

## The Effect of Feeding a Milk Replacer on the Growth and Feed Utilization of Buffalo Calves

W.H. Abdel-Malik, M.S. Saïeh Youssef, A.M. Makky and H. Abdel-Haleem

*Animal Nutr. Res. Sec., Animal Prod. Dept., Min. of Agric. and Mahallet-Mousa Anim. Prod. Station, Minis. of Agric., Kafr El-Sheikh, Egypt.*

A COMPARATIVE feeding trial was conducted involving 50 male buffalo calves. After the colostrum period, they were divided into two equal groups. The control group was fed whole milk and the other group was given an imported milk replacer. They were weaned at 15 and 12 weeks of age, respectively. In addition, berseem hay and a concentrated mixture were fed ad libitum.

During the first 15 weeks of age, the average daily live weight gain was practically the same, being 0.493 and 0.523 kg. for the control and the milk replacer groups, respectively. The control group significantly consumed more energy than the tested one. The average daily S.E. was 1.110 and 0.944 kg respectively. Consequently, the milk replacer group was significantly more efficient in energy utilization than the control group. Each one kg live weight gain required 1.613 and 2.301 kg S.E. in the two groups, respectively. Feeding costs per calf were 21.3 and 11.3 L.E. for the control and the milk replacer groups, respectively, involving a reduction of about 50%.

It was concluded that milk replacers could successfully be used in rearing male buffalo calves, which might participate in solving meat shortage in Egypt.

In Egypt, there is a shortage in animal foods which pushes the country to depend partly on imports. It has been claimed that by delaying the slaughter of young male buffalo calves, usually killed at 40 days of age until they reach 18 months old, a great increase in meat production can be attained. This would solve the greatest part of the meat shortage problem. The main reasons for early slaughter of male buffalo calves are the economic factors and the insufficiency of milk for human consumption. Therefore, any reduction in the quantities of whole milk consumed by calves during their suckling period, will be of great importance. This can be achieved by shortening the suckling period or replacing the whole milk by other constituents cheaper than milk. This will encourage the farmer to delay slaughtering his calves, gaining more profit for him and more meat for consumers.

The present study was carried out to investigate the practice of using an imported milk replacer in rearing male buffalo calves and its effect on growth performance, feed efficiency and cost in comparison to the normal whole milk practice.

### Material and Methods

This investigation was carried out in Mahallet-Mousa Animal Production Station, belonging to the Ministry of Agriculture. The experiment comprised 50 male buffalo calves, born from September 26 to October 31, 1969. They were divided into two equal groups and reared in individual boxes.

All calves were fed on colostrum during their first three days of life. Then one group (control) was given whole milk (349.3 kg) during a suckling period of 15 weeks along with the usual farm concentrate mixture (25% decorticated cottonseed cake, 25% maize, 25% rice bran, 11% linseed meal, 10% wheat bran, 2% limestone, 1% bone meal, 5.0% salt and 5.0% mineral mixture). The second group was fed an imported milk replacer (Fokkamel) and a concentrate mixture (WAFI) and weaned at 12 weeks of age. Whole milk and milk replacer were fed according to the schedule in Table 1. The control calves received fresh whole milk twice daily at about 8 a.m. The milk replacer group suckled three times daily (7 a.m., noon, and 4 p.m.) up to the first six weeks, then twice daily afterwards. Rubber suckles were used to get the calves quickly accustomed to drink out from a bucket. Berseem hay and concentrated mixtures were fed adlib to both groups. Feeds and milk consumption were recorded daily for each calf.

Individual body weights were recorded at birth and every fortnight up to 15 weeks old.

Representative samples of the experimental feeds were taken and analyzed using the A.O.A.C. methods (1960). For calculating the nutritive value of all feeds, except the WAFI concentrated mixture, the digestibility coefficients published by our department of the Ministry of Agriculture (1968) were applied. The feeding value of the WAFI concentrate mixture was reported by the manufacturers. The proximate analysis and calculated nutritive value of the feeds used are given in Table 2. Statistical analysis were carried out after Snedecor (1956).

### Results and Discussion

The average daily feeds and feed values consumed per calf by the control and milk replacer groups from birth up to 12 and to 15 weeks of age are shown in Table 3. The milk replacer group consumed slightly more hay, but considerably more concentrate mixture than the control group. The former group consumed, on the average, from the concentrated mixture 2.43 and 1.90 times as those for the latter group during the periods from birth to 12 and to 15 weeks of age, respectively.

*Egypt. J. Anim. Prod.*, 14, No. 2 (1974).

TABLE 1. Daily milk and milk replacer allowances.

Weeks	Whole milk group	Milk replacer group	
	Ins kg	Water L.	Milk replacer kg
1	4.1	3	0.450
2	4.5	4	0.600
3	5.0	5	0.750
4	5.4	6	0.900
5	5.0	6	0.900
6	4.5	6	0.900
7	4.1	5	0.750
8	3.6	5	0.750
9	3.2	4	0.600
10	2.7	4	0.600
11	2.3	3	0.450
12	1.8	2	0.300
13	1.4	—	—
14	1.4	—	—
15	0.9	—	—
Total . . . . .	349.3	371	55.650

This might be a compensation for the lower daily amount of energy offered to calves from the milk replacer than from the whole milk, being 0.537 against 0.915 kg S.E., during the first 12 weeks and 0.430 against 0.797 kg S.E., from birth up to 15 weeks.

The milk replacer group was weaned three weeks earlier than the control. Therefore, they markedly increased their daily consumption from the concentrated mixture. However, hay consumption did not considerably change due to the limited capacity of the rumen of the calves during this early stage of life.

TABLE 2. Proximate analysis and nutritive value of feeds.

Feedstuffs	Proximate analysis						Nutritive value	
	DM	CP	EE	NFE	CF	A sh	SE	DP
			%	%	%	%	%	%
Buffalo whole milk . . . . .	16.81	4.21	6.38	5.41	—	0.81	23.93	3.98
Concentrated mixture . . . . .	89.66	20.65	4.00	47.24	7.47	10.31	66.70	17.16
Milk replacer . . . . .	92.44	22.05	17.94	44.65	—	7.80	81.04	20.60
Wafi concentrated mixture	86.60	16.97	2.80	53.48	5.67	7.68	66.00	13.50
Berseem hay . . . . .	89.50	14.18	1.92	34.01	28.24	11.15	31.84	8.96

TABLE 3. Average daily feed consumption and nutritive value (kg)

Item	Feedstuffs			Nutritive value	
	Milk	Hay	Concentrate	SE	DP
<i>From birth to 12 weeks of age</i>					
Whole milk group (Control) . . . . .	3.822	0.336	0.173	1.136	0.230
Milk replacer group	0.663*	0.379	0.420	0.935	0.228
<i>From birth to 15 weeks of age</i>					
Whole milk group (control) . . . . .	3.330	0.327	0.314	1.110	0.215
Milk replacer group	0.530*	0.378	0.597	0.944	0.228

\* dry milk replacer, each 1 kg = 6.66 kg fluid

The nutritive value of the daily ration consumed by the milk replacer group was significantly ( $p < .01$ ) lower than that for the control group during both periods from birth to 12 and to 15 weeks of age. The data in Table 3 also show that the daily digestible protein consumed by calves in both groups and in both periods was practically the same.

The average body weights, total gain, daily gain, relative growth rate and feed efficiency of calves in both groups from birth up to 12 and 15 weeks

of age are presented in Table 4. Calves on the whole milk group gained slightly less than the milk replacer group, being 3.6 and 5.7% lower during the periods from birth up to 12 and to 15 weeks of age, respectively. These differences were found to be statistically not significant. The average daily gain of buffalo calves found in this investigation was higher than that reported by Youssef *et al.* (1969), about the same as those reported by Ghoneim *et al.* (1957) and Youssef *et al.* (1971), but it was lower than that found by Abdel-Malik (1964) and Ahmed and Tantawy (1954) for male buffalo calves during comparable periods of age. The differences are normal and may be attributed to genetic factors and to differences in the management practices.

TABLE 4. Average body weights, gains, relative growth rate and feed efficiency.

Item	Average birth weight kg	Average final weight kg	Average total gain kg	Relative growth rate* %	Average daily gain kg	Feed efficiency	
						SE kg	DP kg
<i>From birth to 12 weeks of age</i>							
Whole milk group (control)	40.8	86.8	46.0	112.8	0.544	2.124	0.411
×	± 0.667	± 1.841	± 1.313	—	± 0.015	± 0.06	—
Milk replacer group	36.9	84.3	47.4	128.5	0.564	1.664	0.395
×	± 1.246	± 1.311	± 0.776	—	± 0.030	± 0.025	—
<i>From birth to 15 weeks of age</i>							
Whole milk group (control)	40.8	92.8	52.0	127.5	0.493	2.301	0.434
×	± 0.667	± 2.162	± 1.829	—	± 0.015	± 0.063	—
Milk replacer group	36.9	91.9	55.0	149.1	0.523	1.813	0.422
×	± 1.246	± 1.487	± 1.122	—	± 0.034	± 0.030	—

× Standard error of the mean.

\* % gain from birth weight.

Concerning feed efficiency, it was found that the milk replacer group was significantly ( $P < 0.01$ ) more efficient than the control group in energy utilization of the ration. Each kg of body weight gain required 2.124 and 1.664 kg S.E. during the first 84 days, and 2.301 and 1.813 kg S.E. during the whole 105 days of experiment, for the control and milk replacer groups, respectively. This means that the latter group required 21.7 and 21.2% less S.E. than the former, during the two periods, respectively, without any harmful effect on their growth. This might indicate that the amount of S.E. offered per calf in the whole milk group was more than the growth

capacity of the animals. These findings are in harmony with those reported by Ghonein *et al.* (1956, & 1963), Ahmed and El-Shazly (1960), Borhani *et al.* (1967 a & b), Abdel-Malik (1964) and Agabawi *et al.* (1968). Although the differences in energy utilization were found to be statistically significant, the two groups converted the digestible protein of the ration at nearly the same efficiency.

The feeding costs per calf and per kg of body weight gain from birth up to 12 and to 15 weeks of age for the whole milk and milk replacer groups are shown in Table 5. For calculating feeding costs, the following prevailing prices of feeds used (per ton) were in (L.E.) : buffalo whole milk 57.00, milk replacer 133.50, WAFI concentrated mixture 55.00, usual concentrated mixture 28.25 and berseem hay 12.00. It is evident that feeding the milk replacer to calves succeeded in reducing feed costs by about one half, per kg of gain. It was also found that by using the milk replacer instead of whole milk ; 9.3 and 9.9 L.E. could be saved from the feeding costs of every calf up to 12 and to 15 weeks of age, respectively.

TABLE 5. Feeding costs per calf and per kg of gain up to 12 and to 15 weeks of age.

Item	Whole milk group		Milk replacer group	
	up to 12 weeks	up to 15 Weeks	up to 12 weeks	up to 15 weeks
Cost of feeds/calf (L.E.)	19.035	21.273	9.760	11.363
Cost 1 of kg of live weight gain (L.E.) . . . .	0.414	0.409	0.206	0.207

It can be concluded that using the milk replacer (Fokkamel) under the prevailing conditions throughout the experiment succeeded in rearing male buffalo calves with nearly half feeding costs, in comparison to whole milk. This may encourage farmers to delay slaughtering their male buffalo calves for older ages. Applying milk replacers in rearing calves will save milk for human consumption and will share in solving the problem of meat shortage in Egypt. However, the country must not depend on imported milk replacers and efforts must be done to produce them locally. Studies are needed to find out the best milk replacer formulas.

Further studies on both buffalo and cow calves are also needed to investigate further reduction in weaning time and the ideal amount of milk replacer which would give the best economical results.

*Acknowledgment*

We like to express our deepest thanks and gratitude to Dr. A.A. El-Itirby, Under-secretary of the Ministry of Agriculture for his interest and encouragement. We are also grateful to Mr. A.R. Moustafa, Chief Manager of Sakha and Mahallet-Mousa, Animal Prod. Stations and Mr. S. Emara, for their co-operation and facilities offered during the course of this investigation. Thanks are also due to Wessanen Animal Feeds International (W.A.F. I.) Co., Netherlands, for providing the milk replacer and the concentrate mixture (WAFI) and to their representative Mr. J.A. Westerbeeck, who helped in calves management.

## References

- Abdel-Malek, W.H. (1964) *Nutritional studies on the early weaning of Egyptian calves with reference to food requirements*. M. S. Thesis, Fac. of Agric. Cairo University.
- Agabawi, K.A., El-Sayed Osman, H., and Abou-Akkada, A.R. (1968) Feed efficiency, ruminal activity and effects of some blood constituents of early weaned calves. *J. Dairy Sci.*, **51**, 744.
- Ahmed, I.A. and El-Shazly, K. (1960) Early weaning in cow and buffalo calves. *J. Agr. Res.*, **8**, 217.
- and Tantawy, A.O. (1954) Growth in Egyptian cattle during the first two years of age. *Alex. J. "Agric" Res.* **2**, 1.
- A.O.A.C (1960) *Official methods of analysis*, 9th ed. Washington D.C.
- Borhami, B.E.A., Abou Akkada, A.R., El-Shazly, K. and Ahmed, I.A. (1967a) Effect of feeding broken rice grains and decorticated cotton-seed meal on feed efficiency, ruminal activity, and blood constituents of early weaned buffalo calves. *J. Dairy Sci.*, **50**, 1142.
- , El-Shazly, K., Abou Akkada, A.R. and Ahmed, I.A. (1967b) Effect of early establishment of ciliate protozoa in the rumen on microbial activity and growth of early weaned buffalo calves. *Dairy Sci.*, **50**, 1654.
- Ghoneim, A., Abu-Raya, K.A. and Abou-Hussein, E.R.M. (1963) Feeding suckling calves in Egypt on a certain level and reduced allowances of milk. *proceedings of the 2nd Animal Prod. Conf. Cairo, Vol. 1*, P. 275-283.
- , Raafat, M.A., Abu-Raya, A.K., and Abou-Hussein, E.R.M. (1956) Economic food requirements for growing calves during the suckling period. *Cairo University, Faculty of Agric. Bull.* **94**.
- , —, —, — and — (1957) Study of growth in Egyptian cows and buffaloes up to 1½ years old. *Cairo University Faculty of Agric. Bull.* **133**.
- Snedecor, G.W. (1956) *Statistical Methods* 5th ed. Iowa State College Press. Ames, Iowa, U.S.A.
- Youssef, M.S.S., Makky, A.M., Abdel-Malik, W.H., Shehata, E.I., and Bakeer, A.A. (1969) The effect of some artificial flavours on the growth and feed utilization of buffalo and Friesian calves. *Agric. Res. Rev., Cairo*, **47**, 108.
- , —, El-Dahaby, A.H., Abou-Salem, I. and Ali, I.G. (1971) The effect of introducing seaweeds in the rations of suckling calves on growth and feed utilization (unpublished data).

## تأثير التغذية ببديل اللبن على النمو والاستفادة بالفناء في العجول الجاموسى

وهبه حنا عبد الملك ، محمد السعيد صالح يوسف ، عبد المنعم مكي

و ح ، عبد الحليم

معهد بحوث الانتاج الحيوانى ، وزارة الزراعة

أجريت تجربة تغذية مقارنة شملت ٥٠ من العجول الذكور الجاموسى  
قسمت الى مجموعتين متساويتين بعد انتهاء فترة السرسوب وقد غذيت مجموعة  
المقارنة على اللبن الكامل والمجموعة الاخرى على بديل لبن مستورد وبالإضافة  
الى ذلك أعطى دريس البرسيم ومخلوط مركز حتى الشبع . وقد فطمت  
عجول المجموعتين في عمر ١٥ ، ١٢ أسبوعا على التوالي .

وفى خلال الخمسة عشرة أسبوعا الأولى من العمر كان متوسط الزيادة  
اليومية في وزن الجسم ٤٩٦ر . ٥٢٣ر . كجم لمجموعتى المقارنة وبديل اللبن  
على التوالي .

وقد استهلكت مجموعة المقارنة وبصفة مؤكدة قدرا من الطاقة أكبر من  
المجموعة الاخرى حيث كان المتوسط اليومى ١١١٠ر ، ٩٤٤ر . كجم معادل  
نشأ لهما على التوالي وبذلك كانت مجموعة بديل اللبن أعلا كفاءة فى الاستفادة  
بالطاقة من مجموعة المقارنة وقد لزم ٨١٣ر ، ٢٣٠١ر كجم معادل نشأ فى  
المجموعتين على التوالي لإنتاج الكيلوجرام من الزيادة فى وزن الجسم وقد  
بلغت تكاليف تغذية العجل الواحد ٤٦٣ر ، ١١٤ر جنيها مصريا لمجموعتى  
المقارنة وبديل اللبن على التوالي مما يتضمن خفضا قدره ٥٠٪ .

وقد استنتج أنه يمكن بنجاح استعمال بديلات اللبن فى تنشئة العجول  
الذكور الجاموسى مما يسهم فى حل مشكلة نقص الحلوم فى مصر .