. The first aim could be achieved by careful breeding and selection. The second may be in a way by reducing the size and live weight of the dairy animals. Sexual mating at relatively earlier ages succeeded in some countries in reducing the live weight

of the dairy animal during its successive productive life without any harmful effect on milk secretion. Investigations in this field ought to be carried out with our local breeds, along with a careful study for the proper levels for maintenance and production.

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تأثير موسم الادرار على محصول اللبن والدهن للبقر والجاموس المصرى مع

الاشارة للغذاء الحافظ والمنتج

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الملخص

لقد أجريت دراسة أولية عن الادرار النسبى للبقر والجاموس فى مصر فى مواسم الحليب المختلفة على حيوانات من قطاع محطة تجارب تغذية الحيوان بكلية الزراعة جامعة القاهرة (٢٧ بقرة ، ١٢ جاموسة) ووجد أن كمية اللبن فى الموسم تزداد تدريجيا من الموسم الأول لتصل الى أقصى ادرار فى الموسم الرابع للبقر والخامس للجاموس حيث بلغ الادرار ١٣٥٥ ٪ من ادرار الموسم الأول للبقر ونحو ١٤٢٧ ٪ فى حالة الجاموس . وبعد ذلك ينخفض الادرار تدريجيا فى المواسم التالية وكان الانخفاض فى حالة الجاموس أسرع منه فى حالة البقر كما أوضحت هذه الدراسة أن كمية الدهن الناتجة فى المواسم المختلفة تكون متناسبة مع كمية اللبن الناتج ، فالإنتاج النسبى للدهن فى المواسم المتعاقبة يشابه تماما إنتاج اللبن مما يدل عموما على أن متوسط نسبة الدهن فى المواسم المختلفة ثابت فى اللبن لكل من البقر والجاموس كما وجد أن بعض الحيوانات استمرت فى إنتاج ادرار مرتفع حتى موسم الادرار الثامن أو التاسع .

كما أوضحت هذه الدراسة أن ادرار معظم مواشى اللبن فى مصر يقل عن الحد الإقتصادى المربح ولذلك يجب رفع القدرة الإنتاجية لماشية اللبن والجاموس مع محاولة خفض العليقة الحافظة للحيوانات لأدنى حد مناسب حتى يكون إنتاج اللبن أكثر ربحا ويحتاج تأكيد ذلك لدراسة أوسع على أعداد كبيرة وفى أماكن متعددة .