

THE NUTRITION OF FRIESIAN CALVES DURING THE SUCKLING PERIOD

By

*E.R.M. ABOU-HUSSEIN, M.A. RAAFAT AND M.A. SALEM

A study was carried out to find the suitable and economic requirements for satisfactory growth of Friesian calves during a suckling period of 24 weeks. Colostrum or milk was handfed individually using the nipple pails. Experimental animals (66 Friesian calves: 31 males and 35 females) were fed in groups using different treatments according to the amounts of milk and plant food. The results indicated that the most economical and adequate mixture having the best food utilization was 680 kgs whole milk along with 111.4 kgs starch value plant feedstuffs, the total starch value being 212.8 kgs. The calorific value of the milk was 423640 Calories. The average daily gain with males was 0.725 kg, ranging between 0.649 and 0.792 kgs. This average was 7.1% more than that with females which were gaining 0.677 kg. daily (0.655-0.726 kg.).

The Holstein Friesian was imported in the U.A.R. and proved successful under our local conditions. Since the Friesian has a higher milk production as well as higher ability to grow as compared to the local breeds, thus it is important to know the most convenient feeding requirements of this imported foreign breed at different stages of age under our local conditions. Therefore, feeding young Friesian calves during the suckling period was investigated to find out the most economical ration using whole Friesian milk along with our common and available local feedstuffs.

Vilinger (1956) found that the total feeds consumed in the first 6 months in kilograms were whole milk 298, 305, skimmed milk 301, 301; concentrates 353, 338; hay 129, 129 for male and female calves respectively. The mean amounts utilized per kilograms gained weight during the first six months were 1.862, 1.993 kgs starch units and 310, 322 grs digestible protein. Jottrand (1957) reported that it is profitable to rear heifer calves on 100-150 litres whole milk and 200-250 litres skimmed milk along with 75-90 kgs concentrates. In this connection Richter *et al.* (1957) suggested to reduce whole milk for rearing calves to 230 kgs for Friesian heifer calves and 120 kgs or attenuing Friesian bull calves along with 830 kgs skimmed milk. The same authors (1958) found that the total amount of whole and skimmed milk up to the 16th. week should be more than 700 kgs including 230 kgs whole milk for heifer and 120 kgs for bull calves. They also claimed (1959) that it is possible to reduce the whole milk offered to calf to 60 kgs with a total amount of 700-750 kgs whole and skimmed mil. Noller *et al* (1957) reported that feeding Friesian calves on 229.5 kgs of 126 kgs whole milk or 27 kgs whole milk and 220.5 kgs milk equivalent, made average daily gains of 1.21, 1.17, and 1.29 lbs. respectively. Simmonjan (1957) reported that the mean

* Animal Production Dept., Fac. of Agrico., Cairo University.

daily gains were 700 to 750 grs during the first six months when calves received either 320 kgs whole milk and 800 kgs skimmed milk or 230 ggs whole milk and 600 skimmed milk along with 100 and 103 kgs concentrates respectively. Beguceve (1963) preferred to rear calves on 194 kgs whole milk along with 220 kgs skimmed milk instead of 287 kgs whole milk and 404 kgs skimmed milk. Ragab and Abdel-Aziz (1961) recommended to feed Friesian calves in U.A.R. on 453.6 kgs whole milk with 49.1 kgs calf meal. Mathieu and Waget-Litre (1962) recommended to feed French Friesian calves on 200 litres milk during 5 weeks along with concentrates and hay to appetite. Van marle (1963) found highly significant differences in liveweight when Friesian calves were given 10, 6.6 or 5 kgs milk per 100 kgs liveweight during 24 weeks. Mysjutkina (1963) reported that Friesian-bullocks calves during 6 months fed on 380 kgs skimmed milk, 80 kgs concentrates and more succulent hay and grass had an average daily weight gains of 800 grs, while it was 860 grs when they were given 793 kgs skimmed milk 154 kgs concentrates.

Material and Methods

Animals

66 Friesian calves, 31 males and 35 females were experimented on. They were taken just after calving from the dairy Friesian herd in the Animal Production Research Stations, Faculty of Agriculture, Giza.

Feeding

Calves were separated from their dams just after calving. They were hand-fed on mother's colostrum in the first three days and were given Friesian whole milk from the fourth day up to the weaning age at the end of the 24th week. Milk was given twice daily shortly after milking in equal parts at 8 a.m. and 2 p.m. Plant feedstuffs as green clover, clover hay, darawa (green corn plants) and concentrates were offered from the 3rd week twice daily after the milk feed. The concentrates include rice bran, wheat bran, and undecorticated cottonseed cake.

The amount of milk for each calf was given individually in each treatment. The animal of the same ages were fed in groups on the plant feedstuffs in each treatment.

Recording weight

Calves were individually weighed every four weeks before feeding at 3 a.m., the average of three successive daily weighings was taken to the nearest kilogram.

Results and Discussion

In treatment 'A' (Table 1) calves were given 680 kgs whole milk as recommended Jottrand (1957), Bobek and Molnar (1958), and Simonjan (1957). The average daily gain with males was 0.423 kg, ranging between 0.381 and 0.470 kg. This average was 7.5% less than average daily gain with

TABLE 1.—DAILY GAIN AND EFFICIENCY OF FRIESIAN CALVES DURING THE SUCKLING PERIOD (24 WEEKS) BY FEEDING ON DIFFERENT LEVELS OF MILK AND PLANT FEEDSTUFFS.

Treatments.	Milk given.		Starch value (S.V. given)				Male calves.			Female calves		
	Kg.		As milk Kg.	As plant food Kg.	Total S.V. Kg.	Daily S.V. Kg.	No. of Animals	Average daily gain	Average efficiency	No. of Animals	Average daily gain	Average efficiency
A	680		101.37	88.90	190.27	1.13	6	0.423	1:2.699	8	0.457	1:2.502
B	605		90.12	88.90	179.02	1.07	7	0.426	1:2.541	6	0.361	1:2.984
C	531		79.06	111.44	190.50	1.13	6	0.600	1:1.905	9	0.516	1:2.207
D	680		101.37	111.44	212.81	1.32	6	0.725	1:1.757	6	0.677	1:1.874
E	1021		152.06	167.16	319.22	1.90	6	0.645	1:2.970	6	0.727	1:2.626

females which was 0.457 kg., ranging between 0.417 and 0.547 kg. It is to be noticed that the average daily gain was 39.3% less than that recorded by Simonjan (1957).

In treatment 'B' animals were given 605.3 kgs whole milk and the same amount of starch value from plant feedstuffs as those in treatment 'A' as recommended by Richter *et al* (1958) and Bobek and Molnar (1958). The average daily gain with males was 0.426 kg., ranging between 0.351 and 0.515 kg. This average was 18% more than that with females which was 0.361 kg, ranging between 0.310 kg. and 0.387. Such results with growth rates were reflected on the efficiency. It was lower in females than with treatment 'A'. It can be mentioned that reducing the amount of milk from 680 kgs. to 605.3 kgs. did not impair significantly the growth of calves during the 24 weeks of Age.

In treatment 'C' calves were given 531 kgs. whole milk as recommended by Villinger(1956) and Leisner (1957/58) along with 111.44 kgs. starch value plant feedstuffs. The total starch value of milk and feedstuffs was 190.5 kgs. which similar to that given in treatment 'A'. The average daily gain with males was 0.600 kg., ranging between 0.512 and 0.661 kg. This average was 16.3% more than the average daily gain with females which was 0.516 kg, ranging between 0.424 and 0.595 kg. This average daily gain was 41.8 and 13.0% more than the results in treatment 'A' for males and females respectively. The efficiency was lower in females than that in males. In this connection, Villinger (1956) obtained the same efficiency figure (1:1.9) which was arrived at in this treatment.

In treatment 'D', animals were given the same amount of milk given in treatment 'A' (680 kgs.) along with the plant feedstuffs offered in treatment 'C' (111.44 kgs S.V.). The average daily gain with females was 0.725 kg., ranging between 0.649 and 0.792 kg. This average was 7.1% more than the average daily gain with females which was 0.677 kg, ranging between 0.655 and 0.726 kg. It is to be noticed that the average daily gains were 71.4 and 48.1% more than the results obtained in treatment 'A' for males and females respectively. In this connection, Whitaker *et al.* (1957) found that there were significant correlations between weight gains and concentrate consumption.

In treatment 'E', calves were fed on 1021.3 kgs. whole milk along with 167.16 kgs. S.V. plant feedstuffs. The total amount of feed was equivalent to 319.2 kgs. S.V. which was $1\frac{1}{2}$ times that offered in treatment 'D'. The average daily gain with males was 0.645 kg, ranging between 0.631 and 0.750 kg. This average was 11.3% less than that with females which was 0.727 kg., ranging between 0.667 and 0.792 kg. The efficiency was lower in this treatment than in treatment 'D' in both sexes.

These studies with suckling Friesian calves showed that the most economical level was that in treatment 'D', that is 680 kgs. whole Friesian milk along with plant feedstuffs equal to 111.44 kgs. starch value, the total starch value being 212.8 kgs. The calorific value of the milk was 423640 Calories. It is therefore recommended that the allowances in treatment 'D' could be applied in practice. It appears to be most suitable mixture and marginal

allowances which would be sufficient for normal growth. For the economic importance of the results with treatment 'D' the feeding scheme during the suckling period is presented in Table 2.

TABLE 2.—FEEDING CHART FOR WEEKLY ALLOWANCES OF EACH FRIESIAN CALF DURING THE SUCKLING PERIOD OF 24 WEEKS.

Age in weeks	Whole milk		Plant food starch value	Total starch value
	Quantity	Starch value		
		Kg.	Kg.	Kg.
1—3 days	Colost.	—	—	—
4—7 „	16.2	2.412	—	2.412
2 „	28.4	4.221	—	4.221
3 „	28.4	4.221	0.840	5.061
4 „	28.4	4.221	0.840	5.061
5—8 „	31.5	4.690	2.380	7.070
9—12 „	37.8	6.628	4.620	10.248
13—16 „	31.5	4.690	6.020	10.710
17—20 „	25.2	3.752	6.930	10.682
21—24 „	18.9	2.814	7.490	10.304
Total . . .	680.0	101.371	111.440	212.811

REFERENCES

- BEGUCEV, A.P. (1963). Development and formation of productivity in dairy cattle with different ways of feeding young stock. *Zivotnovodstvo*, No. 2, 31-38. (*In Nutrition Abst.* 33, 6987, 1963).
- BOBEK, JANO MOLNAR, I. (1958). Results on state farms of rearing calves on milk with reduced fat content. *Allullenyeseles*, 7, 287-292. (*In Nutrition Abst.* 29, 4838, 1959).
- JOTTRAND, M. (1957). Feeding of calves in the High-Katanga. *Bull. D' Information de L' L'INEAO*, 6, 31-40. (*In Nutrition Abst.* 27, 5832, 1957).
- LEISNER, G. (1957/58). Calf feeding experiment with a reduced amount of whole milk. *Jahrb. Areitgemeinschaft*, 1, 223-231. (*In Nutrition Abst.* 29, 6541, 1959).

- MATHIEU, C.M. and WEGAT-LITRE, E. (1962). Methods of distribution of the milk. *Ann. Zootech.*, **11**, 197-207. (*In Nutrition Abst.* **33**, 6988, 1963).
- MYSJUTRINA, M.V. (1963). Increasing early maturing of dairy cattle by intensive rearing of calves. *Zivotnovodstvo*, No. 7, 68-71. (*In Nutrition Abst.* **34**, 3214, 1964).
- NOLLER, C.H., CROWL, B.W. and LUNDQUIST, N.S. (1957). Whole milk and milk replacer systems for dairy calves. *Purdue Agric. Exper. State Res. Bull. No. 656*, P. 5. (*In Nutrition Abst.* **29**, 6541, 1959).
- RAGAB, M.T. and ABDEL-AZIZ, A.S. (1961). The effect of some environmental factors on body weight and relative growth rate in Friesian calves of Tahreer Province. *J. Anim. Prod. U.A.R.* **1**, 107-120.
- RICHTER, K., CRANE, K.L. and ANTONI, J. (1957). I-Reading calves with graded amounts of whole milk. *Zuchtungskunde*, **29**, 191-199. (*In Nutrition Abst.* **28**, 1391, 1958).
- RICHTER, K., CRANE, K.L. and ANTONI, J. (1958). 2. Rearing Calves with graded amounts of whole milk. *Zuchtungskunde*, **30**, 319-324. (*In Nutrition Abst.* **29**, 3212, 1959).
- RICHTER, K., CRANE, K.L. and ANTONI, J. (1959). 3. Rearing calves with graded amounts of whole milk. *Zuchtungskunde*, **31**, 153-157. (*In Nutrition Abst.* **29**, 6540, 1959).
- SIMONJAN, H.M. (1957). Influence of different types of feeding on growth and development of calves. *Trudy Armjansk. Inst. Zivot. Vet. 2, Zivot. Korm. No. 6*, 19-32. (*In Nutrition Abst.* **31**, 1422, 1961).
- VAN MARLE, J. (1963). Effect of three levels of milk-feeding on the growth, development and carcass quality of Friesian steers. *S. African J. Agric. Sci.*, **6**, 475-483. (*In Nutrition Abst.* **34**, 4759, 1964).
- VILLINGER, O. (1956). *Minimum nutrient requirements of, and feed conversion by, young cattle*. Institut Fur Tierzucht and Milchwirtschaft an der Justus-Liebig-Hochschule, Giessen, P. 76. (*In Nutrition Abst.* **28**, 1958).
- WHITAKER, R.T., MILLER, W.J., CARMON, J.L. and DALTON, I.L. (1957). Influence of level and source of crude fibre in calf starters on weight and feed consumption. *J. Dairy Sci.*, **40**, 887-892.

((تغذية عجول الفريزيان اثناء فترة الرضاعة))

السيد رفعت ابو حسين ، محمد على رافت ، محمد ابراهيم سالم

المخلص

اجريت هذه التجربة على ٦٦ عجل وعجلة فريزيان (٣١ ذكر ، ٣٥ انثى) لدراسة انسب الاحتياجات الاقتصادية لنمو العجول الفريزيان اثناء فترة رضاعة استغرقت ٢٤ اسبوع . ولقد قسمت حيوانات التجربة الى مجاميع حسب المعاملات الغذائية المختلفة طبقا لكميات اللبن ومواد العلف المستخدمة . ولقد قدم السرسوب واللبن يدويا لكل حيوان على حدة بطريقة الجردل .

وتشير النتائج الى ان ٦٨٠ كيلو جرام لبن كامل بالاضافة الى ١١١٤٤ كجم معادل نشا من مواد العلف النباتية وبقيمة نشوية كلية قدرها ٢١٢٨٨ كجم كانت اكثر المعاملات اقتصادا او افضلها استفادة . ولقد كانت القيمة الحرارية للبن المفدى عليه في هذه المعاملة هي ٤٢٣٦٤٠ سعرا كبيرا . وكان متوسط الزيادة اليومية للذكور وهو ٧٢٥ر. كجم (٦٤٩ر. - ٧٩٢ر. كجم) يزيد بمقدار ٧٪ عنه في الاناث الذي بلغ ٦٧٧ر. كجم (٦٥٥ر. - ٧٢٦ر. كجم) .

* قسم الانتاج الحيوان (فرع التغذية) كلية الزراعة . جامعة القاهرة .