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GROWTH PERFORMANCE AND SOME BLOOD PARAMETRS OF BUFFALO CALVES AS AFFECTED BY FEEDING SILAGE OR ALFALFA RATIONS

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ABSTRACT

The present study was carried out at the Experimental Farm of Animal Production Department, Faculty of Agriculture, South Valley University, Qena. Twelve buffalo male calves, averaged 102.33±0.9 kg of body weight and aged 6-7 months old were used to investigate the effect of feeding corn or sorghum silage compared to fresh alfalfa on some blood parameters and growth performance of growing buffalo male calves. Calves were divided into three equal groups (four in each), and were fed the following experimental treatments (T1): contained 52% concentrate mixture + 48% fresh alfalfa, (T2) contained 52.35 % concentrate mixture + 47.65% maize silage and (T3): contained 52% concentrate mixture + 48% sorghum silage. The feed efficiency value and the economical efficiency were calculated. Blood samples were collected to determine serum glucose, total protein, albumin, globulin, total lipids, cholesterol, triiodothyronine and thyroxin .

The results revealed that there is a significant ($P<0.05$) difference in the nutritive value in terms of TDN and DCP, among the three different treatments. The nutritive values are 61.12, 66.00 and 64.12 for TDN and 9.63, 6.76 and 6.24% for DCP in T1, T2 and T3, respectively. Average daily DM intake / calf was significantly different among the three treatments (4.82, 4.78 and 4.83 for T1, T2 and T3, respectively). The average daily gain of calves after period (180 days) illustrated that the lowest gain was in T1 (96.75 kg) and the highest in T2 (117 kg) followed by T3 (105 kg). The calves in groups T2 or T3 were more efficient in feed utilization than those in group T1. The results showed that there was a significant difference among treatments in some of blood components (glucose, total protein, albumin, triiodothyronine and thyroxin). The highest of glucose level was in treatments T2 and T3, while the highest value of protein and albumin treatment was in T1. The highest value of serum thyroid hormone concentrations were in group T2.

It could be concluded that using corn silage and sorghum silage for buffalo calves can be more successfully used for feeding without any adverse effect on productive performance and physiological responses.

Keywords: buffalo calves, blood parameters, growth performance, silage.

INTRODUCTION

The shortage of animal feedstuffs represents a real problem constrains the animal production development in Egypt. The shortage of animal in Egypt is the result of limited area assigned for forage production and a shortage of concentrate supplied for livestock. Alfalfa forage (*Medicago sativa*) is a major dietary component for lactating animals which is called king of forages.

An important objective of livestock feeding in most developing countries is to improve the use of potentially available forage to maximize the turn home grown feeds.Therefore preserving amounts of whole corn and sorghum plants as silage may help to reduce feeding shortage (Mahmoud *et al*., 1992). El-Sayes *et al*., (1997) reported that using maize silage for fattening calves improved their performance, reduced cost of feeding and minimized the amount of expensive concentrates in ration.

The high energy content and cheap price of maize and sorghum silage may promote the use of maize and sorghum silage for feeding ruminants. There are many advantages for preserving whole corn plant as a silage. Sorghum silage can have equal or slightly more nutritional value than tropical corn silage when these forages were fed at equal concentration of dietary fiber (Nichols *et al*., 1998).

The objectives of this investigation were to study the effect of feeding corn or sorghum silage compared to fresh alfalfa on some blood parameters and growth performance of growing buffalo male calves.

MATERIALS AND METHODS

The present study was carried out at the Experimental Farm of Animal Production Department, Faculty of Agriculture, South Valley University, Qena

Experimental design :

Twelve buffalo male calves with average live body weight 102.33±0.9 kg and 6-7 months of age were used in this investigation. Calves were divided into three similar groups (four in each), on the basis of live body weight and age. The average initial weights were about 102, 102 and 103 kg for the 1st, 2nd and 3rd groups, respectively. The calves weight were recorded biweekly in the morning before drinking and feeding (fasted 15 hours). Initial and final weights were recorded on average of two consecutive fast weights in two successive days.

Feeding and management:

Calves were fed the following experimental rations, which recorded as T1, T2 and T3, respectively, T1: contained 52.00 % concentrate mixture + 48.00 % fresh alfalfa ; T2: contained 52.35 % concentrate mixture + 47.65 % maize silage and T3: contained 52.00 % concentrate mixture + 48.00 % sorghum silage.

Concentrate mixture contained 40% yellow maize, 14% wheat bran, 15% linseed meal, 13.5% soybean meal, 15% molasses, 1.0 % calcium carbonate, 1% sodium chloride, and 0.5% mineral and vitamins mixture.

Animals were fed to cover the requirements of DM and TDN for growth according to NRC (1988) and rations were adjusted biweekly according to body weight changes. The feed residues were taken into account to determine actual feed intake. Calves were individually fed the experimental rations. Fresh alfalfa, maize silage, and sorghum silage were offered to the animal two times daily at 9 a.m. and 6.0 p.m. Concentrate

mixture was fed to all groups before feeding alfalfa and maize and sorghum silage. Fresh water was available all the day time. The efficiency values of feed utilization for weight gain were calculated and expressed in terms of kg gain per / kg total dry matter intake. The economical efficiency was calculated as the ratio between income (income from gain) and cost of feed consumed.

Samples of feeds were collected daily during the last week of each month and mixed together. Samples of alfalfa, maize silage and sorghum silage were analyzed. Dry matter (DM) was determined by drying at 60-70^{o}C for 48 hour in air-oven for a constant weight and were ground through 1mm mill screen openings. Concentrate mixture was dried at 105^{o}C until reached a constant weight in air–oven for DM determination. Proximate analysis of the experimental rations was carried out for DM, OM, CP, CF, EE, and ash according to A.O.A.C. (1990). The nitrogen free extract (NFE) was calculated by the difference.

At the beginning of the experiment and at three and six months of the experiment 10 ml blood samples were collected from jugular vein before the morning feeding. Blood samples were immediately centrifuged at 3000 rpm for 15 min and serum was stored at -20^{o}C until analysis using commercial kits. Obtained blood serum samples were chemically determined for total protein and albumin as described by (Doumas, 1971 and Kaplan and Szalbo, 1983) while serum globulin was obtained by the difference between the total protein and albumin concentration. Albumin / globulin ratio was calculated. Total lipids and cholesterol were determined according to (Schalm *et al*., 1975). Glucose in blood serum was also determined according to Trinder (1969) Serum Triiodothyronine and thyroxin concentrations were determined by a direct phase-solids I^{125} radioimmunoassay techniques using (coat-A-count TKT3 and TKT4) according to Irvin and Standever (1968) and Chopra *et al*. (1971). RIA kits were purchased from diagnostic products corporation (CPC, Los Angeles, CA, 90045-5597, USA).

Digestibility trial:

Animals of each group were used in the digestibility trial at the last week of the experimental period. Fecal samples were taken directly from the rectum of each calf twice daily at 7.0 a.m and 2.0 p.m. Representative sample of each daily collection was dried in drying oven at 60-70^{0}c for 48 hours. The daily dried fecal samples from each animal were grounded through 1mm mill screen openings and were saved for chemical analysis. Digestibility coefficients of DM, OM, CP, CF, EE and NFE were determined using acid insoluble ash (AIA%) as neutrals marker according to (Van Keulen and Young, 1977). Then nutritive values (TDN and DCP) were calculated.

Statistical analysis:

The results were statistically analyzed using the general linear model (G.L.M) procedure of SAS Institute (SAS, 1996) for complete randomized design. All statements of significant difference are based on the 0.05 level probability. Significant differences among treatments within the experiment were analyzed using (Duncan, 1955).

$Y_{ij} = \mu + T_i + E_{ij}$ where,

Y_{ij} = experimental observations.

μ = the overall mean.

T_i = the effect of dietary treatment. (i =1,…3)
E_{ij} = the experimental error.

RESULTS AND DISCUSSION

Nutritional evaluation of the experimental rations:

Values of the chemical composition of the experimental feedstuffs, experimental rations and the effect of different silage rations in comparison with alfalfa ration on the digestion coefficient of nutrients are presented in Tables (1 and 2).

Nutritive values expressed as TDN and DCP of the three different rations fed to buffalo male calves are presented in Table (3). The present results revealed that there were significant ($p<0.05$) differences between the TDN values of both types of silage rations (T2 and T3) and control ration (T1). This may be attributed, generally, to higher values of all digestible nutrients of both types of silage rations (T2 and T3) and at the same time the lower values of all digestible nutrients in the control ration (T1). Also, the high TDN values of rations containing concentrate mixture and silage may be attributed to the mutual associative effect of silage with concentrate mixture. (Mohamed *et al.,* 1999 and Gafaar, 2001). While there were insignificant differences in the TDN values between calves fed both types of silage rations (T2 and T3). Statistical analysis showed that The lowest ($P<0.05$) DCP content was recorded for the rations T2 and T3 in comparison with the control ration T1. The differences in DCP among the rations may be attributed to the variations in CP contents (Table 2) of the three rations.

These results are in accordance with those obtained by Mohamed *et al*. (1999) who reported that increasing proportion of maize silage in the rations of Friesian calves to 25% and 50% of dry matter intake tended to increase TDN compared with control ration (berseem). Similar results were obtained by Gafaar (2001), who found that the value of TDN was increased, but DCP value was decreased significantly ($P<0.05$) when Friesian calves were fed ration containing corn silage with concentrate mixture compared with those fed ration containing berseem with concentrate mixture.

Table (1): Proximate analysis of the experimental feedstuffs.

Items	DM	On dry matter basis %					
		OM	CP	EE	CF	NFE	Ash
Alfalfa	21.08	89.59	18.57	1.55	25.26	44.21	10.41
Maize silage (MS)	24.94	93.53	8.70	1.37	35.32	48.14	6.47
Sorghum silage (SS)	28.09	90.95	7.48	1.68	33.88	47.91	9.05
Concentrate mixture (CM)	89.57	94.03	13.89	3.37	13.87	62.90	5.97

Table (2): Proximate analysis of experimental rations.

Items	DM	On dry matter basis %					
		OM	CP	EE	CF	NFE	Ash
T1	56.70	91.90	16.14	2.50	19.33	53.93	8.10
T2	58.71	93.79	11.41	2.41	24.12	55.85	6.21
T3	60.06	92.55	10.81	2.56	23.47	55.71	7.45

Concentrate mixture contains: 40.0 % yellow corn, 14.0 % wheat bran, 15.0 % linseed meal, 13.5 % soybean meal, 15.0 % molasses, 1.0 % calcium carbonate, 1.0 % sodium chloride and 0.5 % mineral plus vitamins additives.

Table (3): Average values of digestion coefficients and nutritive values of different experimental rations

Nutrition	Treatments			SE	Sig
	T1	T2	T3		
Digestion coefficients, %					
DM	61.12^{c}	66.00^{a}	64.12^{b}	1.075	*
OM	59.50^{b}	62.15^{a}	61.98^{a}	0.57	*
CP	59.64	59.24	57.71	1.31	NS
EE	70.40^{b}	75.37^{a}	73.93^{a}	1.601	*
CF	49.80^{b}	61.64^{a}	57.88^{a}	2.48	*
NFE	67.28^{b}	72.31^{a}	70.90^{a}	0.70	*
Nutritive value, %					
TDN	59.50^{b}	66.11^{a}	63.58^{a}	0.75	*
DCP	9.63^{a}	6.76^{b}	6.24^{b}	0.22	*

$^{a, b \text{ and } c}$ Means in the same raw denoted with different superscripts are different significantly (*P<0.05).
NS = not significant.
T1: contained 52 % concentrate mixture (CM) + 48 % fresh alfalfa.
T2: contained 52.25 % concentrate mixture (CM) + 47.75 % maize silage (MS).
T3: contained 52 % concentrate mixture (CM) + 48 sorghum silage (SS).

Effect of feeding experimental rations on the performance of buffalo calves :

1- Feed intake :

Average daily DM intake per calf fed the experimental rations is presented in Table (4).

Table (4): Daily dry mater and fresh amount of different feedstuffs allowances by buffalo calves during the experimental period as affected by feeding rations .

Animal body weight (kg)	T1			T2			T3		
	Concent. mixture (kg/d)	Alfalfa (kg/d)	Total intake (kg/d)	Concent. mixture (kg/d)	Maize silage (kg/d)	Total intake (kg/d)	Concent. mixture (kg)	Sorghum silage (kg)	Total intake (kg)
100-125	1.80	1.69	3.49	1.8	1.62	3.42	1.8	1.69	3.49
125-150	2.02	1.90	3.92	2.02	1.87	3.89	2.02	1.83	3.85
150-175	2.46	2.32	4.78	2.46	2.12	4.58	2.46	2.25	4.71
175-200	2.91	2.64	5.55	2.91	2.62	5.53	2.91	2.67	5.58
200-225	3.36	3.06	6.42	3.36	3.12	6.48	3.36	3.16	6.52
Average									
DM	2.51	2.32	4.83	2.51	2.27	4.78	2.51	2.32	4.83
Fresh	2.80	11	13.80	2.80	9.10	11.90	2.80	8.25	11.05

T1: contained 52 % concentrate mixture + 48 % fresh alfalfa.
T2: contained 52.25 % concentrate mixture + 47.75 % maize silage.
T3: contained 52 % concentrate mixture + 48 sorghum silage.

From the present results it could be noticed that, the amount of DM intake from concentrates mixture in each period was similar at all treatments . Thus , the average DM intake from concentrate mixture was similar for T1, T2 and T3 throughout the experimental period .

Generally, DM intake from the different rations at different periods was nearly similar.

2. Changes in body weight and weight gain:

The average total and daily live body weight gains of buffalo male calves fed experimental rations are presented in Table (5) . The data indicated that the average initial live body weights of calves groups were nearly equal.

At the end of the experimental period (180 days), it can be noticed that, the average final live body weights of animals fed alfalfa ration (T1) recorded the lowest body weight. Statistical analysis showed that there were significant ($p<0.05$) differences in average final body weight between calves fed different rations. Also , it can be noticed that, the average final live body weights of animals fed silage rations recorded higher body weight.

Table (5): Average total and daily Live body weight gains of buffalo calves as affected by feeding different experimental rations

Items	Treatments			SE	Sig.
	T1	T2	T3		
No. of animals	4	4	4	-	-
Duration of trial (days)	180	180	180	-	-
Av. Initial live weight (kg)	102.75	102.75	103.00	0.90	NS
Av. Final live weight (kg)	199.50^{c}	219.75^{a}	208.00^{b}	1.82	*
Av. Total live weight gain (kg)	96.75^{c}	117.00^{a}	105.00^{b}	2.17	*
Av. Daily gain (kg)	0.538^{c}	0.650^{a}	0.583^{b}	0.01	*

$^{a, b \text{ and } c}$ Means in the same raw followed with different superscripts are significantly different (*P<0.05). AV= average

NS = not significant

T1: contained 52 % concentrate mixture + 48 % fresh alfalfa.

T2: contained 52.25 % concentrate mixture + 47.75 % maize silage.

T3: contained 52 % concentrate mixture + 48 sorghum silage.

The average daily gains were 0.538, 0.650 and 0.583 kg/day for the calves fed T1, T2 and T3, respectively. There were significant differences ($p<0.05$) among feeding treatments. Greater final live body weight and live body gain for calves fed treatment T2 and T3 in comparison with those fed control ration T1 may be due to increasing TDN values in these ration compared with T1 (Table 3). Similar results were obtained by Petit *et al*. (1994) and Taie *et al*. (1998). Also, Shahin (2004) reported that high energy level in the diets of buffalo heifers resulted in significant ($P<0.05$) increase in weight gain and average daily gain. Results of the present study were in harmony with those observed by Waldo *et al*. (1997), who found that average daily gains of growing heifers fed corn silage diets were greater than those fed alfalfa diets.

Table (6): Effect of feeding different experimental rations on the monthly live body weight of buffalo calves.

Treatment	No. of Animal	Initial weight	Duration of Treatment (month)					
			1	2	3	4	5	6
T1	1	105	119	132	145	159	175	194
	2	100	112	125	138	153	173	193
	3	103	118	133	148	165	186	208
	4	103	117	131	145	162	180	203
Average		102.75	116.5	130.25	144	159.75	178.5	199.50
T2	1	104	123	141	161	180	200	220
	2	100	118	137	158	178	200	222
	3	104	122	140	159	178	197	217
	4	103	122	141	161	181	200	220
Average		102.72	121.25	139.75	159.75	179.25	199.25	219.7
T3	1	102	119	136	154	172	191	210
	2	102	118	135	152	169	187	206
	3	105	121	139	156	173	190	208
	4	103	120	137	155	172	190	208
Average		103.00	119.50	136.75	154.25	171.15	189.25	208

From Table (6) , it could be noticed that daily gains and body weight were increased with increasing age of buffalo calves Average daily gain of buffalo males calves fed different rations in the present study ranged between 0.53 to 0.65 kg/h/day during the experimental period (Table 5). These values were in agreement with those obtained by several investigators (El-kholy , 1991; El-Feel *et al*., 1992 and El- Ashry *et al*. 1996) .

3. Feed utilization and economical efficiency :

The results concerning feed utilization and economical efficiency for buffalo male calves fed different experimental rations are presented in Table (7). The values of the efficiency of feed utilization were expressed as kg DM required for kg live body weigh gain. The data indicated that male calves fed silage ration (T2 or T3) were more efficient in feed utilization, while those received alfalfa ration (T1) were the least efficient in feed utilization.

Table (7) : Feed utilization and economical efficiency of buffalo calves fed different experimental rations .

Item	Treatments		
	T1	T2	T3
Kg daily DMI/ kg daily gain	8.98	7.35	8.28
Daily feed cost (L.E.)*	6.26	5.32	4.98
Price of daily Wt. gain (L.E.)**	6.46	7.80	7.00
Economic efficiency (3/2)	1.03	1.47	1.41
Daily feed cost/kg daily Wt. gain (L.E.)	11.64	8.18	8.54
Price of one kg live weight (L.E.)	12	12	12

Based on the assumption that the price of one ton of fresh alfalfa, maize silage, sorghum silage and concentrate mixture was 213, 154, 129 and 1400 L.E, respectively. The price of one kg body weight on selling was 12 L.E.

***Daily feed cost = Total cost of fresh amounts of different feedstuffs (Table,15).**

****Price of daily weight gain = daily weight gain (kg) X price of one kg live weight (L.E.).**

Better feed efficiency due to feeding silage rations may be due to the high TDN values as a result of high digestion coefficient of nutrients of silage rations compared to alfalfa ration (Table 3). Also, this result may be an indication of the higher metabolizable energy of DM intake of these rations (T2 and T3) which could be more efficiently utilized for growth (Blaxter, 1967). This result was in agreement with those obtained by Mohamed *et al*. (1999).

Economical efficiency and daily feed cost/kg daily weight gain during the experimental period are shown in Table (7). It was calculated as the ratio between the price of daily body gain and daily feed cost. The values of economical efficiency were 1.03, 1.47 and 1.41 for T1, T2 and T3, respectively. Similar result was obtained by Gafaar (2001) who found that economical efficiency was significantly increase ($p<0.05$) with increasing the level of corn silage in the rations up to 75% compared with those fed the control ration (fresh berseem). Also, it could be noticed that, daily feed costs per kg daily weight gain for rations of T2 and T3 were nearly equal and lower than those of T1. Similar results were obtained by Mohamed *et al*. (1999) who reported that Friesian calves fed rations contained 50 or 70% maize silage recorded the lowest feed cost per kg gain compared with those fed control ration (berseem).

4- Effect of feeding different experimental rations and age on some blood serum parameters:

The mean glucose levels in blood serum as affected by feeding treatments and age of buffalo male calves are presented in Tables (8 & 9). Statistical analysis showed that significant ($p<0.05$) differences were found in blood proteins, glucose and thyroid hormones between buffalo calves fed T2, T3 and those fed T1, but insignificant differences were found between calves fed diets T2 and T3. Greater values of blood glucose concentration in treatments T2 and T3 compared with T1 could be due to high TDN values as a result of increasing digestion coefficients of nutrients in T2 and T3 compared with T1 (Table 3). Similar result was obtained by Abd El-latif (2003) who found that blood plasma glucose content of Friesian calves fed high energy diets (70% TDN) was significantly higher than those fed low energy diets (60% TDN).

Concerning the effect of age on glucose concentration, The present data revealed that glucose concentration started at high level at the beginning of the experiment then decreased progressively by advancing age of buffalo calves. The decrease was statistically significant ($p<0.05$) between calves due to age. Decrease of glucose level by advanced age may be due to high metabolic rates of the young animals resulted from the high rates of cellular reactions and higher production of volatile fatty acids in the more developed rumen. In addition to the rapid synthesis of the cellular reactions materials and growth of the body, which require moderate quantities of energy (Abd El-Fattah,S. Omima 1993). Similar results were obtained by Yousef (1985), Yousef (1992) and Abd El-Fattah, S. Omima (1993).

Data in Table (8) observed that glucose concentration decreased gradually with the advance of age 68.83, 66.25 and 61.63 mg/100 ml, respectively. Calves received silage rations (T2 and T3) had lower value of

serum total proteins than those fed control ration (T1). The average value of serum total proteins of buffalo calves fed T1 was significantly ($p<0.05$) higher than those fed T2 and T3.

Higher levels of total protein concentration in the blood for treatment T1 may be due to the higher level of CP content in treatment T1 in comparison with T2 and T3. This finding may indicate that the level of serum total protein could be altered according to protein intake. Positive correlation between dietary protein and plasma protein concentration was reported by (Bush, 1989). The same trend was obtained by Gafaar (2001).

Table (8): Some blood serum contents of buffalo calves as affected by feeding the experimental rations

Items	Treatment			S.E.	Sig.
	T1	T2	T3		
Glucose (mg/100 ml)	63.87^{b}	66.45^{a}	66.39^{a}	1.40	*
Total protein (g/100 ml)	6.34^{a}	6.06^{b}	6.00^{b}	0.03	*
Albumin (g/100 ml)	3.47^{a}	3.30^{b}	3.25^{b}	0.01	*
Globulin (g/100 ml)	2.87	2.76	2.75	0.02	NS
A/G ratio	1.21	1.20	1.18	0.01	NS
Total lipids (mg/100 ml)	2.85	2.99	2.97	0.02	NS
Cholesterol (mg/100 ml)	121.17	120.49	119.30	5.61	NS
Triiodothyronine (ng/dl)	126.29^{b}	130.92^{a}	128.45^{b}	2.3	*
Thyroxin (μg/dl)	4.00^{b}	4.35^{a}	4.11^{b}	0.12	*

$^{a, b \text{ and } c}$ **Means in the same raw followed with different superscripts are significantly different (*p<0.05). NS = not significant.**

Table (9): Effect of age (duration of treatment) on some blood serum components of buffalo calves.

Items	Duration of Treatments (month)			S.E.	Sig.
	0	3	6		
Glucose (mg/100ml)	68.83^{a}	66.25^{b}	61.63^{c}	0.63	*
Total protein (g/100ml)	5.42^{c}	6.23^{b}	6.76^{a}	0.06	*
Albumin (g/100ml)	2.96^{c}	3.37^{b}	3.69^{a}	0.03	*
Globulin (g/100ml)	2.46^{c}	2.86^{b}	3.07^{a}	0.04	*
Alb./Glo. ratio	1.20	1.18	1.20	0.02	NS
Total lipids (mg/100ml)	2.35^{c}	2.80^{b}	3.67^{a}	0.05	*
Cholesterol (mg/100ml)	103.22^{c}	121.15^{b}	136.59^{a}	0.79	*
Triiodothyronine (ng/dl)	118.20^{c}	130.88^{b}	136.57^{a}	0.96	*
Thyroxin (μg/dl)	3.67^{c}	4.15^{b}	4.64^{a}	0.06	*

$^{a, b \text{ and } c}$ **Means in the same raw followed by different superscripts are significantly different (*p<0.05).**
NS = Not significant.

Concerning the effect of age on serum total protein (Table 9) , serum total protein increased gradually with the advance of age to reach maximum value (6.76 g/100ml) after 6 months of the treatment. The effect of age on total protein was significant ($p<0.05$). These results were in accordance with those obtained by (Maarek, 1996; El-Ashry *et al*., 1994, Abu-Elawa., 1995 and Metry *et al*., 1998.

As shown in Table (9) , the average serum albumin concentration of buffalo calves fed T1 was significantly ($p<0.05$) higher than those fed T2 and T3.

The present results indicated that the percentage of albumin concentration to total protein in the blood represented 54.00, 54.48 and 54.17 % for T1, T2 and T3, respectively. These results were in agreement with those obtained by Coles (1986). Concerning the effect of age on serum albumin , it was observed that the lowest values were obtained at the beginning of the experiment, while the highest values were obtained after 6 months. This means that albumin concentration was significantly ($p<0.05$) increasing with the advance of age . The present results were in harmony with those obtained by Maareck (1996)

In buffalo heifers . In growing buffalo calves, (El-Ashry *et al*., 1994, Abu-Elawa., 1995 and Metry *et al*., 1998) reported that value of albumin was increased significantly with advanced of age. Serum globulin concentrations of different groups of buffalo calves were significantly different ($P<0.05$). Similar result was obtained by Gafaar (2001).

The inspection of the mean values of globulin levels at different ages indicated that buffalo calves had the lowest values at younger age. Statistical analysis indicated that the differences among means were significant ($p<0.05$). The literatures suggested an increasing of serum and plasma globulin particularly with advancing age (Yousef ., 1985; Maareck 1996; El-Ashry *et al*., 1994; Abu-Elawa., 1995, Metry *et al*. 1998).

The data of Albumin / globulin ratio (Alb./Glo. ratio) of buffalo calves are presented in Table (9). Statistical evaluation for the values of A/G ratio for experimental groups showed insignificant effect of rations on A/G ratio. These results were in agreement with those reported by Abd El Fattah, S. Omima (1993), Abu-Elawa (1995) and Metry *et al*. (1998).

The average total lipids and cholesterol levels in serum of buffalo calves as affected by feeding rations and age are presented in Tables (8 & 9) . From the present results in Table (9), it can be observed that no significant differences were found between treatments. . The present data in Table (9) indicated that total lipids concentration started at low level then increased progressively by advancing of age of buffalo calves. The increase was statistically significant ($p<0.05$). Similar result was obtained by Yousef (1985), Hussein (1986) and Metry *et al*. (1998) .

The mean cholesterol levels in serum as affected by feeding treatments and age of buffalo calves are presented in Table (9) . There were insignificant differences among different treatments. Concerning the effect of age of buffalo calves on cholesterol concentration (Table 9), the present data revealed that cholesterol concentration started at low level then increased progressively ($P<0.05$) by advancing of age. Our findings are in agreement with those obtained by Yousef (1985); Hussein (1986); Abd El Fattah, S. Omima (1993); El-Ashry *et al*. (1994) and Metry *et al*. (1998). They reported a significant increase in cholesterol level in plasma or serum of buffalo calves with advancing of age. The increased serum cholesterol concentration by progressing age may be due to the changes of thyroid gland and gonads activity at different ages. Positive relationship was observed in the present

study between cholesterol and serum total lipids concentration as reported by Yousef (1985).

Mean values of triiodothyronine (ng/dl) and thyroxin (μg/dl) hormones in serum of buffalo calves as affected by feeding and age are shown in Tables (8& 9). The present data showed that feeding maize silage ration (T2) resulted in significantly ($p<0.05$) higher concentration of triiodothyronine as compared to control and sorghum rations (T1 and T3) fed calves. Sorghum silage ration (T3) led to higher concentrations of triiodothyronine and thyroxin in comparison with the control ration (T1), but the difference was not significant. Increasing the concentrations of thyroid hormones for calves feeding silage rations could be due to higher energy content of these rations compared to the control ration. There was a positive relationship between energy intake and the concentration of thyroid hormones as reported by (Tiirats, 1997 and Ahmed, 2003). The data presented in Table (9) indicated that both triiodothyronine and thyroxin showed a maximum concentrations after 6 months of the experiment, while the lowest concentrations were recorded at the beginning of the experiment .Similar trends were observed by Hussein (1986), Hussein (1991), Youssef (1992) and Shaban (2000). They reported that the values of triiodothyronine and thyroxin concentrations were increased by progressing age of buffalo calves, probably due to the increased growth and metabolic rates at advancing age.

It could be concluded that using corn silage and sorghum silage for feeding buffalo calves can be more successfully used without any adverse effect on productive performance and physiological responses at the same time reduce feed cost and save considerable amounts of expensive concentration.

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مظاهر النمو وبعض مقاييس الدم فى عجول الجاموس متأثراً بعلائق تحتوى على السيلاج و البرسيم الحجازى

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أجريت هذه الدراسة فى مزرعة كلية الزراعة جامعة جنوب الوادي بمحافظة قنا أستخدم فى هذه الدراسة عدد ١٢عجل جاموس متوسط وزنها ١٠٢,٨ ± ٠,٩كجم وزن حى فى عمر من ٦-٧ شهور ، ويهدف البحث دراسة تأثير التغذية على علائق تحتوى السيلاج والبرسيم الحجازى على مكونات الدم ومظاهر النمو فى عجول الجاموس النامية ،قسمت الحيوانات الى ثلاثة مجاميع فى كل مجموعة ٤ عجول وتم تغذيتها على ثلاثة علائق تجريبية . العليقة الاولى : تحتوى على ٥٢% مخلوط مركز و٤٨% وبرسيم حجازى طازج والمجموعة الثانية تحتوى على ٥٢,٣٥% مخلوط مركز و ٤٧,٦٥% سيلاج زرة شامية والمجموعة الثالثة تحتوى علىمخلوط مركز ٥٢% و ٤٨% سيلاج ذرة رفيعة. أخذت عينات الدم من العجول لتقدير الجلوكوز والبروتين الكلى والالبيومين والجلوبيولين والدهون الكلية والكلوستيرول وهرمونات الغدة الدرقية الثلاثى اليود والثيروكسين.

تتلخص النتائج كما يلى: توجد فروق معنوية بين المجاميع الثلاثة فى كل من المركبات الكلية المهضومة (TDN) و كذلك البروتين المهضوم (DCP%)و كانت القيم كما يلى ٦١,١٢ و ٦٦,٠٠ و ٦٤,١٢ للمركبات الكلية المهضومة (TDN)و ٩,٦٣% و ٦,٦٧ % و ٦,٢٤% للبروتين الكلى المهضوم (DCP%) على التوالى لكل من الجموعة الاولى و الثانية و الثالثة. وجد ان متوسط المادة الجافة المأكولة فى اليوم لكل عجل سجلت فروق معنوية و كانت القيم كمايلى ٤,٨٣ و ٤,٧٨ و ٤,٨٢ فى المجاميع الثلاثة على التوالى (الاولى ثم الثانية ثم الثالثة) . وجد أن متوسط معدل النمو اليومى بعد مدة (١٨٠ يوم) كما يلى : سجلت المجموعة الاولى أقل معدل نمو بمتوسط ٩٦,٧٥ كجم و قد سجلت المجموعة الثانية اعلى معدل نمو بمتوسط ١١٧كجم وقد سجلت هذة الاختلافات درجة معنوية بينما سجلت المجموعة الثالثة ١٠٥,٨ كيلو جرام .و قد وجد أن المجموعة الثانية والثالثة أعلى كفاءة فى معدل التحويل الغذائى و الكفاءة الاقتصادية عن المجموعة الاولى . وجد أن مكونات الدم بينها أختلافات معنوية لكل من الجلوكوز و البروتين الكلى و الالبيومين و الجلبيولين و الدهون الكلية و الكلوستيرول و هرمونات الغدة الدرقية الهرمون ثلاثى اليود و الثيروكسين. وجد أن اعلى معدلات الجلوكوز كانت فى المجموعة الثانية و الثالثة بينما كان اعلى قيم لكل من البروتين و الالبيومين فى المجموعة الاولى.

تخلص هذه الدراسة أن تغذية عجول الجاموس النامية على سيلاج الذرة الشامية وسيلاج الذرة الرفيعة وجد أنها أقل تكلفة اقتصاديا دون أى تأثير على الأداء الفسيولوجي و الإنتاجي للعجول.