PRODUCTIVE PERFORMANCE AND SOME BLOOD PARAMETERS OF BUFFALO CALVES RAISED ON DIFFERENT FEEDING REGIMES FROM BIRTH TILL WEANING

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SUMMARY

Twenty one newly born male and female buffalo calves (12 males + 9 females) were divided depending on weight and sex into three similar groups. The effects of replacing half the requirements of buffalo milk with either soybean meal and ground corn or linseed meal and ground corn mixtures on their productive performance and some blood serum parameters were studied. Calves received experimental diets when 3 days of age up to weaning at 15 weeks of age. The first two weeks were considered as adaptation period. The experimental diets were as follows:

- *Group A: 100 % of allowances from buffalo milk (Control).*
- *Group B: 50 % of allowances from buffalo milk plus 50% of allowances from a concentrate mixture 1 which comprised 70 % ground soybean meal and 30% ground corn.*
- *Group C: 50 % of allowances from buffalo milk plus 50 % of allowances from a concentrate mixture 2 which comprised 65 % ground linseed meal and 35% ground corn.*

Calves were fed milk individually while soild feeds (starter and berseem hay) were fed ad libitum in groups from the start of the trial till weaning at 15 weeks with water available all time. Daily feed intake (for each group) and weekly body weight (for each calf) were recorded. At the 15th week of age three digestibility trials were carried out using 3 male calves in each. Blood samples were collected at ages 15, 60 and 105 days and total protein, globulin and total lipids were determined.

Results indicated the following

- *Dry matter, CP and EE digestibilities of group A were significantly($P<0.05$) higher than those for the other groups.*
- *Calves of group A had the highest values of average daily intake as DM, TDN and CP while group C had the lowest one.*
- *No significant effect of feeding regime was found on daily gain of buffalo calves.*
- *Calves of group B had the best feed conversion as Kg DM, TDN and CP/kg gain, meanwhile, group A expressed the poorest one.*
- *Blood analysis showed significant increase in concentration of globulin in group C and AST activity in group B when compared with the others. Meanwhile concentration of total protein, albumin, total lipids and ALT activity did not exhibit any differences. Such blood traits tend to increase with the advance of age, except for blood globulin and ALT enzyme activity where the contrary was true.*

• *Less feeding cost of kg gain was recorded for groups B and C, while the most expensive kg gain cost was that for group A .*

It be concluded that, both conventional and non conventional raising of buffalo calves are equally effective for enhancing preweaning calves growth. Therefore, up to 50% of buffalo milk of suckling buffalo calves can be replaced by either concentrate mixture 1 (70% ground soybean meal and 30% ground corn) or concentrate mixture 2 (65% ground linseed meal and 35% ground corn) without any adverse effects on productive performance and some blood serum parameters. Reducing feeding costs due to reduction of the amount of suckling milk, may help in the relief of the problem of milk shortage in Egypt.

Keywords: Suckling buffalo calves, soybean meal, linseed meal, corn flour, performance, total protein, total lipids

INTRODUCTION

Buffalo milk production has been estimated at 3.27 million tons in Egypt, (Ministry of Agriculture, 2005). Buffalo milk is in high demand for either direct consumption or for processing. So, its price is the highest compared to that of cows and goats. The amount of whole buffalo milk required during the suckling period (15 weeks) is about 300 – 400 kg. So, most buffalo holders, especially small holders sell young calves as early as possible to save milk for selling. About 45000 heads / year are slaughtered in Egypt, (Mahmoud *et al*., 1994a) which badly affect livestock resources.

Many attempts have been made to save this big number of slaughtered calves per year and reduce the amount of suckling milk at the same time, using milk replacers instead of expensive milk (El-Ashry, 1975; El-Ashry *et al*., 1988 a and b; Campos and Huber, 1983; Mahmoud *et al*., 1994 a and Hegazi *et al*., 2005); reduce the amount of required suckling milk (Ghoneim *et al*., 1963 and El-Bedaway *et al*., 1989); early weaning (Salama *et al*., 1989 and Raghab, 2003); using the cheaper cow milk for buffalo calves (Khattab *et al*., 1989 and Elready, 2006) or using soybean milk (Matter *et al*., 1998 and 2005 and El-Basiony *et al*., 2007) that can enable small holders to save the buffalo milk for selling and raising their calves to appropriate marketing weights.

The objective of this study was to investigate the effects of replacing half the requirements for buffalo milk with either soybean meal and ground corn or linseed meal and ground corn mixtures on the productive performance and some blood serum parameters of suckling buffalo calves in an attempt to reduce feeding costs of rearing.

MATERIALS AND METHODS

This study was carried out at El-Gemmeza Animal Production Research Station, Animal Production Research Institute, Agricultural Research Center, to study the effects of replacing half the requirements for buffalo milk with either soybean meal and ground corn, or linseed meal and ground corn mixtures on the productive performance and some blood serum parameters of suckling buffalo calves in an attempt to reduce feeding costs of rearing.

In this respect, twenty one newly born male and female buffalo calves were used in this study. Experimental calves were randomly divided into three similar groups of

7 calves in each (4 males + 3 females) according to their body weights. Calves were used directly after the colostrums feeding period at three days of age up to weaning (15 weeks old). The first 2 weeks were considered as an adaptation period. The experimental animals were subjected to the following treatments:

Group A: 100% of allowances from buffalo milk (Control).

Group B: 50% of allowances from buffalo milk plus 50% of allowances from concentrate mixture (1) (CM1).

Group C: 50% of allowances from buffalo milk plus 50% of allowances from concentrate mixture (2) (CM2).

Concentrate mixture (1) consists of 70% ground soybean meal and 30% ground corn, while CM2 consists of 65% ground linseed meal and 35% ground corn. Every 1 kg buffalo milk was replaced by 293 gm CM 1 (group B) or 303 gm CM2 (group C). Ground CM1 or CM2 were mixed with amount equal 50% of allowances from milk of each calf at feeding time. Chemical composition of CM1 and CM2 are shown in table (1). The calves were individually fed milk by bucket twice daily from 1 to 10 weeks of age at 8.00 a. m. and at 4.00 p. m. then once daily from 11 to 15 weeks of age. Daily feed allowances of calves from milk were calculated at 10% of calf body weight (Abou-Selim *et al*., 1991). Calves were fed milk individually while the dry feeds (starter and berseem hay) were group fed *ad lib* starting from 2 weeks old of age. Feed residuals, if any, were weighed and the amounts consumed were recorded daily for each group. Clean water was available in free amount. Vitamin and mineral mixture blocks were provided freely. Health condition of calves has been supervise through out the entire experimental period.

Individual live body weight (LBW) was recorded weekly and then total and average daily gain (ADG) was also calculated. Blood samples were taken from all experimental calves at 15^{th}, 60^{th} and 105^{th} day of age after 3 hours of morning feeding. A sample of 15 ml of blood per animal was withdraw from the jugular vein into clean glass tubes and left at room temperature for 45 – 60 minutes, then centrifuged at 4000 r.p.m for 15 minutes. Blood serum was separated into clean dry glass vials and stored at - 20° C until analysis. Representative samples of CM1, CM2, starter, berseem hay and feces were analyzed according to A. O. A. C. (1990). Whole milk samples were analyzed using milko-Scan (133 B. Foss Electronic).

Blood samples were analyzed for the following parameters: total protein (TP), albumin, globulin, aspartate amino acid transferase (AST), albumin transferase (ALT) and total lipids. Total proteins and albumine were determined according to Doumas and Biggs (1972 a & b), and globulin was calculated by subtraction of albumin from the corresponding total protein. The AST and ALTactivities were determined as described by Reitman and Frankel (1957). Commercial kits were used for the calorimetric determination of serum total lipids.

During the experimental period, three digestibility trials were carried out using 3 calves (15 week of age) in each , to determine the digestion coefficients of the experimental rations. Fecal grape samples were taken from the rectum three times daily for five successive days as a collection period. Acid insoluble ash (AIA) was used as natural marker for nutrients digestibility determination (Van Keulen and Young, 1977).

The statistical analysis was computed carried out using analysis of variance procedure described in the SAS (1995). Differences among treatments means were tested for significance by Duncan's multiple range test (1955).

RESULTS AND DISCSSION

Chemical composition:

Chemical composition of feed ingredients and concentrate mixtures expressed as% on DM basis is shown in table (1). The chemical composition of buffalo milk, starter and berseem hay were within the range obtained by Matter *et al*. (1998 and 2005) and El – Ashry *et al*. (2003). Comparing CM1 to CM2 on DM basis indicated that CM1 was lower than CM2 in CF, EE and ash contents but higher in CP and NFE contents. However, CM1 contained nearly the same amount of DM as CM2. Meanwhile, the EE in CM2 was about twice that of CM1. Data showed that, the variations in the chemical composition of tested concentrate mixtures reflected their composition.

Table 1. Chemical composition (on DM basis%) and nutritive value of whole milk, feed ingredients and concentrates mixtures used in the experiment

Items	DM%	Chemical composition,% on DM basis						TDN%
		OM	CP	CF	EE	NFE	Ash	
Buffalo milk	16.81	95.12	23.80	-	39.80	31.52	4.88	23.50
Corn grains	90.48	98.60	9.62	2.30	4.30	82.38	1.40	82.60
Soybean meal	89.20	94.96	43.98	5.59	2.25	43.14	5.04	74.76
Linseed meal	91.30	89.40	33.75	7.85	9.15	38.65	10.60	68.40
Berseem hay	88.17	87.41	14.18	29.18	2.84	41.21	12.59	51.40
Starter	88.38	94.52	17.02	5.62	3.22	68.66	5.48	71.90
CM1	90.45	97.37	19.67	3.60	3.95	70.15	2.63	80.22
CM2	91.10	95.55	18.19	4.35	6.20	66.81	4.45	77.68

* Calculated from tabulated values (A. P. R. I., 1997).

Digestibility coefficients:

Data in table (2) show that, DM, CP and EE digestibilities for group A were significantly ($P<0.05$) higher than for the others. These results may be due to the source of DM in the liquid diets (Akinyele and Harshbarger, 1983) or source of CP (El-Ashry *et al*., 1988b) or both. The reduction in CP digestibility of group C may be due to source of CP (Abou-Raya, 1967). Fonnesback *et al*. (1981) reported that CP digestibility was closely related to dietary CP level and source.

The digestibilities of EE followed the same trend as those of CP. Roy (1974) reported that the source of protein in the diet affects fat digestion, although the mechanism by which the two operate is still unclear. Verdonk *et al*. (2001) reported that replacing all of milk proteins in a veal calve diet led to the decrease of the apparent fat digestibility about of 7, 7, 10, 15 and 10% for wheat gluten, soy protein isolate, soy protein concentrate, soy flour and potato protein, respectively. As shown in table (2), the CF and NFE digestibilities were not significantly different among

groups. These results were in agreement with those obtained by El-Ashry *et al*. (1988b) but were lower than those obtained later by El-Ashry *et al*. (2003).

Table 2. Digestion coefficients (%) of experimental rations by buffalo calves at 15 week of age

Nutrient	Group A	Group B	Group C
DM	72.91[a] ± 0.13	70.70[b] ± 0.28	69.60[b] ± 1.01
CP	76.90[a] ± 0.82	73.29[b] ± 0.48	71.19[b] ± 0.84
CF	49.91 ± 0.72	50.32 ± 0.48	51.19 ± 0.75
EE	83.70[a] ± 0.32	80.64[b] ± 0.34	81.28[b] ± 0.90
NFE	78.50 ± 0.56	79.50 ± 0.46	78.70 ± 0.71

a and b: Means within the same row with different superscripts differ ($p<0.05$).

From the present data, it appear that, the digestibilities of DM, CP and EE decreased after replacing 50% of buffalo milk by concentrates mixtures (CM1 & CM2). Roy *et al*. (1977) stated that the apparent digestibility of DM, CP and EE decreased when non-milk protein was used in the place of milk protein, which agrees with the present study.

Effect of treatments on feed intake:

Data presented in table (3) show that, group A expressed the highest value for DM intake as kg per day (1.752), while group C had the lowest value (1.637). These results are in agreement with those obtained by El-Bedawy *et al*. (1989) with buffalo calves fed milk at levels of 100, 75 and 50% of requirements. El-Bordeny *et al*. (2005) reported intake of 1.53 to 1.74 kg DM/ head/ day for buffalo calves. However, El-Ashry *et al*. (1988a) stated that source of protein had no effect on daily DM intake of buffalo calves fed different types of milk replacers. Fanlkner *et al*. (1994) also found no differences in digestible DM intake as a result of creep feed source. These results may be due to lower DM digestibility for groups B and C which led to an increase of retention time of feed in calves stomachs causing decrease of feed intake. The differences in DM intake may be attributed to the variation in a weight gain of the animals among all groups (Abdel-Raouf, 1999). El-Ashry *et al*. (1988b) found that, the differences in food intake may be due to the differences in body weight, DM of the substitutes and their CP content.

The average daily TDN and CP intake presented in table (3) followed a trend similar to that recorded for daily DM intake. The values were 1.623, 1.451 and 1.405 kg for TDN and 322, 303 and 290 gm for CP for groups A, B and C, respectively. These results agree with those obtained by El-Bedawy *et al*. (1989) and El-Bordeny *et al*. (2005) for buffalo calves.

Effect of treatments on growth performance:

Data concerning means of initial and weaning weights for the different groups are presented in table (4). The mean values recorded for initial and weaning weights were 42.71, 40.00 and 41.00 and 104.29, 100.57 and 99.00 kg for groups A, B and C, respectively. There were no significant differences among groups regarding initial or weaning weights.

Table 3. Average daily intake* of DM, TDN and CP of buffalo calves fed different experimental rations

Items	Group A	Group B	Group C
DM intake, kg/ day:			
From milk	0.501	0.237	0.237
From CM1	-	0.374	-
From CM2	-	-	0.389
From starter	0.886	0.743	0.694
From berseem hay	0.365	0.328	0.317
Total DM intake, kg/ day	1.752	1.682	1.637
TDN intake, kg/ day:			
From milk	0.701	0.332	0.332
From CM1	-	0.334	-
From CM2	-	-	0.333
From starter	0.716	0.600	0.561
From berseem hay	0.206	0.185	0.179
Total TDN intake, kg/ day	1.623	1.451	1.405
CP intake, gm/ day:			
From milk	119	56	56
From CM1	-	74	-
From CM2	-	-	71
From starter	151	126	118
From berseem hay	52	47	45
Total CP intake, gm/ day	322	303	290

* Group feeding (7 calves per each).

Data concerning the average daily gain of calves for the different groups (Table 4) ranged between 644 to 684 gm. Differences were not statistically significant. Calves of group A had the highest gain followed by those of groups B and C, the values being 684, 673 and 644 gm/ animal/ day for the three groups, respectively. These results agree with those obtained by El-Bedawy *et al*. (1989) who reported that, decreasing level of buffalo milk from 100% to 50% from allowances for calves reduced the average daily gain from 633 to 549 gm/ day. Moreover, El-Ashry *et al*. (1988b), showed that the daily live weight gain was reduced by inclusion of non-milk protein in the diet. These results also, agreed with those of Tjardes *et al*. (1998) who reported that calf performance was not significantly affected by intake level. Petit *et al*. (1987) and Longenbach and Heinrichs (1998) reported that any milk replacer with nutrients from vegetable sources (other than milk) decreased growth rate for calves. The results were less than the values obtained by Hilal (1985) who reported that ADG ranged between 593 to 793 gm/ day for buffalo calves. On the other hand the present results were higher than those obtained by El-Ashry *et al*. (1988b) who found that the ADG for buffalo calves fed half of the protein allowances as plant proteins ranged between 413 to 540 gm/ day during the experimental period (9 weeks). Such differences may be due to differences in the length of the experimental periods.

From the previous data, it could be noticed that, there were no significant effects on daily gain of buffalo calves due to feeding concentrates mixtures as substitution of buffalo milk up to replacement rate 50%.

Table 4. Productive performance of buffalo calves fed different experimental rations

Items	Group A	Group B	Group C
Animal weight:			
Initial weight, kg	42.71 ± 1.21	40.00 ± 1.70	41.00 ± 1.63
Weaning weight, kg	104.29 ± 3.60	100.57 ± 3.46	99.00 ± 3.02
Total gain, kg	61.58 ± 3.58	60.57 ± 3.70	58.00 ± 2.46
Average daily gain, g	684 ± 40	673 ± 40	644 ± 30
Feed conversion*:			
Kg DM/ kg gain	2.56	2.50	2.54
Kg TDN/ kg gain	2.37	2.16	2.18
Kg CP/ kg gain	0.471	0.450	0.450

No significant differences among all groups.
* Group feeding (7 calves per each).

Effect of treatments on feed conversion:

Results obtained for feed conversion (kg DM, TDN and CP/ kg gain) are presented in table (4). It was observed that calves of group A were less efficient when compared with groups B and C. On the other hand, calves in group B had the best efficiency as kg DM, TDN and CP/ kg gain. The results showed that calves of groups B and C converted their diets into live weight gain more efficiently than group A. These results agree with those obtained by Nuwagaba and Kayongo-male (1983) who found that, decreasing milk intake from 10% to 5% of body weight improved feed efficiency. The DM, TDN and CP required to produce 1 kg live body gain ranged from 2.50 to 2.56 kg DM, 2.16 to 2.37 kg TDN and 0.450 to 0.471 kg CP. These results were lower for kg CP/kg gain and higher for kg DM and kg TDN/kg gain than those reported by El-Bedawy *et al*. (1989) who reported 0.477 to 0.529 kg CP/ kg gain for buffalo calves fed 100, 75 and 50% milk from allowances. Meanwhile, they reported 2.30 to2.56 kg DM/ kg gain and 1.80 to 2.10 kg TDN / kg gain. These results were similar to those of Matter *et al*. (1998) who found 2.38, 2.02, 2.13 and 1.58 kg TDN / kg gain for buffalo calves fed 100, 65, 50 and zero% buffalo milk from allowances. From the results of the experimental period of rearing buffalo calves, control group A gave the poorest feed conversion values, whereas groups B and C gave the best values.

Effect of treatments on some blood serum parameters:

Data in table (5) show that, neither total protein nor the albumin concentrations were significantly affected by the feeding treatments. However, replacing 50% of milk with CM2 (group C) tended to increase total serum protein compared to the other two feeding treatments (groups A and B). These results are in agreement with those reported by Mahmoud *et al*. (1994b) who stated that the non milk dietary protein did not significantly affect the blood total protein in buffalo calves. The average values of total protein obtained in the present study (Table 5) was affected by age. In this respect; it significantly ($P<0.05$) increased at 60 and 105 days of age compared to that at 15 days old. Mansour (1996) reported that the total protein exhibited a significant gradual increase as the animals progressed in age.

In general, the obtained values for TP (Table 5) were very close to those reported by Mahmoud *et al*. (1994b), Mansour (1996), Terzano *et al.* (1997) and Zia-Ur Rahman *et al*. (1997).

Table 5. Effect of different experimental rations on calves protein fraction and liver function after feeding

Blood components	Age of calves days	Treatments			Overall mean
		Group A	Group B	Group C	
Protein fraction:	15	6.02±0.15	6.98±0.58	6.51±0.28	6.50^{b}±0.34
Total	60	7.66±0.16	6.52±0.16	8.34±0.09	7.50^{a}±0.14
protein	105	6.61±0.25	6.87±0.87	7.75±0.63	7.08^{a}±0.58
(g/dl)	overall mean	6.76^{a}±0.19	6.79^{a} ±0.54	7.53^{a}±0.33	
Albumin	15	3.67±0.26	4.13±0.37	3.80±0.20	3.87^{a}±0.28
(g/dl)	60	4.31±0.41	3.60±0.22	4.05±0.38	3.99^{a}±0.34
	105	3.93±0.29	3.80±0.16	3.40±0.13	4.47^{a}±0.19
	overall mean	3.97^{a}±0.32	3.84^{a}±0.25	3.75^{a}±0.24	
Globulin	15	2.35±0.16	2.85±0.17	2.71±0.08	2.64^{a}±0.14
(g/dl)	60	3.35±0.67	2.92±0.24	4.29±0.58	3.52^{a}±0.50
	105	2.68±0.35	3.07±0.58	4.35±1.56	3.37^{a}±0.83
	overall mean	2.79^{b}±0.39	2.95^{b}±0.33	3.78^{a}±0.74	
Liver function:	15	8.50±0.68	16.00±0.58	10.83±1.17	11.78^{b}±0.81
AST	60	15.00±2.10	25.00±7.24	14.17±4.70	18.06^{a}±4.68
(U/L)	105	13.67±3.03	14.83±1.36	14.33±2.18	14.28^{ab}±2.19
	overall mean	12.39^{b}±1.93	18.61^{a}±3.06	13.11^{b}±2.68	
ALT	15	13.67±1.85	9.66±0.43	13.33±2.37	12.22^{a}±1.55
(U/L)	60	12.00±1.96	10.66±1.73	11.00±1.50	11.22^{a}±1.73
	105	6.66±0.63	8.66±0.63	9.33±0.43	8.22^{b}±0.53
	overall mean	10.77^{a}±1.48	9.66^{a}±0.90	11.22^{a} ±1.43	
Total	15	0.68±0.10	0.69±0.07	0.52±0.01	0.63^{b}±0.06
lipids	60	0.74±0.01	0.66±0.07	0.82±0.01	0.74^{b}±0.03
(mg/dl)	105	1.10±0.13	0.96±0.01	1.12±0.01	1.06^{a}±0.05
	overall mean	0.84^{a}±0.08	0.77^{a}±0.05	0.82^{a}±0.01	

a and b : Means in the same column or row with different superscripts are significantly ($P<0.05$) differed.

Data in table (5) indicate that the increase in the total protein resulted from the increase of the blood globulin rather than blood albumin. It clearly appears that blood globulin in group C was significantly ($P<0.05$) greater than that in groups A and B. An opposite but insignificant trend was found for blood albumin. These finding agree with the results of Larson and Touchberry (1959), Dubinskaya (1984) and Mahmoud *et al*. (1994b).

Data presented in table (5) also show that the AST enzyme activity was significantly ($P<0.05$) affected by the feeding treatments, meanwhile, the activity of ALT did not significantly differ among the experimental groups. In this respect, the greatest value of AST (18.61 U/L) and the lowest ALT value (9.66 U/L) were recorded for group B. This means that using CM1 for replacing 50% of the buffalo milk, seems to be more effective on hepatic function than using CM2.

Data given in table (5) further indicate that ALT activity declined in the experimental groups with the advance of age. An opposite trend was noticed for AST especially in groups A and C .

Concerning the total lipid concentration in the blood of buffalo calves, it is apparent that it was not significantly affected by feeding treatments (Table 5). However, it tended to be the lowest in group B. This may be due to differences in EE content in CM replacing milk. The EE content in CM1 was about 50% of that in CM2 (Table 1).

Effect of treatments on economical efficiency:

Data presented in table (6) show the daily feeding cost (LE/ calf), feeding cost/ kg gain and economical efficiency of the three experimental groups of calves for the experimental period. The cheapest feeding cost / kg was recorded for groups B and C, while the most expensive gain cost was that for group A. It was noticed that feeding cost/ 1kg gain decreased by 39.68 and 37.82% and return/ 1kg increased by 258 and 245% for groups B and C, respectively compared to group A. Better economical efficiency obtained with groups B and C may be due to reducing the amount of expensive milk in groups B and C compared to group A. These results are in agreement with Nuwagaba and Kayongo-male (1983) who found that decreasing milk intake from 10 to 5% of body weight reduced the feeding cost of suckling Friesian and Ayrshire dairy calves during the first three months of age.

Table 6. Economical efficiency of buffalo calves fed different experimental rations

Items	Group A	Group B	Group C
Average daily feed consumption as fed (kg):			
Milk	2.98	1.410	1.410
CM1	-	0.414	-
CM2	-	-	0.427
Starter	1.00	0.841	0.785
Berseem hay	0.414	0.372	0.360
Average daily gain, kg	0.684	0.673	0.644
Daily feeding cost, LE/ head	10.67	6.33	6.25
Feeding cost, LE/ kg gain	15.60	9.41	9.70
Relative cost of kg gain*	100	60.32	62.18
Price of weight gain, LE/ kg	12.31	12.11	11.59
Return, LE	1.64	5.78	5.34
Return, LE/ kg gain	2.40	8.59	8.29
Improving in return/ kg gain	-	258%	245%
Economic efficiency**	1.15	1.91	1.85

* Assuming that feeding cost of kg gain of the control (A) equal 100.

** Economical efficiency = Price of the weight gain/ daily feeding cost.

The price of feedstuffs and body gain:

CM1 = 1510 LE/ ton CM2 = 1500 LE/ ton Starter = 1440 LE/ ton,

Berseem hay =700 LE/ton Buffalo milk = 3000 LE/ ton Body gain = 18 LE / kg .

It can be concluded that, both conventional and non conventional raising of buffalo calves are equally effective for enhancing preweaning calves growth. Therefore up to 50% of buffalo milk of suckling buffalo calves can be replaced by either concentrate mixture 1 (70% ground soybean meal and 30% ground corn) or concentrate mixture 2 (65% ground linseed meal and 35% ground corn) without any

adverse effects on productive performance, and some blood serum parameters. Reducing feeding costs due to reduction of the amount of suckling milk, may help in the relief of the problem of milk shortage in Egypt.

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الأداء الإنتاجي وبعض قياسات الدم في العجول الجاموسي المنشأة على نظم غذائية مختلفة من الميلاد حتى الفطام

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استخدم في هذا البحث ٢١ عجل جاموسي حديث الولادة (١٢ ذكر + ٩ إناث) قسمت إلى ثلاثة مجموعات لدراسة تأثير إحلال كسب فول الصويا + حبوب الذرة المطحونة أو كسب بذرة الكتان + حبوب الذرة المطحونة محل ٥٠% من لبن الرضاعة المقرر على الأداء الإنتاجي وبعض قياسات الدم للعجول الجاموسي الرضيعة. امتدت الفترة التجريبية من عمر ٣ أيام حتى الفطام عند عمر ١٥ أسبوع. أعتبر أول أسبوعين فترة أقلمة. طوال الفترة التجريبية غذيت العجول على العلائق التجريبية التالية:

- مجموعة أ : ١٠٠% من اللبن الجاموسي المقرر لرضاعة هذه العجول (مقارنة).
- مجموعة ب: ٥٠% من اللبن الجاموسي المقرر لرضاعة هذه العجول + ٥٠% من الاحتياجات من المخلوط المركز ١ (٧٠% كسب فول الصويا + ٣٠% حبوب الذرة المطحونة).
- مجموعة ج: ٥٠% من اللبن الجاموسي المقرر لرضاعة هذه العجول + ٥٠% من الاحتياجات من المخلوط المركز ٢ (٦٥% كسب بذرة الكتان + ٣٥% حبوب الذرة المطحونة).

وكان كل عجل يتغذى على اللبن منفردا وفقا لاحتياجاته أما البادئ ودريس البرسيم فكانت التغذية تتم عليهم بطريقة جماعية وكان يتم حساب المأكول يوميا وكذلك يتم وزن الحيوانات أسبوعيا ، في الأسبوع الخامس عشر من عمر العجول أجريت ٣ تجارب هضم باستخدام ٣ عجول ذكور من كل مجموعة.

جمعت عينات الدم من كل العجول عند أعمار ١٥، ٦٠، ١٠٥ يوم وذلك لقياس التغيرات التي طرأت على بروتين الدم والألبيومين والجلوبيولين والدهون الدم.

فيما يلي أهم نتائج هذه الدراسة:

- معاملات هضم المادة الجافة والبروتين الخام ومستخلص الإثير للمجموعة (أ) كانت أعلى معنويا عند مستوى ٥% بالمقارنة للمجموعتين ب ، ج.
- سجلت عجول المجموعة (أ) أعلى مأكول (كجم/ رأس/ يوم) من المادة الجافة والمركبات الكلية المهضومة والبروتين الخام تليها عجول المجموعة (ب) ثم المجموعة (ج).
- سجلت عجول المجموعة (أ) أعلى معدل نمو يومي (كجم/ رأس/ يوم) تليها عجول المجموعة (ب)8ثم المجموعة (ج) ولكن بدون فروق معنوية عند مستوى ٥% معنوية.
- سجلت عجول المجموعة (ب) أفضل معدل تحويل غذائي (كجم مادة جافة أو بروتين خام أو مركبات كلية مهضومة/ كجم نمو)، تليها حيوانات المجموعة (ج) ثم المجموعة (أ) .
- أظهر تحليل الدم زيادة معنوية في تركيز الجلوبيولين في المجموعة الثالثة ونشاط أنزيم AST في المجموعة الثانية بينما لم يحدث تغيير معنوى في تركيز البروتين الكلي و الألبيومين والليبيدات الكلية ونشاط أنزيم

ALT كما لوحظ زيادة معنوية في مكونات الدم السابقة مع زيادة العمر فيما عدا تركيز الجلوبيولين ونشاط ALT حيث ظهر العكس صحيح .

- أظهر التقييم الاقتصادي أن أقل تكلفة تغذية لكل كجم نمو كانت لحيوانات المجموعة (ب) تليها المجموعة (ج) ثم المجموعة (أ).
- تشير نتائج هذه الدراسة إلى أن التنشئة التقليدية وغير التقليدية للعجول الجاموسي الرضيعة لها نفس التأثير الإيجابي على معدل النمو وبالتالي فإنه يمكن إحلال مخلوط المركز ١ (٧٠% كسب فول صويا + ٣٠% حبوب الذرة المطحونة) أو مخلوط مركز ٢ (٦٥% كسب بذرة الكتان + ٣٥% حبوب الذرة المطحونة) محل ٥٠% من كمية اللبن المقررة للعجول الجاموسي الرضيعة دون حدوث أضرار على الأداء الإنتاجي لهذه العجول وكذلك على بعض قياسات الدم مع خفض تكلفة التغذية والمساعدة في حل مشكلة نقص اللبن في مصر .