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BABY BEEF PRODUCTION FROM BUFFALO CALVES RAISED ON DIFFERENT FEEDING REGIMES

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ABSTRACT

This study aimed to evaluate the effect of rearing techniques of buffalo calves on growth performance, feed conversion, carcass characteristics and economic efficiency of buffalo calves. Sixteen suckling buffalo bull calves, one week old, were assigned to two groups according to their live body weight. First group (Control; n=6; 38.5 ± 2.53 kg) was raised on whole buffalo milk from birth to 15th week of age, thereafter calves were fed dry feed only until slaughter (195 days of age). The second group (milk-fed; n=10; 37.4 ± 1.96 kg) was raised the same as control until 15th week and thereafter fed 1 kg of whole milk/day/calf continuously until slaughter (188.2 day of age). The target of this supplement was to prevent weaning shock, improve growth rate and maintain baby veal beef characteristics after early fattening. Both groups received calf starter (*ad libitum*), berseem and wheat straw allover the trial. The average daily gain (ADG) was improved linearly with the advancement of age, although the differences between groups appeared from 16th week of age (second period; 1.003 ± 0.06 kg and 1.377 ± 0.05 kg for control and milk-fed groups, respectively; P<0.01). Total dry matter intake (DMI) was higher (P<0.01) in milk-fed group than control especially in second period. Therefore, feed conversion was better (by about 17.3%) in supplemented group than control during second period (2.96 *vs.* 3.58 kg DM/kg gain) and it was better than those in starting period. Carcass length, weight and its quarters were higher in milk-fed group than those in control. However, the hot dressing percentage did not differ between groups. Crude protein percentage was higher (P<0.05) in eye muscle of treated group than control. Additionally, ether extract percentage of meat was higher (P>0.05) in milk-fed group than control, whereas the moisture was lower (P<0.05) in the same group. Milk-fed group exhibited a higher percentage of expressible fluid, cocking losses and tenderness of meat than those of control. The income of early fattening was very good and it was higher in milk-fed group than control by about 18.7%. The results suggest that whole milk supplementation in small quantities after weaning agé in veal production could be an advantageous alternative to improve growth performance and carcass and meat quality. Also, it can be started at early fattening to produce high quality of meat and profit of fattening.

INTRODUCTION

Egyptian buffalos are nearly equal in number to Egypt's native cattle (around 3.5 million). They play an important role in Egypt's agriculture especially for small holders. Moreover, buffalo is considered the main dairy animal in Egypt (produce about 48.8% of the consumed milk; FAO, 2005), and they provide a major source of meat in the country (about 40% of Egypt's red meat; FAO, 2005). Their carcasses are characterized by high proportion of muscles and low fat when compared with cattle carcasses (Fooda, 2005). The small holders (2-3 head/farm) own more than 70% of all buffalos in Egypt. Most of these farmers get rid of males before weaning for many reasons. The most important reason is that meat at this age is of highest quality associated with a healthy product including low fat content, good smooth fibers of muscles, taste and flavor (Zeidan *et al.*, 1999 and Vieira *et al.*, 2005).

However, slaughtered animals at this age are considered a big loss to meat production at the national level.

Most of the studies on the effects of diet on calf performance and meat quality have been carried out using either milk replacer (Beauchemin *et al.*, 1990; Xiccato *et al.*, 2002) or natural milk (Vieira *et al.*, 2005). It was found that Holestein calves that received low level of whole milk (about 2.7–5.5 kg/d) were consuming a considerable amount of forage, however the greater amount of consumed milk reduced the forage intake (Abdelsamei, 1989). The feed efficiency of their calves was similar among low and high levels of milk intake. Several researchers reported correlations ranging from 0.4 to 0.88 between the level of milk consumption and weight gain among calves (Totusek and Arnett, 1965; Wyatt *et al.*, 1977 and Abdelsamei, 1989). Sejrsen and Purup (1997) reported that the high-energy diets allowed rapid growth rate and excess fattening from approximately 3-10 months of age. Some researchers have reported that feeding regime did not have a significant effect on carcass composition or meat palatability attributes (Murray *et al.*, 1975; Smith *et al.*, 1977; Nour and Thonney, 1987 and Xiccato *et al.*, 2002). While, other researchers showed that differences in carcass traits and composition of cattle fed different feeds (Williams *et al.*, 1983; Kempster and Southgate, 1984 and Kempster *et al.*, 1986). There are very few studies on veal calves fed whole milk. Therefore, the purpose of this study was to investigate the effect of whole milk supplementation after weaning until reaching slaughter weight to veal buffalo calves on growth performance, carcass, meat quality and its economics.

MATERIALS AND METHODS

This study was conducted at animal production research station, Mahallet Moussa, Kufr El-Sheikh Governorate. The farm belongs to Animal Production Research Institute, ARC, Ministry of Agriculture. Sixteen buffalo bull calves 4-7 days of age were randomly assigned to two experimental groups according to their live body weight.

All calves were fed whole buffalo milk at the rate of 10% of their birth weight starting from 1-4 week of age and 7.5% of birth weight from 5-8 week. Thereafter, they were fed 5% of birth weight until weaning. The first group was weaned at 15 weeks of age (control group; G1; n=6). The experimental group (milk-fed; G2; n=10) was fed whole milk at the same regime until 15^{th} week of age and then offered 1.0 kg of whole milk daily until approximately 28 weeks of age. Whole buffalo milk was fed using bucket and floating nipple. Calf starter, berseem (clover) or its hay and wheat straw were offered *ad libitum* to both groups from the second week until 28 weeks of age. Drinking water was available twice daily at the first period (before 15 weeks of age) and three times daily at the second period (from 16 – 28 weeks of age). Calves were housed in individual concrete pens and rice straw bedding at first period and thereafter, transferred to semi-open stall barn. All calves were injected subcutaneously with antiparazites. Individual live weights were recorded at the beginning of the trial, and then at biweekly intervals to determine average daily gain. Also, feed intake was recorded individually for two consecutive days weekly to calculate feed conversion and economic efficiency.

At the end of the experiment, body measurements of five calves from control and ten calves from experimental group were recorded and calves were slaughtered. The warm carcass weight was recorded to calculate individual warm dressing percentage. Also, warm carcass length was measured. The weight of longissimus dorsi muscle (the 9th, 10th and 11th ribs) and their measurements were recorded. Physical characteristics, as well as sensory assessment of meat quality (pH value, expressible fluid, color intensity, cocking losses, tenderness and panel taste) were carried out using eye muscle samples. The value of pH was determined by Bechman pH meter. Expressible fluid and tenderness were determined using planometer according to Soloviev (1966). The color intensity of meat was determined using colorimeter according to Husain *et al.* (1950). Loss of weight by cocking was measured according to Nigm *et al.* (1985). Dry matter, crude protein, ether extract and ash of homogenized longissimus meat were determined. Chemical analysis of feed stuffs (Table 1) and homogenized longissimus dorsi muscle (Table 2) were determined according to A.O.A.C. (1990).

Data of growth rate, feed intake, feed conversion, carcass traits and chemical composition of longissimus muscle were analyzed using the general linear model (GLM) of SAS (1996). Raising regime (treatment), sampling time and their interaction were included in the model of growth rate, feed intake and feed conversion. Data of carcass criteria were analyzed using one way classification model that included weaning regime and the experimental error. The overall means were compared using Duncan's multiple range test (Duncan, 1955).

Table (1): Chemical composition (%) of the experimental feedstuffs.

Ration	DM	On dry matter basis		
		Crude Protein	Ether Extract	Ash
Calf Starter*	89.8	17.3	5.2	6.6
Berseem hay	90.6	16.8	2.4	13.6
Wheat Straw	91.4	6.7	1.5	10.9

*** Composition: Yellow corn, soybean meal (44%), linseed cake, wheat bran, molasses, calcium carbonate and sodium chloride.**

RESULTS AND DISCUSSION

1- Animal Performance:

Least square means of birth weight and weights of calves at different ages until slaughter are presented in Table (2). There were no significant differences between control (G1) and experimental groups (G2) at neither birth nor 15th week of age. However, during the second period (from 16th week of age) calves supplemented with whole milk continuously were significantly ($P<0.01$) heavier than those of the control group (Fig. 1). Consequently, the mean final live body weight for G2 group was 192.3 ± 3.8 kg vs. 167.3 ± 4.9 kg for G1 with an improvement ($P<0.01$) of body weight by about 15%. Moreover, the final weight of treated group was obtained at lower age (188.2 *vs.* 195.0 days; $P<0.05$). In comparison with previous studies, the results agree with Youssef (1992) who showed similar curve, where the average birth weight and weaning weight were 34.2 and 77.1, respectively, although the mean weight at 7 months of buffalo calves was 143.0 kg which is less than the present findings. Shafie *et al.* (1982) and Fooda (2005) found that the mean body weight of buffalo calves at 6 months of age was 133-135 kg (ranged between 119-152 kg). These results were less than our findings at similar age.

Table (2): Least square means of growth performance of veal calves weaned (G1) or fed milk (G2) until slaughter.

Items	G1	G2	SE
No. of animals	6	10	
Period I:			
Initial (birth) BW, kg	38.5	37.4	2.24
Final BW, kg	77.0	77.7	2.24
Total gain, kg	38.5	40.3	5.50
Daily gain, kg	0.393	0.411	0.035
Total DMI, kg	1.78	1.96	0.07
Feed conversion (kg DM/kg gain)	4.56	4.78	0.47
Period II:			
Initial BW, kg	77.0	77.7	2.24
Final BW, kg	167.3	192.3**	4.35
Total gain, kg	90.3	114.6	7.42
Daily gain, kg	1.003	1.377**	0.054
Total DMI, kg	3.59	4.08	0.15
Feed conversion (kg DM/kg gain)	3.58	2.96	0.30
Age at slaughter (day)	195.0	188.2	4.30

** Significant at $P < 0.01$

A similar trend was found in average daily gain (ADG) of calves (Table 2). The ADG of experimental group in the finishing period was higher than control (1.377 ± 0.047 *vs.* 1.003 ± 0.06 kg; P<0.01). The curve of growth rate was elevated linearly with the advancement of age during both experimental periods. The differences between groups started to be clear during the second experimental period (Fig. 2). It was observed that the growth rate of G2 group increased linearly starting from 16th week to 26th week of age. Although, ADG in G1 group declined from 16th week until 20th week, thereafter it was elevated gradually. This trend illustrated that milk supplementation prevented calves from weaning shock and improved ADG. Compared with previous studies, Youssef, (1992) showed that ADG was 476 g/day for suckling period of buffalo calves, and increased to 601 g/day for the post weaning period (4-9 month of age). Also, Abdel-Malik *et al.* (1974) found the ADG of suckling buffalo calves was 493 g, whereas Fahmy (1972) and Khattab *et al.* (1989) reported that ADG ranged between 636-721 g during the same period. The minimum value of ADG at the 4th month of age (434 g/d) can reflect the effect of weaning drawback (Afifi *et al.*, 1977; Langer *et al.*, 1985 and Youssef, 1992). El-Ashry *et al.* (2003) found that ADG of buffalo calves ranged between 524 and 573 g during the suckling period when the calves were given calf starter containing soybean meal or sunflower meal as a protein source.

Least square means of total dry matter intakes (DMI) and feed conversion values are summarized in Table (2). Total DMI did not differ between groups during the first period, however in the second period the experimental calves consumed total DMI higher (P=0.002) than control calves

(4.08 ± 0.09 *vs.* 3.59 ± 0.12 kg/d). The highest difference (P<0.01) was observed at 2second week of age. The average DMI of starter in both groups as a percent of BW ranged from 1.5 to 1.9 % in the first period and increased to reach a range of 2.25 to 2.4 % during the second period. Consequently, total DMI ranged from 3.45 to 3.65% of BW in both first and second periods (Table 3). The mean value of feed conversion was better (by about 17.3%) in G2 group than G1 during the second period (2.96 *vs.* 3.58 kg DM/kg gain).

Table (3): Mean daily DMI (kg) of veal calves and its percent of body weight.

Items	G1	G2
Period I:		
DMI of: Starter, kg	0.88	1.07
% of BW	1.54	1.88
Berseem hay	0.50	0.50
% of BW	0.88	0.88
Whole milk	0.41	0.39
% of BW	0.78	0.75
Total DMI	1.79	1.96
% of BW	3.10	3.40
Period II:		
DMI of: Starter, kg	2.34	2.68
% of BW	2.25	2.39
Berseem hay	0.75	0.75
% of BW	0.72	0.67
Wheat straw	0.50	0.50
% of BW	0.48	0.45
Whole milk	0	0.15
% of BW	0	0.13
Total DMI	3.59	4.08
% of BW	3.45	3.65

Vieira *et al.* (2005) observed that no significant difference was found in growth rate or slaughter weight of Brown Swiss male calves fed *ad libitum* concentrate or fed 4 kg/day of natural milk supplement until slaughter at 345 kg of live weight. Moreover, they found that calves which were fed whole milk consumed lower amount of concentrate and straw than calves fed concentrate *ad libitum.* In the present study, milk supplements(1 kg/day) until slaughter did not reduce calves ability of feed consumption but improved it.

On the other hand, Xiccato *et al.* (2002) found that grain maize supplementation (about 550 g/day from 14^{th} wk of age till slaughter date) improved final live weight (P<0.001) ADG (P<0.05) and feed efficiency (P<0.01) compared with calves fed milk replacer exclusively. Similar findings were reported by Morisse *et al.* (2000). Also, Beauchemin *et al.* (1990) and Pommier *et al.* (1995) showed that growth performance was improved compared with calves fed exclusively milk replacer fed cereal grains. Cozzi *et al.* (2002) presented the administration of beet pulp significantly increasing the calves' ADG compared to veal calves fed milk replacer only, however feed efficiency was similar in both groups. Diaz *et al.* (2001) found that the actual DMI as percentage of BW was 1.43, 2.35 and 2.51% for suckling calves which were fed milk replacer only at the rate of 1, 3 or 4% of BW and gained by the rate of 500, 950 and 1400 g/d, respectively. These results support our findings where the DMI of concentrate (starter and milk; as % of BW) was 2.25 and

2.54% resulted in an increase in daily gain from 1.003 to 1.337 kg for G1 and G2 groups, respectively.

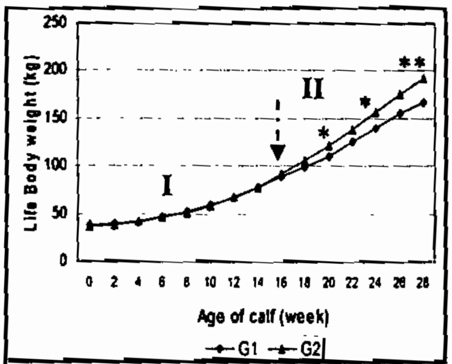

Fig. (1): Life body weight of veal calves during both periods of the trial.
(* P<0.05; ** P<0.01; I= 1st period; II= 2nd period)

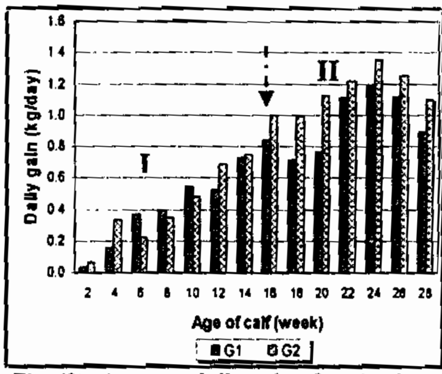

Fig. (2): Average daily gain of veal calves during both periods of the trial.

3- Slaughter Results And Carcass Evaluation:

The slaughter measurements and carcass evaluation of veal calves are reported in Tables (4 and 5). The fasting weight was higher (P<0.05) in G2 group than G1 group (181.5 *vs.* 162.0 kg), as well as body measurements of calves (as length, height and brest round) were higher (P>0.05). The length of carcass was greater (P<0.05) in G2 group than G1 (68.1 *vs.* 58.0 cm).

Table (4): Carcass characteristics in veal calves that weaned (G1) or fed milk (G2) until slaughter.

Items	G1	G2
Fasting weight, kg	162.0 ± 6.9	181.5 ± 4.4**
Length of animal, cm	160.5 ± 4.9	171.3 ± 3.3*
Height of animal, cm	114.5 ± 1.7	116.4 ± 1.2
Breast round, cm	133.7 ± 3.4	138.1 ± 2.3
Carcass Length, cm	58.0 ± 3.8	68.1 ± 2.5**
Rump round, cm	59.0 ± 2.5	62.4 ± 1.9
Hot Carcass, kg	83.0 ± 4.5	89.2 ± 2.8
Carcass compactness [a]	1.43 ± 0.09	1.45 ± 0.07
Fore right quarter (FR), kg	19.6 ± 0.97	21.1 ± 0.62
Fore left quarter (FL), kg	19.4 ± 0.92	20.6 ± 0.58
Hind right quarter (HR), kg	22.4 ± 1.4	23.9 ± 0.9
Hind left quarter (HL), kg	22.1 ± 1.4	23.6 ± 0.9
FR/ hot carcass %	23.6 ± 0.48	23.7 ± 0.31
FL/ hot carcass %	23.3 ± 0.64	23.1 ± 0.40
HR/ hot carcass %	26.9 ± 0.48	26.7 ± 0.3
HL/ hot carcass %	26.7 ± 0.57	26.4 ± 0.36
Hot dressing % [b]	51.2 ± 1.1	49.1 ± 0.66
Longissimus dorsi muscle, kg	4.65 ± 0.41	4.87 ± 0.27
Meat weight, kg	0.57 ± 0.05	0.58 ± 0.03
Bone weight, kg	0.99 ± 0.08	0.96 ± 0.05
Eye M. area (R), cm^2	61.5 ± 5.5	55.3 ± 3.46
Eye M. area (L), cm^2	53.4 ± 6.5	54.7 ± 4.14
Meat rip, kg	2.17 ± 0.28	2.14 ± 0.19
Oesophagal groove (cm)	11.5 ± 2.14	18.0 ± 1.51

[a] Carcass weight / length ratio (Vieira *et al.*, 2005) ; [b] Hot carcass/fasting weight*100
* Significant at P< 0.10 ; ** Significant at P< 0.05

As shown in Table (5), milk-fed calves had significantly higher weight of head (P<0.05), hide (P=0.06) and kidney (P=0.004). Also, they had higher weight of legs, tail, liver, spleen and heart but without significant differences. However, the lung and kidney fat were heavier in control calves without significant differences.

The hot carcasses and its quarters of G2 were heavier than those in G1. Although, milk supplementation did not affect significantly carcass compactness index (hot carcass: carcass length ratio), the percentage of every quarter to hot carcass and hot dressing percent. The longissimus muscle was heavier in calves that received milk than control, although its components did not differ between groups. The results may agree with Vieira *et al.* (2005) who found that veal calves receiving milk until slaughter were slightly higher than grain-fed calves in hot carcass, dressing percent, carcass length and compactness index but without significant differences. Additionally, Abdelsamei (1989) mentioned that carcass and non-carcass components, marbling scoure, meat cocking losses and palatability were not influenced by preweaning milk intake of Holestein calves.

The oesophagal groove length was longer in milk-supplemented group than those of control (18.5 *vs.* 11.5 cm) due to continuous activity of this groove in G2 than G1 group.

Table (5): Non-carcass components in veal calves that weaned (G1) or fed milk (G2) until slaughter.

Items	G1	G2
Head, kg	9.31 ± 0.42	10.8 ± 0.27**
Legs, kg	5.5 ± 0.46	6.4 ± 0.29
Hide, kg	13.7 ± 0.77	15.7 ± 0.51*
Tail, kg	0.55 ± 0.04	0.59 ± 0.03
Liver, kg	3.06 ± 0.20	3.46 ± 0.12
Spleen, kg	0.57 ± 0.13	0.62 ± 0.08
Heart, kg	0.81 ± 0.07	0.90 ± 0.05
Lung, kg	3.55 ± 0.31	3.34 ± 0.19
Kidney, kg	0.60 ± 0.05	0.81 ± 0.03***
Kidney fat, kg	0.56 ± 0.11	0.47 ± 0.08

* Significant at P= 0.06; ** Significant at P< 0.05; *** Significant at P= 0.004

4- Physical And Chemical Characteristics Of Longissimus Dorsi Muscle:

The overall means of physical and chemical traits of longissimus dorsi muscle are presented in Table (6). It was observed that pH values tended to be higher (P=0.10) in G2 than G1 (5.6 *vs.* 5.2). These values are in the normal range of pH, which ranged between 5.4 to 5.6 (Salem et al., 1982 and El-Asheeri, 1984). The expressible fluid of fresh meat was greater (P<0.01) in treated group than control, whereas water/protein ratio was lower (P<0.05) in treated group (4.14 *vs.* 4.61). Cocking losses tended to be higher in milk-fed group than control (39.3 *vs.* 32.3%) but without significant differences. This may be a result of the higher percent of veal crude protein in treated group. These results are in agreement with Salem *et al.* (1982) who reported that there is a positive relationship between protein percent and expressible fluid. Also, El-Gammal (1977) concluded that proteins are the principle water binding constituent in meat.

Table (6): Physical and chemical characteristics in veal calves that weaned (G1) or milk-fed (G2) until slaughter.

Traits	G1	G2
Physical traits:		
pH value	5.2 ± 0.19	5.6 ± 0.13
Expressible fluid %	29.7 ± 6.14	53.6 ± 4.34**
Cocking losses %	32.3 ± 2.9	39.3 ± 2.1
Water/Protein ratio	4.61 ± 0.16**	4.14 ± 0.12
Color intensity, unit	0.54 ± 0.015	0.55 ± 0.011
Tenderness (cm^2)	6.05 ± 2.01	7.14 ± 1.42
Chemical traits:		
Moisture%	79.6 ± 0.86*	76.9 ± 0.57
Crude protein%	17.2 ± 0.59	18.7 ± 0.42*
Ether extract %	2.61 ± 0.56	3.13 ± 0.39
Ash%	4.4 ± 0.34	4.0 ± 0.22

*P<0.05 ; ** P< 0.01

Abdelsamei (1989) and El-Bedawy *et al.* (2004) found that pH, expressible fluid and cocking losses of veal Holstein calves or meat of buffalo calves did not differ significantly when different rations were used. Color intensity of fresh muscle was similar in both groups. Tendemess of fresh meat was slightly higher (P>0.05) in treated group than control (7.14 *vs.* 6.05 cm^2). This may be due to a higher percent of ether extract in veal of treated group (Nigm et al., 1985). This result was greater than that obtained by Fahmy (1986); Soliman (1987) and Zeidan *et al.* (1999 and 2003) when they worked on buffalo calves, also slightly higher than those findings by Xiccato et al. (2002) who used veal Holstein calves in the same age. The sensor properties (data is not presented) of G2 group were better than those in G1 except for juiciness and aroma. Juiciness of meat was higher in G1, this may be related to lower values of expressible fluid and cocking losses in the same group.

Significant differences between groups occurred as regard in moisture (79.6 *vs.* 76.9% for control and milk-fed groups, respectively). Crude protein of muscle was higher significantly (P<0.05) in milk-fed group than control (18.7 *vs.* 17.2 %). Additionally, ether extract was higher in calves that received milk than in control calves but without significance (3.13 *vs.* 2.61%). Whereas, ash percent did not differ significantly between groups.

The results agree with some of previous studies, so our values are in the same ranges obtained by Salem et al. (1982); Xiccato *et al.* (2002); Cozzi *et al.* (2002); Vieira *et al.* (2005) and Brown *et al.* (2005). Also, the results are in agreement with Blome *et al.* (2003) who demonstrated that carcass protein increased as the ratio of protein to energy increased in the diets of bull calves fed for ADG of up to 0.62 kg/d. As well as, Abdelsamei, (1989) who found that increasing preweaning milk levels intake increased carcass chemical fat. Vieira *et al.* (2005) showed that ether extract was higher (P<0.05) in veal calves fed milk until slaughter than weaned calves, whereas the dry matter, crude protein and ash percentage did not differ between groups. Similar results were obtained by Tikofsky *et al.* (2001) who observed that increasing fat content in milk replacer fed to bull calves in an isocaloric, isonitrogenous diet increased carcass fat percentage without altering carcass protein. Beauchemin *et al.* (1990) and Xiccato *et al.* (2002) reported that increase in overall milk consumption provided carcasses with a higher fat percentage. These findings may be explained by the fact that the milk supplied to milk-fed group avoids the inefficiency of ruminal fermentation by passing directly to the abomasum through the esophageal groove (Toullec, 1992). On the other side, Maiga (1975) and Simpfendorfer (1974) found that water, protein and ash content of ruminant tissues are not influenced by diet, rate of gain, stage of maturity or breed.

6- Economic Efficiency Of Veal Production:

The feed cost and income of veal production in the second period of this study are presented in Table (7). It was found that G2 had higher profit than G1 group (1340.6 *vs.* 1129.0 LE for every calf). The improvement in income in treated group was about 18.7%.

Table (7): Economic efficiency of buffalo veal calves supplemented with milk (G2) or weaned (G1).

Items	G1	G2
Initial BW, kg (2nd period)	77.0	77.7
Final BW, kg	167.3	192.3
Total gain	90.3	114.6
Price of kg DM of feed	0.966	1.44
DMI, kg/d	3.59	4.08
Feed cost/d , LE	3.47	5.87
Total feed cost during 2nd period, LE	315.8	493.0
Price of gain, LE	1444.8	1833.6
Profit, LE	1129.0	1340.6

Market price Pt./kg fresh matter of: Calf concentrate starter = 107; Clover (berseem) = 9.5; Whole buffalo milk = 200; Wheat straw = 40; kg of life body weight = 16 LE according to the year 2006 prices.

CONCLUSION:

It can be concluded that milk supplementation continuously in small amounts (1.0 kg/d/head) to young bull buffalo calves resulted in an improvement of feed intake, feed conversion and growth rate. Thus, the experimental calves did not suffer weaning shock. Moreover, this amount of milk kept the activity of oesophagal groove to transfer milk directly into abomasums to produce veal calves with the same properties and quality of suckling calves or baby beef (average 192 kg). From this trial, it was observed that we can start early fattening of excess buffalo bull calves to achieve high growth rates (from 1.0 to 1.4 kg gain/d) under good management conditions. The beef quality in this case is excellent and of high price value. The profit income was higher (about 18.7%) in treated group than control. Farther research can be conducted using milk replacers to reduce the cost of this kind of veal production.

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انتاج اللحم البتللو من عجول الجاموس المنشأة على نظم غذائية مختلفة

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تهدف هذه الدراسة الى تقييم تأثير نظم تنشئة عجول الجاموس الرضيعة على النمو والكفاءة التحويلية للغذاء ومواصفات الذبيحة والكفاءة الاقتصادية. تم اختيار ١٦ عجل ذكر جاموسي عند عمر ٧ أيام ووزعت على مجموعتين تجريبيتين على أساس الوزن الحي. المجموعة الأولى (مقارنة، ٦ حيوانات ، بمتوسط وزن ٣٨,٥ كجم) كانت تغذى على اللبن الجاموسي الكامل من الميلاد وحتى عمر ١٥ أسبوع حيث يتم فطامها وتغذيتها تغذية جافة فقط حتى الذبح (عند متوسط عمر ١٩٥ يوم). أما المجموعة الثانية (معاملة، ١٠ حيوانات، بمتوسط وزن ٣٧,٤ كجم) كانت تغذى مثل المجموعة الأولى من الميلاد وحتى عمر ١٥ اسبوع ولكنها استمرت بعد ذلك فى التغذية على ١ كجم لبن جاموسى / يوم / حيوان باستمرار حتى الذبح عند متوسط عمر (١٨٨,٢ يوم). هذه المعاملة تهدف أساسا الى الوقاية من صدمة الفطام وتدهور النمو فى هذه الفترة وبالتالى تحسين النمو وانتاج لحم بتللو يتميز بنفس صفات البتللو اللبانى ولكن عند اوزان كبيرة نسبيا (بمتوسط وزن ١٩٠ كجم). كلا من المجموعتين كانتا تغذى على بادئ عجول (حتى الشبع)، وبرسيم أخضر أو دريس و تبن القمح طوال فترة التجربة. وقد قسمت التجربة الى فترتين، الأولى من الميلاد حتى عمر ١٥ أسبوع والثانية من الأسبوع السادس عشر حتى الذبح.

كانت أهم النتائج المتحصل عليها كالأتي: ازداد متوسط النمو اليومي طرديا من الميلاد وبالتقدم فى العمر حتى عمر ١٥ أسبوع مع عدم وجود فروق بين المجموعتين فى هذه المرحلة، ولكن بدء ظهور الفروق في معدلات النمو من بداية المرحلة الثانية (عند عمر ١٦ أسبوع) حيث استمرت المجموعة الثانية في الازدياد حيث كان متوسط معدل النمو اليومى خلال هذه المرحلة ١,٣٧٧كجم في حين انخفض معدل النمو اليومي فى مجموعة المقارنة الى ١,٠٠٣ كجم. وقد كان متوسط المأكول اليومي من المادة الجافة أعلى معنويا (P<0.01) في مجموعة المعاملة عنه في مجموعة المقارنة خاصة فى المرحلة الثانية (بدءا من الاسبوع السادس عشر). كذلك الكفاءة التحويلية للغذاء كانت افضل في مجموعة المعاملة عنها فى المقارنة (٢,٩٦ ، ٣,٥٩ كجم مادة جافة/كجم نمو على التوالى). وقد كان متوسط طول الذبيحة ووزنها وكذلك أوزان أرباعها أعلى فى مجموعة المعاملة عنها فى المقارنة. فى حين كانت نسبة التصافى متقاربة فى المجموعتين وبدون فروق معنوية. أما عن التركيب الكيماوى للحم فقد تم تقديره فى العضلة العينية حيث كانت نسبة البروتين الخام أعلى فى مجموعة المعاملة عنها فى المقارنة (P<0.05). وكذلك كانت نسبة الدهن أعلى فى مجموعة المعاملة منه فى المقارنة ولكن بدون فروق معنوية، فى حين أن نسبة الرطوبة كانت أقل معنويا (P<0.05) فى مجموعة المعاملة. ولم يكن هناك اختلاف فى نسبة الرماد بين المجاميع. وقد كانت مجموعة المعاملة متفوقة فى اختبارات الصفات الطبيعية للحم وكذلك اختبارات التذوق مثل الطراوة، الملمس، القوام، وسهولة الهضم والاستساغة. أما عن العائد المادى الناتج عن التسمين المبكر فقد كان مرتفعا وكان أعلى فى مجموعة المعاملة عنه فى المقارنة بمعدل ١٨,٧%.

نستخلص من هذه الدراسة أن الاستمرار فى تغذية العجول على كميات قليلة من اللبن الطبيعي بعد عمر الفطام قد أدى الى تحسين معدلات النمو والكفاءة التحويلية للغذاء كما أدت الى تحسين مواصفات الذبيحة وجودة اللحم. كما يمكن البدء فى عمل تسمين مبكر لعجول الجاموس الصغيرة وذلك لانتاج لحم بتللو عالى الجودة وبأعلى عائد مادى واقتصادى.