# EFFICIENCY OF FEED UTILIZATION WITH BUFFALOES AND DAIRY CATTLE (1)

*By*

M.A. RAAFAT (2), A.M. MAKKY (3),
A.A. ABOUL-SEOUD (4) AND M.E. SALEH (5)

## SUMMARY

The efficiency of feed utilization for milk production, concerning S.E. and D.P., of five Friesian cows and seven buffaloes, individually fed, at Dokki Experimental Station, was studied for the first 305 days postpartum and for the complete lactation period.

The coefficient of efficiency for all the animals were higher during the standard than during the complete lactation period.

The average efficiency percentages of S.E. conversion were 28.69% and 27.44% for buffaloes in *2nd* and *3rd* lactation respectively while the average efficiency for D.P. conversion for them were 23.59% and 22.49% respectively. Friesian cows were less efficient, in S.E. conversion, than buffaloes in the same lactation.The average percentage efficiencywere23.13%and 28.69% respectively.

As for protein conversion, there was almost no difference between the two species in *2nd* lactation. The average percentage efficiency were 23.43% and 23.59% for the Friesians and buffaloes respectively. The efficiency of protein conversion was underestimated because of the surplus allowances given.

## INTRODUCTION

In U.A.R. the cultivated area is limited while the density of population is very high and consequently the production of the land does not suffice human consumption.

Moreover, a great competition between man and animal exists for the use of the land. It has been shown that the available feedstuffs are not sufficient for supplying the requirements of our livestock (Animal Production Department, Ministry of Agriculture,

(1) Part of Ph. D. Thesis. Faculty of Agriculture, Cairo University.

(2) Professor of Animal Nutrition, Faculty of Agriculture, Cairo University.

(3) Head of Animal Nutrition Section, Animal Production Department, Ministry of Agriculture.

(4) Head of Poultry Nutrition Section, Animal Production Department, Ministry of Agriculture.

(5) Senior Specialist, Animal Nutrition Section, Animal Production Department, Ministry of Agriculture.

U.A.R., 1961) and that is one of the major causes for its low production. Because of the insufficiency of feedstuffs, it is desirable to keep only those animals of highest efficiency of feed utilization.

The importance of raising dairy cattle comprises in converting forages, roughages and other by-products which are not suitable for human consumption into an edible human food of high energy, protein quality, mineral and vitamin content, *i.e.*, milk. Many investigators have shown that the dairy cow is more efficient in food utilization than all the other kinds of livestock, Jordan (1901), Cooper and Spillman (1917), Armsby and Moulton (1925) and Leitch and Godden (1941). In addition, cow's productive life includes more than one lactation with a similar number of calves, and she is herself utilized as beef. Moreover, milk production supplies the dairy farmer with a daily cash money.

According to the latest cencus (1959), 66% of milk production in Egypt comes from buffaloes while 33.5% comes from cows, and the rest from goats and sheep. Ragab and Asker (1958) have estimated the average annual milk production, for buffaloes and native cows, to be approximately 1350 and 900 kg. (3000 and 2000 lb) respectively. These levels of production in comparison to that of foreign dairy breeds are very low and may be attributed to low yielding genetic factors, underfeeding, using cattle for draft and lack of good management.

The buffalo consumes more feeds than the native cow because of her big size and high milk and fat production. The best dairy animal is not the one that produces most kilograms of milk or fat per year, it is the one that produces most officiently, *i.e.*, that produces the highest quantity of milk per unit of feed consumed. The efficeincy of milk production involves innumerable genetic and environmental as well as physiological and economic factors. Cross efficiency is defined as the percentage of the energy in the given feed inclusive maintenance recovered in milk produced.

Feed, labour and miscellaneous costs are the major inputs for milk production. Feed costs abroad make up 50-59% of the total milk production costs, Tolba (1953), while in U. A. R. it may reach 80% because of the comparatively low labour costs.

Some dairy farmers believe that heavey feeding of dairy cows and buffaloes will increase milk production but it is known that the animal responds only within its inherited capacity. Moreover, by feeding beyond certain levels milk production tends to increase but at decreasing increments with successive feed units in accordance with the principle of diminishing increments, Brody (1945).

The main object of the present study is to find out the most efficient dairy cattle under our local conditions by measuring the level of efficiency of feed utilization of the buffalo our prime dairy animal compared with that of the Friesian cow, which was introduced to our country for the aim of improving the native dairy herd of cows. The propagation of the more efficient species is desirable for making best use of the limited amounts of feedstuffs.

## MATERIALS AND METHODS

*Animals* : Five Friesian cows and three buffaloes all having one previous lactation, beside four buffaloes which have two previous lactations at Dokki Animal production Station of the Ministry of Agriculture were chosen for this investigation. The experimental animals calved subsequently during the pasture season of 1959-1960 and one full lactation has been completed for each animal.

*Feeding* : To ensure complete control of feeding the animal were kept in doors the year around and were fed individually, suitabls barriers were built between each two animals. During winter season; the ration fed composed of berseem (*Trifoleum alexandrinum*), wheat straw and a cubed concentrate mixture of 65% undecorticated cottonseed cake, 20% wheat bran, 12% rice bran, 2% limestons, 1% commercial salt and 5% cane molasses. As forage was not available during summer season only the previous concentrate mixture was given beside wheat straw. Feed was given twice daily at about 8 a.m. and 4 p.m. A weighed quantity of feed was given to each animal at each feeding and the refused portion, if found, re-weighed and subtracted from the assigned daily ration. Each animal was fed a maintenance ration, according to its body weight and a production ration according to its average yield of milk and fat during the previous week.

Ghoneim's Feeding Standards for dairy cows and buffaloes were applied for calculating feeding requirements. For maintenance, 0.58 kg. starch equivalent (S.E.) inclusive 0.05 kg. digestible protein (D.P.) and 0.51 kg S. E. inclusive 0.05 kg. D.P. are required for every 100 kg. bodyweight of cows and buffaloes respectively. The requirements for the production of 1 kg. of cow's milk containing 4% fat, are 0.2626 kg. S.E. inclusive 0.0676 kg. D. P. and for the production of 1 kg. of buffaloe's milk containing 7% fat are 0.3726 kg. S. E. inclusive 0.0856 kg. D.P.

Feeding allowances were adjusted every fortnight to correspond with changes in both bodyweight and milk production. For the sake of simplicity and practical feeding, the quantities of roughages were kept constant throughout the whole lactation period, and the amount of concentrate mixture was adjusted to balance the nutrient allowances.

Ir winter, berseem was fed at the rate of 25 and 30 kg. daily for cows and buffaloes respectively. Wheat straw was given at the rate of 4 and 7 kg. to all of the animals during winter and summer periods respectively.

To ensure the maximum possible yield, *i.e.*, at the flush of lactation the production ration, during the first six weeks after parturition, was increased to fullfill the requirements for the average daily milk yield plus one kilogram of milk. After attainment of maximum yield, the production allowances were given according to actual milk yield throughout the rest of the lactation period.

*Weighing* : The experimental animals were weighed once every two weeks in the morning before drinking and feeding. The animals were hand-milked twice daily and milk weights were recorded at each milking.

*Sampling* : representative all-day milk sample was taken every fortnight from each animal, by using the Danish bucket, the sample was preserved by the addition of a tablet of potassium dichromate and the percentage of fat in milk was determined by the usual Gerber method. Representative samples of all the feeds used throughout the lactation period were taken and analysed by suing the A.O.A.C methods. The proximate analysis and the calculated nutritive value of the feeds are given in Table 1. Digestion trials were not conducted. Instead, for estimating the nutritive value of the feeds consumed, the coefficients of digestibility published by the Animal Production Department, Ministry of Agriculture, U.A.R. (1961) were applied to the chemical analysis of berseem and wheat straw. The approximate nutritive value of the concentrate mixture was calculated from the nutritive value of its ingredients.

Milk records with different fat percentages were converted into 4% FCM and 7% FCM for cows and buffaloes respectively by applying the following two formulae :

4% FCM of cows = 0.4 Milk + 15.0 fat (Gaines 1923)

7% FCM of buffaloes = 0.265 Milk + 10.5 fat (Raafat & Saleh 1962)

It has been assumed, in the present investigation, that 4% FCM of cows has 15.9 S.E. inclusive 3.18 D.P., and that 7% FCM of buffaloes has 23.8 S.E. inclusive 4.02 D.P.

TABLE 1.--Chemical Composition and Nutritive Value of Feeds Consumed

| Feedstuff | Proximate Analysis | | | | | | Nutritive Value | |
|---|---|---|---|---|---|---|---|---|
| | Moisture | Crude Protein | Ether Extract | Nitrogen Free Extract | Crude Fiber | Ash | Digestible Protein | Starch Equivalent |
| | % | % | % | % | % | % | % | % |
| Concentrates mixture . . . | 8.75 | 19.25 | 4.47 | 41.75 | 16.32 | 9.46 | 13.07 | 50.40 |
| Wheat straw . . . . . | 8.68 | 2.35 | 1.18 | 40.64 | 34.43 | 12.72 | 0.82 | 22.49 |
| Berseem 1*st* cut (1*st* year) . | 87.65 | 2.25 | 0.31 | 5.20 | 2.45 | 2.14 | 1.77 | 6.82 |
| Berseem 2*nd* cut (1*st* year) . | 84.35 | 2.83 | 0.42 | 5.96 | 3.92 | 2.52 | 2.20 | 8.16 |
| Berseem 3*rd* cut (1*st* year) . | 77.50 | 3.15 | 0.55 | 8.71 | 7.22 | 2.87 | 2.31 | 10.76 |
| Berseem 1*st* cut (2*nd* year) . | 89.20 | 1.94 | 0.29 | 4.34 | 2.32 | 1.91 | 1.53 | 5.86 |
| Berseem 2*nd* cut (2*nd* year) . | 85.50 | 2.50 | 0.35 | 5.62 | 3.81 | 2.22 | 1.94 | 7.57 |
| Berseem 3*rd* cut (2*nd* year) . | 79.25 | 2.95 | 0.47 | 7.73 | 6.85 | 2.75 | 2.16 | 9.86 |

Gaine's formula (1928) for the estimation of the coefficient of efficiency of milk production was used, with slight modification, in the present investigation, by expressing it in terms of starch equivalent (S.E.) instead of total digestible nutrients (TDN) for both milk and feed as follows:

$$\text{Coefficient of efficiency (C.E.)} = 100 \times \frac{\text{S.E. in milk produced}}{\text{S.E. in feed consumed}}.$$

In the same manner, the efficiency of milk production in terms of digestible protein (D.P.) was also estimated as follows :

$$\text{Coefficient of efficiency (C.E.)} = 100 \times \frac{\text{D.P. in milk produced}}{\text{D.P. in feed consumed}}$$

## RESULTS AND DISCUSSION

The total feed consumption, total milk production and the efficiency of feed utilization, druing the complete lactation period, for the experimental buffaloes and Friesian cows are presented in tables 2 and 3 respectively.

To adjust for the effect of variable length of lactation periods on efficiency, the actual feed consumption, actual milk production and the efficiency of feed utilization, during the first 305 days after parturition, of the experimental buffaloes and cows are also given in tables 4 and 5 respectively.

TABLE 2.—**Feed consumption, Milk production and Efficiency of Buffaloes. (Complete lactation period)**

| Lactation No. | Animal No. | Lactation Period days | Live weight | | Milk Yield 7% FCM | Nutritive value of milk | | Nutritive value of feed | | 7% FCM produced per 1 kg. S.E. | S.E. in feed necessary for 1 kg. FCM | Coefficient of Efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Initial | Final | | S.E. | D.P. | S.E. | D.P. | | | S.E. | D.P. |
| | | | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | % | % |
| Second | 923 | 435 | 470 | 530 | 1598.2 | 380.37 | 64.25 | 1575.61 | 314.66 | 1.014 | 0.986 | 24.14 | 20.42 |
| | 917 | 468 | 520 | 570 | 2943.1 | 700.46 | 118.31 | 2317.36 | 486.71 | 1.270 | 0.787 | 30.23 | 24.31 |
| | 918 | 307 | 550 | 585 | 1417.3 | 337.32 | 56.98 | 1356.00 | 275.68 | 1.045 | 0.957 | 24.88 | 20.67 |
| Average | — | 403 | 513 | 562 | 1986.2 | 472.72 | 79.85 | 1749.66 | 359.02 | 1.110 | 0.910 | 26.42 | 21.80 |
| Third | 900 | 490 | 600 | 620 | 2633.0 | 626.65 | 105.85 | 2500.53 | 522.09 | 1.053 | 0.950 | 25.06 | 20.27 |
| | 897 | 565 | 615 | 650 | 3053.5 | 726.73 | 122.75 | 2890.49 | 604.42 | 1.056 | 0.947 | 25.14 | 20.31 |
| | 902 | 390 | 660 | 680 | 2208.3 | 525.58 | 88.77 | 2110.41 | 444.43 | 1.046 | 0.956 | 24.90 | 19.97 |
| | 153 | 476 | 570 | 600 | 2620.1 | 623.58 | 105.33 | 2362.88 | 482.00 | 1.109 | 0.902 | 26.39 | 21.85 |
| Average | — | 481 | 611 | 638 | 2628.7 | 625.64 | 105.68 | 2466.08 | 513.24 | 1.066 | 0.939 | 25.37 | 20.60 |

TABLE 3.—**Feed consumption, Milk production and Efficiency of Friesian Cows (Complete lactation period)**

| Lactation No. | Animal No. | Lactation Period days | Live weight | | Milk Yield 4% FCM | Nutritive value of milk | | Nutritive value of feeds | | 4% FCM produced per 1 kg. S.E. | S.E. in feed necessary for 1 kg. FCM | Coefficient of Efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Initial | Final | | S.E. | D.P. | S.E. | D.P. | | | S.E. | D.P. |
| | | | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | % | % |
| Second | 588 | 359 | 390 | 455 | 1608.8 | 255.80 | 51.16 | 1148.93 | 232.00 | 1.400 | 0.714 | 22.26 | 22.05 |
| | 521 | 447 | 415 | 450 | 2160.6 | 343.54 | 68.71 | 1597.98 | 309.90 | 1.352 | 0.740 | 21.50 | 22.17 |
| | 464 | 506 | 400 | 475 | 2390.5 | 380.09 | 76.02 | 1735.37 | 353.98 | 1.378 | 0.726 | 21.90 | 21.48 |
| | 374 | 380 | 455 | 495 | 2018.1 | 320.88 | 64.18 | 1498.40 | 302.32 | 1.347 | 0.742 | 21.41 | 21.23 |
| | 365 | 497 | 500 | 540 | 2927.7 | 465.50 | 93.10 | 2187.66 | 446.63 | 1.338 | 0.747 | 21.28 | 20.84 |
| Average | — | 438 | 432 | 483 | 2221.1 | 353.16 | 70.63 | 1633.67 | 328.96 | 1.363 | 0.734 | 21.67 | 21.55 |

The efficiency of feed utilization for milk production is shown in the tables in three ways as folows : (1) Amount of fat-corrected milk (FCM) produced per 11 kg. S.E. fed. (2) Amount of S.E. in feed necessary for the production of 1 kg of FCM. (3) Coefficient of efficiency concerning both S.E. and D.P. It was prefered here to estimate the efficiency in the form of gross (total) rather than in the form of net (partial) efficiency.

Though some investigators Leitch & Godden (1941) and Brody (1945) had estimated beside the gross efficiency the net efficiency of milk production considering only that part of feed consumed above maintenance level, but there is, of cousre, a large error in estimating maintenance, district from production, of a producing animal and consequently the net efficiency of milk secretion is less close to reality than is the gross efficiency.

It ought to be mentioned that records of milk and feed, for the first three days after parturition, were disregarded and not included in the given tables.

In regard to bodyweight, it was noticed that all the animals gained weight throughout their lactation periods, but not at the same rate. The average initial bodyweights were 432,513 and 611 kg. for cows in the *2nd* lactation, buffaloes in *2nd* and *3nd* lactations respectively, while their average final bodyweights were 483, 562 and 638 kg. in the same order. Bodyweight increase was higher in the *2nd* than in the *3rd* lactation group of buffaloes as it averaged 49 and 27 kg. respectively. This may be attributed to the young age and relatively fast rate of growth of buffaloes in *2nd* lactation. On the other hand, the average bodyweight increase for both the Friesians and buffaloes, in the *2nd* lactation, was nearly the same ; the averages were 51 and 49 kg. respectively.

It is well known that weight changes in the adult cow are a reflection of the storing and depletion of nutritional reserves within the body. However, it can be pointed out that a portion of the increase in bodyweight of animals, especially in the last part of the lactation period, was due to the effect of pregrancy. In this consideration, it ought to be mentioned that no extra feed allowance was given for the pregnant animals. This would appear to ignore the requirements for the growth of the foetus and placenta, but it has been shown that the daily requirement of feed nutrient for this purpose is small except during the last two months of pregnancy. In ordinary practice, the animal will have been dried off during this final period and will be receiving generous allowances to bring it into good condition for calving and subsequent lactation. Weight changes, in this investigation have been considered in the final estimation of efficiency of milk production. The total feed consumption presented in the four tables have been corrected for gain of bodyweight by subtracting 3.0 kg. of S.E. and 0.1 kg. of D.P. for every 1 kg. bodyweight gain, from the total

feeds consumed. This allowance was given by Woodman (1948), as to be fed in excess of maintenance, to bulls aging over two years and in half-fat condition, for every 1 kg. liveweight increase. Knott *et al* (1934) proposed 3.53 lb.TDN per 1 lb. bodyweight gain in lactating cows while Brody and Procter (1935) suggested 2.1 lb. TDN. for this purpose. However, such corrections can be only approximate at best because of lack of knowledge of the kind of tissue gained.

The lactation periods of most of the experimental animals extended more than usual due to late fertile service. They were on the average 403, 481 and 438 days for *2nd*, *3rd* lactation groups of buffaloes and for the group of Friesian cows respectively. Daily milk yield of the buffaloes tended to increase to reach the maximum production within an average period of four weeks postpartum while in the case of Friesian cows, the maximum level was attained after three weeks postpartum on the average. Then a gradual decrease in milk production took place with some fluctuations till the end of the lactation period. It was noticed that the rate of decline, in the last months of lactation, was pronounced due to the effect of pregnancy. Studying the records of milk yields together with fat percentage of milk, it was noticed that they varied inversely throughout the whole lactation period, but not in direct proportion. A wide individual variation between the experimental animals in total milk production was also noticed.

The buffaloes in the *2nd* lactation group, during their complete lactation period, consumed on the average 1749.66 kg. S.E. inclusive 359.02 kg. D.P. and secreted an average of 1986.2 kg. of 7% FCM. The average coefficients of efficiency of S.E. and D.P. conversions were 26.42 % and 21.80 % respectively. The average quantity of 7% FCM produced per 1 kg. S.E. fed was 1.110 kg. and thus, the average quantity of S.E. needed for the production of 1 kg. of 7% FCM was 0.910 kg.

The buffaloes in the *3rd* lactation group, in comparison with those in the *2nd* lactation group, showed to be slightly less efficient in feed utilization. They consumed during their complete lactation an average of 2466.08 kg. S.E. inclusive 513.24 kg. D.P. and produced an average of 2628.7kg. of 7% FCM; the coefficient of efficiency was 25.37% and 20.60% for S.E. and D.P. conversions respectively. The average quantity of 7% FCM produced per 1 kg.S.E. fed decreased from 1.110 kg. in the *2nd* lactation group to 1.066 kg. in the *3rd* lactation group and the average quantity of S.E required for the production of 1 kg. of 7% FCM increased from 0.910 to 0.939 kg. in the two groups respectively.

It is well known, that milk production of an animal increases with advancing age till a certain lactation, due to the increase in animals size which is associated with greater digestive capacity and increased udder capacity. Consequently, higher efficiency of feed utilization

was expected with buffaloes in 3*rd* than in 2*nd* lactation group, but the reverse was noticed. This may be attributed to the effect of the good buffalo No. 917, which represented one third of her group, on raising the average efficiency of her group over that of the other group. It was noticed that the coefficients of efficiency of S.E. conversion for the other two buffaloes in the 2*nd* lactation group, were lower than that of all the individuals in the 3*rd* lactation group.

The group of Friesian cows, in comparison with the group of buffaloes in the same lactation (2nd), behaved less efficiently because they produced, during their complete lactation period an average of 2221.1 kg. of 4% FCM while they consumed on the average 1633.67 kg. S.E. inclusive 328.96 kg. D.P. in their rations. As an average, 1.363 kg. of 4% FCM was produced per 1 kg. S.E. fed. In other words, an average of 0.734 kg. S.E. was necessary for the production of 1kg. of 4% FCM. The coefficient of efficiency of S.E. conversion was lower for cows than for buffaloes by 17.98%; the percentages were 21.67% and 26.42% respectively. But the two species did not significantly differ in regard to the efficiency of protein conversion; the average percentages were 21.55% and 21.80% for Friesians and buffaloes respectively

Milk production, feed consumption and efficiency of feed utilization for the experimental animals, on an equitable base, *i.e.* for the first 305 days postpartum, as shown in table 4 and 5 were also studied and compared with the data obtained for complete lactation.

During the standard period of 305 days, the average feed consumption in terms of S.E. was 1384.50 kg. for buffaloes in 2*nd* lactation, 1688.72 kg. for buffaloes in 3*rd* lactation and 1199.61 kg. for Friesian cows. The average milk yield, during this period, for the three groups and in the same order, was 1697.9 and 1945.3 kg. of 7% FCM and 1745.5 kg. of 4% FCM, for buffaloes in 2*nd* and 3*rd* lactations and for Friesian cows respectively. The quantity of 7% FCM produced per 1 kg. S.E. fed averaged 1.205, and 1.153 kg. for buffaloes in 2*nd* and 3*rd* lactations respectively, while in the case of Friesian cows, the average quantity of 4% FCM produced per 1 kg.S.E. was 1.455 kg. Consequently, 0.847, and 0.868 kg. S.E. were required for the production of 1 kg. of 7% FCM for buffaloes in 2*nd* and 3*rd* lactations respectively, while an average of 0.688 kg. S.E. was necessary for the production of 1 kg. of 4% FCM in the case of Friesian cows. It is obvious that the quantity of S.E. needed for the production of 1 kg. of 7% FCM, in the case of buffaloes, was higher than that required for the production of 1 kg. of 4% FCM, in the case of cows and this is attributed to the relatively higher energetic value of buffaloe's milk than that of cows. The average coefficiant of S.E.conversion reached the highest percentage with buffaloes in 2*nd* lactation, followed by buffaloes in 3rd lactation while the Friesian cows gave the lowest percentage. The average percentages were 28.69%, 27.44% and 23.13% respectively.

TABLE 4.—**Feed consumption, Milk production and Efficiency of Buffaloes (First 305 days)**

| Lactation No. | Animal No. | Live weight | | Milk Yield 7% FCM | Nutritive value of milk | | Nutritive value of feeds | | 7% FCM Produced per 1 kg. S.E. | S.E. in feed necessary for 1 kg. FCM | Coefficient of Efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Initial | Final | | S.E. | D.P. | S.E. | D.P. | | | S.E. | D.P. |
| | | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | % | % |
| Second | 923 | 470 | 515 | 1289.1 | 306.81 | 51.82 | 1143.54 | 226.94 | 1.127 | 0.887 | 26.83 | 22.88 |
| | 917 | 520 | 560 | 2389.5 | 568.70 | 96.06 | 1646.59 | 353.57 | 1.451 | 0.689 | 34.54 | 27.17 |
| | 918 | 550 | 580 | 1415.0 | 336.77 | 56.88 | 1363.38 | 274.65 | 1.038 | 0.964 | 24.70 | 20.71 |
| Average | — | 513 | 552 | 1697.9 | 404.09 | 68.25 | 1384.50 | 284.90 | 1.205 | 0.847 | 28.69 | 23.59 |
| Third | 900 | 600 | 610 | 1877.7 | 446.89 | 75.48 | 1649.04 | 344.85 | 1.139 | 0.878 | 27.10 | 21.89 |
| | 897 | 615 | 620 | 2020.3 | 480.83 | 81.22 | 1718.17 | 356.26 | 1.176 | 0.850 | 27.99 | 22.80 |
| | 902 | 660 | 660 | 1945.2 | 462.96 | 78.20 | 1770.35 | 364.88 | 1.099 | 0.910 | 26.15 | 21.43 |
| | 1/53 | 570 | 580 | 1938.0 | 461.24 | 77.91 | 1617.30 | 326.83 | 1.198 | 0.835 | 28.52 | 23.84 |
| Average | — | 611 | 618 | 1945.3 | 462.98 | 78.20 | 1688.72 | 348.21 | 1.153 | 0.868 | 27.44 | 22.49 |

TABLE 5.—**Feed consumption, Milk production and Efficiency of Friesian Cows**

**(First 305 days)**

| Lactation No. | Animal No. | Live weight | | Milk Nutritive Yield value of milk | | | Nutritive value of feeds | | 4 % FCM Produced per 1 k.g. S. E. | S. E. in feed necessary for 1 kg. F.C.M. | Coefficient of Efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Inital | Final | 4 % FCM | S. E. | D. P. | S. E. | D. P. | | | S. E. | D. P. |
| | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | % | % |
| Second . . . . | 588 | 390 | 450 | 1469.0 | 233.57 | 46.71 | 982.48 | 200.55 | 1.495 | 0.669 | 23.77 | 23.29 |
| | 521 | 415 | 420 | 1604.8 | 255.16 | 51.03 | 1169.71 | 216.03 | 1.372 | 0.729 | 21.81 | 23.62 |
| | 464 | 400 | 440 | 1639.8 | 260.73 | 52.15 | 1094.93 | 218.35 | 1.498 | 0.668 | 23.81 | 23.88 |
| | 374 | 455 | 475 | 1792.1 | 284.94 | 56.99 | 1278.00 | 253.89 | 1.402 | 0.713 | 22.30 | 22.45 |
| | 365 | 500 | 515 | 2221.7 | 353.25 | 70.65 | 1472.94 | 295.33 | 1.508 | 0.663 | 23.98 | 23.92 |
| Average . . . . | — | 432 | 460 | 1745.5 | 277.53 | 55.51 | 1199.61 | 236.83 | 1.455 | 0.688 | 23.13 | 23.43 |

TABLE 5.—**Feed consumption, Milk production and Efficiency of Friesian Cows**

**(First 305 days)**

| Lactation No. | Animal No. | Live weight | | Milk Nutritive Yield value of milk | | | Nutritive value of feeds | | 4 % FCM Produced per 1 k.g. S. E. | S. E. in feed necessary for 1 kg. F.C.M. | Coefficient of Efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Inital | Final | 4 % FCM | S. E. | D. P. | S. E. | D. P. | | | S. E. | D. P. |
| | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | Kg. | % | % |
| Second . . . . | 588 | 390 | 450 | 1469.0 | 233.57 | 46.71 | 982.48 | 200.55 | 1.495 | 0.669 | 23.77 | 23.29 |
| | 521 | 415 | 420 | 1604.8 | 255.16 | 51.03 | 1169.71 | 216.03 | 1.372 | 0.729 | 21.81 | 23.62 |
| | 464 | 400 | 440 | 1639.8 | 260.73 | 52.15 | 1094.93 | 218.35 | 1.498 | 0.668 | 23.81 | 23.88 |
| | 374 | 455 | 475 | 1792.1 | 284.94 | 56.99 | 1278.00 | 253.89 | 1.402 | 0.713 | 22.30 | 22.45 |
| | 365 | 500 | 515 | 2221.7 | 353.25 | 70.65 | 1472.94 | 295.33 | 1.508 | 0.663 | 23.98 | 23.92 |
| Average . . . . | — | 432 | 460 | 1745.5 | 277.53 | 55.51 | 1199.61 | 236.83 | 1.455 | 0.688 | 23.13 | 23.43 |

It was very interesting to notice that the efficiency of feed utilization by the Friesian cows, for both S.E. and D.P. conversion was attained almost the same, while buffaloes were more efficient in S.E. than in D.P. conversion. In addition, both the two groups of buffaloes showed to be more efficient in S.E. conversion than the group of Friesian cows. Concerning D.P. conversion, Friesian cows, on the average were nearly equal with the group of buffaloes in *2nd* lactation, but they exceeded buffaloes in *3rd* lactation group in that respect.

However, definite conclusions cannot be cor firmly stated here because of the relatively few number of animals examined in the present investigation, yet the study is going on with a larger number, in the Animal Production Experimental Stations at Mahallet Mousa, Sakha and Sirw for buffaloes, Friesian and Demiatti cows respectively.

Though buffalces, in this investigation, had shown to be more efficient in feed utilization (S.E.) than Friesian cows, yet we must put in our consideration that milk production becomes more expensive as calving internal extends more than usual because the dry period is encountered in milk production costs where rations are supplied almost entirely for the sake of maintaining the animal. In this consideration, the buffalo is generally considered to be a very irregular producer. While the Friesian cows and our native cows calve every 12 to 15 months, the calving interval of the buffalo is approximately 18 months and it may extend to as long as three years. This is far too long for economical production and this criterion may be attributed to management practices beside the characterisic silent heat of the buffalo which plays a large part in the delay of calving. Since milk production is one of the functions of reproduction, fertility rate is critical. The dairy farmer must only keep high and regular producers and cull his herd yearly to get rid of unprofitable animals.

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# الكفاءة الغذائية فى الجاموس والابقار

محمد على رأفت ، عبد المنعم مكى، أحمد عبد الله أبو السعود ومحمد السعيد صالح

## الملخص

درست كفاءة تحويل الغذاء ( معادل نشا وبروتين مهضوم ) الى لبن لخمس أبقار فريزيان وسبع جواميس مغذاه تغذية فردية بمحطة الانتاج الحيوانى بالدقى خلال موسم حليبها الكامل وأيضا خلال الـ ٣٠٥ أيام الأولى من فصل الحليب

كان معامل الكفاءة التحويلية للغذاء فى صورة معادل نشا وبروتين مهضوم – لحيوانات التجربة أعلى فى فترة الـ ٣٠٥ أيام ( الفترة الموحدة ) عنه بالنسبة لموسم الحليب جميعه .

كان الجاموس الذى فى موسم حليبه الثانى أعلى كفاءة بقليل من الجاموس الذى فى موسم حليبه الثالث حيث بلغ معامل الكفاءة التحويلية لمعادل النشا ٢٨ر٦٩٪ ، ٤٤ر٢٧٪ خلال الفترة الموحدة ، ٤٢ر٢٦٪ ، ٣٧ر٢٥٪ خلال موسم الحليب جميعه وذلك فى مجموعتى الجاموس على التوالى . وبلغت كمية اللبن المحتوى على ٧٪ دهن الناتجة من كيلوجرام معادل نشا بالعليقة ٢٠٥ر١ ، ١٥٣ر١ كجم ، ١١٠ر١ ، ٠٦٦ر١ كجم للمجموعتين خلال فترة لحليب الموحدة والموسم الكامل على التوالى . وكان معامل الكفاءة التحويلية للبروتين المهضوم للمجموعتين على التوالى ٥٩ر٢٣٪ ، ٤٩ر٢٢٪ خلال الفترة الموحدة و ٨٠ر٢١٪ ، ٦٠ر٢٠٪ خلال موسم الحليب الكامل .

كانت مجموعة الابقار الفريزيان اقل كفاءة فى تحويل معادل النشا بالغذاء من مجموعة الجاموس التى فى نفس موسم الحليب ( الثانى ) حيث بلغ معامل الكفاءة التحويلية لكل منها على التوالى ١٣ر٢٣٪ ، ٦٩ر٢٨٪ بالنسبة للفترة الموحدة و ٦٧ر٢١٪ ، ٤٢ر٢٦٪ بالنسبة لموسم الحليب الكامل . وقد بلغت كمية اللبن البقرى المحتوى على ٤٪ دهن الناتجة من كيلو جرام معادل نشا بالعليقة ٤٥٥ر١ ، ٣٦٣ر١ كجم خلال الفترة الموحدة وموسم الحليب الكامل على التوالى .

وبالنسبة لكفاءة تحويل بروتين العليقة الى بروتين اللبن ، لم يوجد فرق تقريبا بين الأبقار الفريزيان والجاموس الذى فى موسم الحليب الثانى فى هذا الصدد فقد بلغ معامل الكفاءة التحويلية للبروتين فى المجموعتين على التوالى ٤٣ر٢٣٪ ، ٥٩ر٢٣٪ فى فترة الحليب الموحدة و ٥٥ر٢٪ ، ٨ر٢١٪ فى موسم الحليب الكامل .