Egypt. J. Anim. Prod. 23, No. 1-2, pp. 159-165 (1983)

Responses of Early Weaned Buffalo Calves to Three Improved Starters in Comparison with Rearing on Milk Replacer

M. T. Ragab and M.E. Lasheen

Dept. Anim. Prod., Fac. Agric., Cairo and Al-Azhar Universities, Egypt.

THREE newly improved starters were formulated and used for three groups (1,2 and 3) of buffalo calves(Av. live weight 70kg each) purchased from the local market resembling the calves usually obtained for meat production project known as Betello project. A fourth group (group 4) of calves was fed on an imported milk replacer. Each group contained 10 calves. Starters contained different levels of skim milk, cotton seed cake and linseed cake. No significant differences (/ 0.05) were found between groups in average daily weight gain or days required to reach a final live weight of 90 kg. which were 379, 393, 401, 389 g and 58, 51, 54, 53 days for groups 1,2,3, and 4 respectively. Group 3 which received a starter of the lowest skim milk level (35, 25, 15% for groups 1,2 and 3) and highest cotton seed and linseed cakes (15, 20 and 25% for groups 1,2 and 3) showed the lowest cost of starter and cost of gain as well as the best feed efficiency. Market calves used for meat production projects were of developed rumen. The results arrived at stand by the early weaning systems and feeding on starters instead of milk replacers.

Corresponding to the great annual increase in population (one million/10 months). Egypt is facing a sharp shortage in meat and milk. On the other hand the slaughter of females became a common practice regardless of the law which protects their slaughter. Moreover, slaughtered young buffalo males in slaugter houses amounted to 555000 heads per year.A large number of these calves is slaughtered yearly outside the official abbatoirs. Assuming that one million heads of young male and female calves: about 70,000 tons of live weight :were not killed and saved until reaching 300 kg Live weight per head, an extra 230, 000 tons will be obtained, which is nearly equal to what the country imports each year (Lasheen 1980 and Safwat, 1980).

Milk replacers were used in raising new buffalo calves in an attempt to economize the cost of calf raising and save natural milk for human consumption (Ragab *et al.*, 1978: Lasheen, 1980 and Helali *et al.*, 1981). Meanwhile, according to the Egyptian Company for Meat and Milk Production (Lasheen, 1980) sevral problems impeded the wide applicaton of milk replacers particularly which were related to the performance of buffalo calves obtained from the local market and weighting 50-90 kg live weight. Such calves showed

low viability possibly due to their early weaning before marketing or because they received small amounts of natural milk.Rearing calves on milk replacers using these weaned calves was not successful because of the inhibition of rumen development. On the contrary, Safwat (1980) found that the slow rate of growth for buffalo calves fed on whole milk was due to the need for supplementary food besides the milk, especially after the first two months of age.

The drawbacks of using milk replacers along with the accumulated results showing that rumen could be considered fully functional even at the third week of age (Gilliland *et al.*, 1962: Preston *et al.*, 1957; Preston, 1960 and Gerrada and Labbe, 1975) stand up for the early weaning systems referred to by Gyillespie (1890) and Mead (1924).

This work was carried out to formulate an improved starter which meets the physiological requirments of young buffalo calves, purchased from the local markets at about 70 kg live weight, with emphasis on the quality and quantity of protein as a means to avoid the use of milk replacers. From the stand point of ecconomy in animal production, the increased use of plant protein for feeding dairy calves is also an important goal (Lassiter *et al.*, 1963).

Material and Methods

The present study was carried out on Al-Marg Buffalo Farm, which belongs to the Egyptian Company for Meat and Milk production. A number of 38 buffalo calves (Betollo) purchased from the local market at about 70kg live weight, were divided into four groups, of 10 calves each. After arrival to the farm,calves were individually kept in wooden pens in the reception room. Antibiotics were given orally. The first three groups were fed on the newly formulated improved starters (Table 1), while the control group (group 4) received imported milk replacer(D.M.V) usually used by the company and had an improved starter (Table 2). As shown in Table 3, calves of groups 1,2 and 3 received the improved starter from arrival to the farm until reaching 90 kg live weight.

Results and Discussion

A. composition of the improved starters

Table 1 presents the source and level of starter components. Three different levels of animal proteins:being 15,25 and 25% and three different levels of plant proteins (cotton seed cake and linseed cake) were used. Levels for cotton seed cake or linseed oil cakes were I5,20 and 25%. The decline of animal protein was accompanied by the increase of plant protein from both cotton seed and linseed oil cakes. The percent of skim milk was higher (35%) than for both cakes (30%) only in group I. The reverse was found for groups 2 and 3, where skim milk was lower (25 and 15%) than the percent of both cakes (40 and 50%). Barley which may be considered as aprotein supplement was added by (13%) for the three improved starters equal amounts of yellow corn : (10%) and rice bran (8.0%)were also incorporated. Formulation of the improved starters (Table 1) is questionable until growth

and performance were studied in as much as according to Stein *et al.*(1954) and Fries *et al.*(1958) who found that growth from plant protein alone was usually unsatisfactory. Nevertheless, Lassister *et al.* (1963)obtained acceptable rates of growth for calves fed on a mixture of plant and milk protein. Besides, Lasheen (1980) reported that the increase of rice glutin (plant protein) in the milk replacers given for dairy buffalo calves on account of the animal protein (skim milk) reduced the daily weight gains.

From Table 1 it could be noticed that starters showed nearly the same crude protein which were 26.49 and 27.13% for groups 1,2 and 3 respectively. Digestible protein, starch equivalent and fiber content were 21.83, 22.16, 22.50, 62 10, 64.01, 65.93 and 4.08, 4.70, 5.31% respectively. This indicated that starters were not different in the levels of crude protein, digestible protein or starch equivalent and also veriations in the fiber content were low. This gives ideal starters to study the effect of protein source and protein quality of the growth and performance of young buffalocalves in as much as quantitative variations were excluded.

A study conducted by Archiball (1928) on raw and cooked calf meals indicated that 9-weeks old calves were able to digest feeds almost as well as adult cattle. But, according to the National Research Council recommendations (N.R.C.,1966), calves weighing 75 and 100 kg required 360 and 410 gdigestible protein respectively for maintenance 1,0 kg weight gain per day. From Tables 1 and 3 the amount of daily consumption of protein was about 330 g for calves of 70— 80 kg live weight and was 440 g for calves weighting 80 —90 kg. : this was in accordance with the recommendations given by the N.R.C. (1966)

TABLE 1. **Composition of the improved starter.**

Ingredients %	1	2	3
Skim milk dried	35	25	15
Cotton seed cakes	15	20	5
Linseed cake	15	20	25
Barly	13	13	13
Yellow corn	10	10	10
Rice bran	8.0	8.0	8.0
Limestone	2.0	2.0	2.0
Mineral salts	1.5	1.5	1.5
Vitamins	0.5	0.5	0.5
Crude protein.*	26.38	26.49	27.13
Digest. protein	21.83	22.16	22.50
Starch equiv	62.10	64.01	65.93
Fiber	4.08	4.70	5.31

* Calculated according with Ministry of Agric. (1968).

TABLE 2. **Composition of the calf starter.**

Ingredients	%
Ground maize	24
Decorticated cotton seed meal	15
Linseed cake	15
Rice bran	15
Beans meal	10
Wheat bran	14
Dried clover meal	4
Mineral salts	2
Limestone powder	1
Crude protein (gm/kg)*	230
Digestion protein (gm/kg)	173
Starch value (gm/kg)	723
Fiber (gm/kg)	66.5

* Calculated according to Ghoneim, A. (1967).

TABLE 3. **Feeding system.**

Animal weight(kg)	Starter g*	Hay	Water
50 — 60	750	200	ad-Libitum.
60 — 70	1000	300	
70 — 80	1250	400	
80 — 90	1500	500	

* Calculated according to N.P.C. (1966).

about 330 g for calves of 70 - 80 kg live weight was 440 g for calves weighting 80 - 90 kg : this was in accordance with the recommendations given by the N.R.C. (1966).

B. Performance of calves during the first period (From 70 to 90 kg live weight)

Results in Table 4 show the performance of buffalo calves fed on three improved starters and imported milk replacer during the first period, *i.e.* until reaching about 90 kg live weight.

From Table 4 it could be noticed that the average initial weight of calves was similar being 70.4, 70.3, 70.4, and 90.0 kg per head for groups 1,2,3 and 4 respectively. Average final weight per calf was aslo the same : being 91·5, 90·8, 92·2 kg respectivley . Statisitcal analysis showed no significant difference (P/0.5) for the time required to attain 90 kg weight : being 56, 51 and 535 days for groups 1.2.3 and 4 respectively. Similarly, no significant differences between the average daily gains were found. These were 379, 393, 401, and 389 g respectively. The average daily gain for the different groups was 379-401 g hich fell in the range given by El-Ashry *et al.* (1973) which was 343-438 g for buffalo calves fed on milk replacers. Abd El-Rahman (1966) stated that the average daily gain for male buffalo calves, fed on different levels of milk during a suckling period of 126 days was between 350-490 mg. The level of skim milk (animal protein) was lowest (15%) and cotton seed cake (25%) and linseed cake (25%) were highest for the starter given to group 3 when compared with group 1 or 2 and the average daily gain tended to be higher (401 g) than for groups 1 or 2 (379-393) g). It could be concluded that high

TABLE 4. **Performance of buffalo calves fed on improved starter.**

	1	2	3	Control
Number of calves	10	9	10	9.0
Initial weight (kg)	70.4	70.8	70.4	70.0
Final weight (kg)	91.5	90.8	92.2	91.2
Total gain/calf (kg)	21.1	20.0	21.8	20.8
Av days fed	55.7	51.1	54.3	53.4
Av. daily gain (gm)	0.379	0.393	0.401	0.389
Consumed starter/calf (kg)	100	91.7	90.8	53.4
Consumed milk repl. powder, kg	—	—	—	20.2
Feed efficiency				
kg starter/kg gain	4.8	4.5	4.1	—
kg digest. protein/kg gain	1.034	1.016	0.947	—
Prime cost of starter, mill/kg	200	140	110	115
Prime cost of milk replacer,mill/kg powder	—	—	—	800
Prime cost of gain, mill/kg gain	960	640	500	1090

level of skim milk was not necessary for the rearing of calves purchased at 50 - 80 kg live weight from the local martket . These calves were mostly marketed after receiving some concentrated or dry feeds and low amounts of natural milk which possibly enhanced the development of the rumen. Such calves of relatively developed rumen were capable of digesting and utilizing plant proteins (in cotton seed and linseed cakes).

That market buffalo calves (50 - 80 kg live weight) efficient y utizilied plant protein was also conflrmed by the results concerning the consumed starter and feed efficiency given in Table 5. Amount of consumed starter in kg per calf was proximate for groups 2 and 3 (91.7 90.8 respectively), while it was markedly higher for group 1 (100). Similarly, calves of groups 1 which were fed on starter of highest Skim milk level showed low feed efficiency value compared to groups 2 and 3. The amount of consumed starter/kg gain was 4·8,4·5 and 4·1 respectively, while digest protein/kg gain was 1·034, 1·016 and 0.937 respectively.

The cost of starter was remarkably high as the skim milk level increased which was 200, 140 and 110 mill/kg for groups 2, and 3 respectively. On the other hand group 3 where cost of starter was lowest : being 110 mill/kg. in contrast with 640 and 960 mill/kg for groups 2 and 1 respectively. Hence the starter given to group 3 was superior with regards to both its cost and cost of gain. It should be noticed that the gain was markedly high (1090 mill/k when compared with feeding buffalo calves on the improved starters (500-960 mill/kg) suggesting that early weaning and feeding on starter instead of milk replacer is a practice which should be applied for meat production projects which obtain their calves from Egyptian markets at 50-80 kg live weight.

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استجابة عجول الجاموس للفطام المبكر على البادىء المحسن مقارنة بالرضاعة على بديل اللبن ٠

محمد توفيق رجب ومحمد السعيد لاشين

قسم الانتاج الحيوانى ـ زراعة القاهرة ـ زراعة الأزهر

استخدام ثلاث تركيبات مختلفة من البادىء المحسن لتغذية ثلاث مجموعات من عجول الجاموسى (البتلو) المشتراه من الأسواق بمتوسط وزن ٧٠ كجم ـ استخدام عدد ٤٠ عجل جاموس قسمت الى أربع مجموعات ، وكانت المجموعة الرابعة للمقارنة بالتغذية على بديل اللبن ٠

أحتوت تركيبات البادىء الثلاث على نسب مختلفة من لبن الفرز المجفف، كسب القطن وكسب الكتان ٠

لم تلاحظ فروق معنوية بين المجموعات الأربع لمعدل النمو أو العدد الأيام اللازمة للوصول الى وزن ٩٠ كجم ٠

كان معدل النمو اليومى ٣٧٩ ، ٣٩٣ ، ٤٠١ ، ٣٨٩ جم للمجموعات ١ ، ٢ ، ٣ ، ٤ ، على الترتيب وكان عدد الأيام اللازمة للوصول لوزن ٩٠ كجم هى ٥٨ ، ٥١ ، ٥٤ ، ٥٣ يوم للمجموعات الأربع على الترتيب ٠

لوحظ انخفاض تكاليف النمو وارتفاع معدل الكفاءة الغذائية للعجول تبعا لانخفاض نسبة لبن الفرز المجفف المستخدم فى البادئات الثلاث ، مما يوضح تطور الكرش وعدم أحتياج العجول لمصدر بروتين حيوانى ٠

من النتائج السابقة يتضح أنه يمكن تطبيق وتوافق نظام الفطام المبكر لعجول الجاموس البتلو المشتراه من الأسواق بوزن ٦٠ ـ ٧٠ كجم بأستخدام البادىء المحسن بدلا من أستخدام بديل اللبن المستورد والذى لايتفق مع أحتياجات وطبيعة تركيب كرش العجول فى هذه المرحلة ٠