EFFECT OF FEEDING SYSTEM ON GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS OF BALADI COW CALVES.

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ABSTRACT

Forty four entire male Baladi cow calves at 12 months of age and averaging 280 kg in body weight were used to investigate 3 finishing systems. In the first system animals were fed ad libitum on 11% CP diet until they reach 500 kg (system one).In the other two systems animals were fed to gain 0.75 kg/day up to 75kg gain in the first period, where in the 2nd period animals were fed to gain 0.90 kg/day up to 100 kg gain in the 2nd period and there after the animals were fed ad libitum up to 500 kg body weight. The sequence of The diets were 11, 13, 11 %CP in system 2 and 11, 15 and 11% CP in system 3. Growth performance, feed utilization and feed cost/kg gain were obtained.

Results showed that under the experimental conditions step-wise feeding of male baladi cow calves ad libitum on 11% CP diet (system one) was better than the other systems used. This is true regarding the growth and economic parameters tested. Moreover, calves fed on the first system showed significantly higher muscle and less fat carcass.

Key words: Feeding system, Baladi cow calves, Feed efficiency, Growth performance.

INTRODUCTION

Feeding beef cow steers to achieve step-wise increases in gain during the feeding period improve feed efficiency and reduce feed costs without negative effect on carcass traits **(Knablich *et al*., 1997 and Rossi *et al*., 2003)**. Performance of limit fed steers during period of compensatory growth is greater than expected based on **NRC (1984)**, net energy gain equations **(Carstens *et al*., 1991, Knablich *et al*., 1997; and Loerch and Fluharty, 1998).** The same trend observed in Baladi cow calves. **Abdel-Salam (2003) and Rossi *et al*. (2003),** observed that average daily gain was 1.87 kg/day during a period when intake was increased to achieve a predicted gain of 1.33 kg/day after a period of gaining 2.22 kg/day. In addition, steers fed for increasing rates of gain during the feeding period have greater growth rates during the last 45 days on feed, compared to steers fed ad libitum throughout the feeding period. Thus, it is possible crude protein requirements would be higher during these period of compensatory growth compared to steers feed ad libitum throughout the feeding period. Levels of dietary protein are the most important factor affecting animal performance **(Etman *et al*., 1995).**

The present study aimed to test the effect of three feeding systems on Baladi cow calves growth performance, body composition and a simple economical evaluation.

MATERIALS AND METHODS

Forty four entire male Baladi cow calves at 12 months age and averaging 280 ± 12.57 kg at the start of the experiment were used to investigate 3 feeding systems at three intervals using three commercial diets differing in their CP content. The study was conducted in commercial farm at El-Fayoum Governorate. The three commercial diets used are presented in Table 1.

Table 1. The diets used in the present study.

Item	Diets		
	11 %CP	**13 %CP**	**15 %CP**
Ingredients %			
Concentrate mixture*	39.75	45.00	50.00
Wheat straw	43.50	38.00	32.00
Soybean meal	3.75	8.00	11.00
Wheat bran	13.00	9.00	7.00
Chemical composition air dry basis %			
DM	91.12	90.03	90.94
OM	85.22	85.92	85.99
Cp	11.82	14.08	15.94
EE	2.74	2.91	3.06
CF	24.53	23.23	21.29
NFE	46.13	45.70	45.70
ASH	5.90	4.11	4.95
TDN**	55.45	57.15	58.69

*Concentrate mixture composed of 22% yellow corn, 30% wheat bran, 38% undecorticated cotton seed, 4% rice bran, 3% molasses, 2% limestone and 1%common salt.

**According to general Administration for Agrarian Culture, Ministry of Agriculture, Technical Bulletin. No 1(2002).ARE.

Accordingly the tested systems could be summarized as indicated in Table 2.Calves were fed twice daily at 8.00 a.m. and 4.00 p.m. On a daily basis, feed refusal was weighed and recorded.

Table 2. Feeding systems used in the present study.

Periods	**Predicted Gain/day, kg**	**Systems of feeding (diets CP%)**		
		1	2	3
I	0.75	11*	11	11
II	0.90	11*	13	15
III	*	11*	11*	11*

*ad libitum feeding without gain prediction 11,13 and 15 means the CP% in diets 1, 2 and 3 respectively.

Period 1 : up to about the first 75 kg gain.
Period 2 : up to about 100 kg gain.
Period 3 : up to about 500 kg live body weight.

Calves were weighed every two weeks. Average daily gain (ADG) was determined and the feed intake was adjusted to meet the tested growth requirement **NRC (1984).** At the end of the experimental period, five animals form each system were slaughtered to study carcass traits. The 9,10 & 11 rib sections were removed form the right side of each carcass according to procedures of **Hankins and Howe (1946)** where ribe sections were deboned grouned, mixed and sub sampled.

Proximate chemical analysis of the diets and carcass were carried out according to **A.O.A.C (1990).** A sample economical evaluation was conducted.

Statistical analysis was applied using SPSS for windows (1997) including analysis of variance and the differences between treatments means.

RESULTS AND DISCUSSION

The experimental diets used were formulated to contain 11, 13 and 15% crude protein (CP); soybean meal and wheat bran were used to adjust the protein level and to improve the diets used (Table 1).

Regarding the tested systems (Table 2), animals of 1st system were fed ad libitum on the diet that contained 11%CP. In 2nd and 3rd systems animals received diets to gain about 75 kg in the first period and to gain more 100 kg in the second. At the third period all groups were fed ad libitum to reach about 500 kg live body weight. The effect of feeding systems on Baladi male calves gain and feed efficiency is presented in Table 3.

During period I the first group which fed ad libitum showed faster growth rate (1.1 kg gain/day,) compared to the other systems. Such group achieved the predicted gain in 70 days with better feed efficiency compared to the other systems (97-99 d). The better feed efficiency may reflect that animals at this period had the ability to grow fast (about 1 kg/d). So it is better, if restricted feeding is needed, to estimate the requirements for 1 kg growth rate per day. Also at this period animals of restricted feeding acted similarly as they fed to cover the needed gain. These results agreed with the finding of **Carstens *et al*., (1991)** for beef steers.

During period II all groups followed similar trend as the differences were not significant. At this period animals daily gain was about 1 kg/d which was about 11% higher than expected. Again it seems that if we need to used restricted feeding it could be estimated to produce 1 kg/day. Results of these two periods reflect the higher rate of growth between 280 and 450 kg of body weight. Also the same trend was noticed in cow calves **(Abdel-Salam, 2003).**

During period III all groups reached the needed weight in a period from 44 to 51 days. The 2nd system (11/13/11 CP diet) acted similarly as the ad libitum one (system No1). Regarding feed efficiency system 3 was significantly better than system 1 and 2 which was similar. Also, the same trend was noticed in beef cattle, by **Mader *et al*. (1989).**

As for the total period, the ad libitum group (system 1) reached the needed weight much faster (short period) than the other groups followed by that of system 2 and 3 in that order.

However feed efficiency was in favor of the 3rd system followed by the 1st and 2nd systems. It could be noted that the compensatory growth was obtained with the higher CP systems (3 then 2). The same trend was noticed in compensatory gain in Holstein calves, **Abdalla *et al*., (1988).**

Table 3. Effect of feeding system on Baladi cow calves gain and feed efficiency.

Item	systems			SE
	1st	**2nd**	**3rd**	
No. of calves	19	12	13	------
Initial wt, kg	281	282	279.5	2.3
Final wt, kg	500	499	504	2.8
Period I	**(0.75 kg predicted gain/day), to about 75 kg gain.**			
Total gain, kg	77.5^{a}	75.0^{b}	78.5^{a}	3.1
Total feed intake, kg	660^{b}	701^{a}	727^{a}	18.5
Period in days	70	97	99	2.0
Daily gain	1.107^{a}	0.78^{b}	0.79^{b}	0.05
Daily DM intake, kg	8.5^{a}	7.30^{b}	7.30^{b}	0.14
Feed efficiency, kg gain/kg DM intake	0.130	0.107	0.108	0.003
Period II	**(0.90 kg predicted gain/day), to about 100 kg gain.**			
Total gain, kg	107.5	103.9	103.4	5.95
Total feed intake, kg	1084.5	953.21	957.41	20.1
Period in days	102	96	97	1.0
Daily gain	1.05	1.08	1.07	0.06
Daily DM intake, kg	9.57	9.90	9.94	0.11
Feed efficiency, kg gain/kg DM intake	0.109	0.109	0.108	0.003
Period III	**(Ad libitum intake), to about 500 kg body weight.**			
Total gain, kg	44.89^{b}	53.78^{a}	55.56^{a}	3.88
Total feed intake, kg	415.8^{c}	502.35^{a}	451.44^{b}	34.97
Period in days	45^{b}	51^{a}	44^{b}	1.82
Daily gain	0.996^{c}	1.046^{b}	1.276^{a}	0.193
Daily DM intake, kg	9.24^{c}	9.85^{b}	10.26^{a}	0.23
Feed efficiency, kg gain/kg DM intake	0.108^{b}	0.106^{b}	0.124^{b}	0.07
Overall period				
Period in days	217	244	240	4.5
Total feed intake, kg	2160.26	2156.56	2135.85	30.11
Daily gain, kg	1.05	0.968	1.045	0.04
Daily (DM) intake, kg	9.879^{a}	9.017^{b}	9.169^{b}	0.01
Feed efficiency (kg gain/kg DM intake)	0.107	0.107	0.113	0.01

Averages in the same row having different superscripts are significantly different ($P \leq 0.05$).

Regarding animals carcass traits (Table 4) significant differences were obtained in carcass muscles, fat and bones.

However the differences in carcass muscles did not exceed 5% (absolute values). The general trend showed that the animals which fed on ad libitum system (No 1) trended to rank in a good situation among the other tested systems as the animals were grown in a suitable feeding conditions. These results agreed with finding of **Carstens *et al.* (1989)** with farm animals. Body composition (Table 5) was not affected greatly by the tested systems.

Table 4. Effect of feeding system on Baladi cow calves carcass traits.

Item	System			SE
	1	2	3	
Hot carcass weight, kg	297.17	282.92	293.34	8.36
Edible organs, kg	7.33	7.33	7.16	0.241
Dressing, %	60.9	60.05	60.1	0.52
Carcass muscle, kg	246.83[a]	237.62[b]	235.93[b]	18.931
Carcass fat, kg	14.09[b]	17.46[a]	16.16[a]	1.189
Carcass bone, kg	36.25[b]	37.85[b]	41.24[a]	0.810
Carcass muscle% of CW	83.06	81.12	80.43	1.949
Carcass fat %of CW	4.74[b]	5.96[a]	5.51[a]	0.915
Carcass bone% of CW	12.20[b]	12.92[b]	14.06[a]	1.132
Kidney, pelvic, heart fat%	4.17[a]	4.00[a]	3.89[b]	0.130

* carcass weight

Average in the same row having different superscripts are significantly different ($P \leq 0.05$).

Table 5. Effects of feeding system on Baladi cow calves body chemical Composition.

Item	System			
	1	2	3	SE
Water,%	53.1	54.9	55.6	0.92
Protein,%	14.5	14.9	15.0	0.22
Fat, %	30.9	28.5	27.5	1.19

The economical efficiency (Table 6) was in favor of the first system (ad lib. feeding of 11%CP diet). However the differences between such and the other systems did not exceed 4%.

Abdel-Salam, (2003) used two concentrate mixtures differing in their CP level (14 and 18%) and energy levels (66 & 76% TDN). They fed such concentrates at a rate of 3% of their body weight beside ad libitim wheat straw. Animals were fed for 140 days (200 kg body weight at the start α 360 kg at the end). They found growth performance of about 1 kg/day for all groups and the first group was more economic compared to the other groups. They estimated the intake and recalculated ration composition and found that the 11% CP one (the first) was the best. Such results cleared that the 1 kg daily gain is accepted and the lower protein diet is more accepted.

In conclusion under the experimental conditions, it seems that it is better to use the system which produced 1 kg gain/day in average for male Baladi calves weighing 280 kg in average up to 500 kg. Also it seems that the ad libitum feeding on 11%Cp diet (system 1) is more adequate and economic than other tested systems.

Table 6. Economical efficiency of the tested systems.

Feeding period	Systems		
	1	2	3
Feed needed /kg gain			
Period I	8.52	9.35	9.26
Period II	10.09	9.17	9.26
period III	9.26	9.36	8.13
Overall period	9.86	9.94	9.51
Feed cost per kg gain			
Period I	5.48	6.02	5.96
Period II	6.49	6.47	7.13
period III	5.96	6.01	5.23
Overall period	6.05	6.19	6.30
Relative%	100	102	104

Price of one kg of diets 1, 2 and 3 were 0.64, 0.71 and 0.77 L.E

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تأثير النظام الغذائي على أداء النمو وصفات الذبيحة في عجول الأبقار البلدية

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استخدام في هذه الدراسة ٤٤ عجل أبقار بلدية بمتوسط وزن ٢٨٠كجم لاختبار ثلاثة أنظمة غذائية. في النظام الأول غذيت الحيوانات حتى الشبع على عليقة ١١% بروتين حتى وصولها إلي وزن ٥٠٠كجم في الانظمة الأخرى غذيت الحيوانات لتحقيق زيادة يومية مقدارها ٠.٧٥كجم حتى ٧٥كجم زيادة كمرحلة أولى ثم تحقيق زيادة يومية مقدارها ٠.٩كجم حتى ١٠٠كجم زيادة كمرحلة ثانية ثم غذيت الحيوانات بعد ذلك حتى الشبع للوصول إلي وزن ٥٠٠كجم وكان تتابع الغذاء المقدم ١١، ١٣، ١١% بروتين خام في النظام الثاني و ١١، ١٥، ١١% بروتين خام في النظام الثالث

تشير النتائج أن عجول الأبقار البلدية العجول فى وزن ٢٨٠حتي ٥٠٠كجم زيادة مستوى البروتين الخام بالعليقة اثناء مراحل النمو يؤدى إلى زيادة تدريجية فى معدل نموها اثناء مراحل التغذية. تشير النتائج ايضا في هذه الدراسة ان الحيوانات التي غذيت حتى الشبع وكان نسبة البروتين الخام ١١% بروتين فى غذائها (النظام الأول) كان أفضل نظام تغذية استخدم. وهذا ما يؤكده معدلات نمو العجول ودراسة المعايير الاقتصادية.