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Effect of Feeding Guar (*Cyamopsis tetragonolobe)* Germ and Bran on Feedlot Performance and Carcass Yield of Friesian Cross bred Calves

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Abstract

The study was conducted to evaluate the effect of feeding guar germ and guar bran as replacement of groundnut cake and wheat bran, respectively in diets of crossbred fattening cattle. Fourteen crossbred Friesian young calves were divided into two groups (A) as control fed on pelleted feed and group (B) fed the experimental diet (guar mix) with an average initial live weight 144.2± 15.5 kg. Feed intake and live weight gain were collected on daily and weekly basis, respectively. Slaughter and carcass data were also collected. The control group was superior the experimental group the following parameters: Feeding period (101 days), feed conversion efficiency (5.04 DM/Kg live weight gain), weight gain (1.05 Kg/day) and daily dry matter intake (5.3 Kg). Control bulls have higher cold dressing out percentage on both full and empty body weight basis (59.8% and 57.8%, respectively). The Barrel circumference and pelvic width showed slightly higher values in the control group without any significant difference. For linear body measurements (cm), the head, hide, four feet, lungs, tracheas, spleen, intestine empty and omental fat were heavier in the control group of bulls. For the carcass yield and carcass characteristic of experimental bulls of the two groups were almost the same. However, the slaughter weight, cold carcass weight and empty body weight were found higher for the control group. For the non carcass components, the values fluctuated between the two groups, with no significant differences ($p>0.05$). Also no significant ($p>0.05$) differences were observed between the two groups for fat % and connective tissue % but the control group showed higher muscle and connective tissues while treated group showed higher fat and bone content. It concluded that guar germ and bran can effectively replace groundnut cake and wheat bran, respectively, in diets of fattening cattle.

Keywords: Guar, Baggara, fattening, groundnut cake

Introduction

Guar *(Cyamopsis tetragonloba*) meal is one of the industrial by-product remains after separating glactomannan gum from the guar seed. It is considered as a cheap protein source in ruminant and poultry nutrition. It has a potential value as animal feed with high protein content ranging between 45-55% (Subramanian and Parpia, 1975). The high content of protein offers a good source of essential amino acids (Smith *et al*., 1959, and Patel *et al*., 1970). Records indicated that man

had cultivated guar in the Indo-Pakistan for numerous generations.The current production tion of guar seed is concentrated in India, Pakistan, and United States where average yield is estimated at 353, 658 and 634kg/ha, respectively. It is also used as human food in 1935 by Agricultural Research Center (ARC). The aim was to diversify fodder products the attempt did not live long and suspended for no obvious reasons. In 1980 attention was again given in the Sudan to the guar where the S.G.C. began in collaboration with an American company to import the guar seed (S.G.C. 2001). With its high nutrients content and abundance guar can play an important role as animal feed to assist in filling feed gap for animal resources in Sudan. The objective of this study was to investigate the effect of using guar germ and bran on feedlot performance and meat production of Friesian cross bred calves.

Material and methods

Experimental animals and experimental procedure: Fourteen cross bred Friesian young calves born in Kenana dairy farm with an average live weight of 144.2±15.5 kg divided into two group stands as control fed on pelleted feed and group (B) fed the experimental diet (guar). Each group consisted of seven bulls; every bull was housed in a separate pen, provided with shade and good clean troughs for feed and water supply. The animals were kept for adaptation period of seven days during which they were fed the experimental diet in two meals daily (morning and afternoon).

The initial weight was considered after the end of the adaptation period. All the experimental young bulls were weighed at two week interval using a weighing balance before the morning meal. The intake was measured daily as the difference between the offered and refused feed at next morning.

Experimental feed was analyzed for determination of dry matter and proximate chemical analysis in Animal Production Research Center Nutrition Lap (Kuku, Khartoum N). Daily weight gain was calculated by dividing total weight gain over period in days. Feed conversion ratio was calculated as dry matter intake weight in Kg over weight gain in Kg. Six bulls were selected at random for slaughtering (three from each group). The bulls were trucked from Kenana Sugar Farm to Animal Production Research at Khartoum, Hilat kuku. The bulls were fed the same experimental diet. Feed during the last 12 hours before slaughtering and only the water was allowed. Bulls were slaughtered at average weight of 255Kg. The animals were slaughtered in the early morning according to Islamic procedure (Halal).Weights of all offal's and internal and external non carcass component were recorded. The gut fill was calculated as the difference between the alimentary tract components full and empty; thereafter the empty body weight was calculated by subtracting the gut fill from the slaughter weight

Warm carcass weight was obtained immediately after dressing and evisceration, then the carcasses were chilled at 4^0C for 24 hours. The carcasses were cut along the vertebral column into right and left side using sharp hand saw.

Each half carcass was then weighed cold. The left side was prepared for dissection after removing kidney and kidney knob channel fat. The carcass was split into 14 joints (whole sale cuts) according to methods described by Meat and Livestock Commission. Whole sale cuts were separated and weighed.

Student t- test was used to examine the differences in the data of the two groups.

Results and Discussion

Feedlot performance: as shown in Table (1) revealed that the daily dry matter intake, daily live weight gain and feed conversion efficiency for the two groups show no significant differences ($p>0.05$). The mean

live weight gain obtained in the current study was higher than that reported by Turki (2002) for the western Baggara bulls and that may be attributed to the different breed used. The average daily weight gain in crosses Friesian bulls for control feed (1.02 kg/day) and guar germ and bran (1.05 kg/day) was similar to that reported by REF for Kenana bulls (1.03 kg). It was slightly lower than that reported by Willis and Preston (1968) for Holstein (1.18 kg/day). The result of the current study was however higher than daily gain reported by Gumaa (1996) for Baggara bulls (0.94 kg/day) but agreed with the value reported by the same author for Kenana bulls (1.03 kg/day). Eltahir (1994) reported higher daily gain for Friesian crosses bulls than the current different result might be attributed to different age and different initial weight.

Feed conversion ratio showed no significant difference ($p>0.05$) between Friesian cross bred bulls fed control or guar containing meal; and both were better than that reported by Eltahir (2007) and Abdalla (1987) who obtained 6.5 and 7.7 dry matter intake per Kg live weight, respectively. That might be attributed to age, breed of animal or type of feed used. The current results were also in line with Thiessen *et al.* (1984).

Table 1: Effect of feeding guar meal on feedlot performance of Friesian cross bred bull calves

Parameter	Control	Treatment	S.E	L.S
No of bulls	7	7	-	-
Initial weight (kg)	140.5	141.4	6.2	N.S
Period (days)	101	103.1	4.7	N.S
Dry matter feed intake (kg/bull/day)	5.30	5.20	0.26	N.S
Final weight (kg)	254.5	249.9	1.9	N.S
Total gain (kg)	114.0	108.5	6.2	N.S
Gain per day (kg)	1.02	1.05	0.06	N.S
Feed convention ratio(FCR[1)])	5.04	5.1	0.27	N.S

In this and the following tables N.S. = $P< 0.05$

1) FCR = kg. DM feed/ kg. wt. gain

Table (2) shows linear body measurements of the experimental animals. The group fed guar showed slightly higher side length, body length and heart girth ($P>0.05$). The two groups showed nearly the same measurements for most parameters ($p> 0.05$). However, the control group had an insignificantly ($p> 0.05$) higher barrel circumference than the treated group of bull calves. Turki *et al.,* (2011) reported similar data for carcass length, leg length and leg width for Baggara bulls fed guar germ, but they reported higher linear measurement for shoulder circumference. Gaili and Osman (1979) reported carcass length as 112.7cm which is lower than the current study that may be attributed to the different breed used.

Table 2: Effect of feeding guar on linear body measurements (cm) of cross bred Frisian bull calves

Parameter	Control	Treatment	S.E	L.S
Side length	107.30	113.00	4.10	N.S
Body length	133.00	138.00	3.60	N.S
Heart length	143.00	145.00	1.10	N.S
Barrel circumference	183.00	174.30	1.70	N.S
Pelvic width	24.30	24.00	0.90	N.S
Height at rump	119.00	119.80	2.30	N.S
Height at wither	113.30	114.30	2.30	N.S
Face length	45.30	47.00	1.52	N.S

Non-carcass components as percentage of empty body weight were shown in Table (3). All non-carcass components showed no significant difference ($p>0.05$); but it is clear that the gastro intestinal tract was heavier in treated group with exception of empty intestine which was higher in the control group. Consistently the gut fill of the treatment group was 22.9% higher than that of the control. Head, hide, four feet, lung and trachea, spleen, intestine empty and omental fat, were heavier in control group of bulls ($P> 0.05$).

Table 3: The effect of feeding guar on % of empty body weight

Parameter	Treatment	Control	S.E	P. level
Number of bulls	3	3		
Blood	4.00	3.9	0.40	N.S
Head	5.50	5.80	0.24	N.S
Hide	6.30	6.80	0.51	N.S
Four feet	2.50	2.60	0.14	N.S
Genitalia	0.56	0.57	0.03	N.S
Lungs &trachea	1.48	1.59	0.05	N.S
Pancreas	0.12	0.11	0.009	N.S
Spleen	0.14	0.19	0.06	N.S
Heart	0.42	0.41	0.02	N.S
Diaphragm	0.60	0.62	0.04	N.S
Tail	0.30	0.31	0.02	N.S
Rumen full	14.30	10.80	1.37	N.S
Rumen empty	2.46	2.23	0.10	N.S
Omasum full	2.90	2.70	0.40	N.S
Omasum empty	1.02	1.01	0.13	N.S
Abomasum full	1.59	1.42	0.20	N.S
Abomasum empty	0.77	0.73	0.13	N.S
Intestine full	7.30	6.80	0.40	N.S
Intestine empty	2.86	3.10	0.18	N.S
Gut fill	19.07	14.70	1.30	N.S
Liver	1.30	1.40	0.10	N.S
Mesenteric fat	0.30	0.30	0.10	N.S
Omental fat	0.56	0.62	0.08	N.S
Kidneys	0.29	0.30	0.03	N.S

It is noteworthy that head, hide, four feet, heart, alimentary tract are early maturing tissues which decrease in percentage as animal grows older (Owen *et al.,* 1982). The current results were lower than those reported by Eltahir (2007) who studied tropical Baggara bulls. Mohamed *et al.,* (2012) studied Baggara bulls fed different type of roughages and reported higher non carcass component percentage of empty body weight

than understudied bulls. This might indicate that Frisian bulls studied have lower non carcass component and hence higher dressing percentage than tropical breeds.

The percentage of heart, lungs and trachea, four feet and tail (0.42, 1.4, 2.5 and 0.3% respectively) are highly consistent with the results (0.41, 1.4, 2.4 and 0.3%, respectively) reported by Eltahir (1994). While the liver percentage was approximately the same as that reported by El Shafie *et al.* (1976).

Carcass yield as shown in Table (4) revealed animals fed guar were 6.3% lower in empty body weight and hot carcass weight. However the difference in slaughter weights is 1.3% lower for the treated group compared to the control ; and dressing percentage of hot and chilled carcass weight on both slaughter and EBW basis showed non-significant difference Eltahir (2000) reported lower chilled dressing percentage for Frisian crosses calves and Baggara calves the same was true for the data reported by ElKhidir (2004). The current result was in line with Gregory *et al.,* (1994) who reported dressing percentage of 59.98% for cattle.

Table 4: Carcass yield and characteristics

Parameter	Treatment	control	S.E	P.level
Number of Calves	3	3		
Slaughter weight(kg)	253.3	256.6	3.4	NS
Hot carcass weight (kg)	122.6	130.8	2.9	N.S
Cold carcass weight (kg)	118.3	127.6	3.6	N.S
Empty body weight (kg)	205.01	218.80	4.63	N.S
Hot dressing% of slaughter weight	48.4	50.6	2.3	NS
Chilled dressing% of slaughter weight	46.7	50.4	3.2	NS
Hot dressing percentage of EBW	59.8	59.7	0.9	N.S
Chilled dressing of EBW	57.8	58.5	0.7	N.S

Muscle, fat and bone ratios were shown in Table (5). Muscle percentage of bulls fed guar meal were lower than the control group (60.5 versus 63.0 %) that is in line with the findings of Gumaa (1996) but lower than what was reported by Eltahir (1994). The difference may be attributed to the difference in age or breed used as reported by Lawrie (1998) who stated that carcasses of younger calves contain high percentage of bone and less percentage of fat.

Muscle percentage obtained in this study was lower than that reported by Keane (1994) who reported that Belgium Blue cattle breed had high percentage (64.7%) of muscle tissues, Elkhidir *et al.*, (1988) reported higher muscle and fat but lower bone percentage for Kenana bulls. The discrepancy might be due to age, breed and slaughter weight differences. Gaili and Osman (1979) reported 54.1%, 12.95% and 9.25 % for lean, bone and fats, respectively, for western Sudan Baggara bulls, these values showed lower muscles and bones content than the current study.

Table 5: Effect of feeding guar meal on carcass components of cross bred calves (% of carcass weight):

Parameter	Treatment	Control	S.E	P. level
Muscle	63.0	65.21	2.2	N.S
Fat	3.1	1.35	0.3	N.S
Bone	30.3	28.78	1.7	N.S
Connective tissue	3.6	4.66	2.2	N.S

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تاثير استخدام بذرة و ردة القوار علي اداء و نسبة التصافي في عجول الفريزيان المهجنة

حسناء محمد سليمان [1] و عبدالرحمن مجذوب محمد[2] و عمر عبدالرحيم الخضر[3] و أحمد خليل أحمد سليمان[1] و بابكر عبدالرازق النذير[2] ومزمل عطا علي[4]

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المستخلص:

اجريت هذه الدراسة لتقييم تاثير استخدام بذرة و ردة القوار كبديلين عن أمباز الفول و ردة القمح على التوالى لتسمين عجول هجائن الفريزيان. استخدم فى هذه التجربة 14 عجل و كان متوسط وزنها عند بداية فترة التسمين 144.2 ± 15.5 كجم تم تقسيمها الى مجموعتين متماثلتين فى الوزن. قدم للمجموعة الاولى (القياسية) عليقة كنانة المحببة و المجموعة الثانية عليقة القوار. جمعت معلومات عن معدل استهلاك العلف اليومى ومعدل الزيادة فى الوزن الحى اسبوعيا كما تم جمع معلومات عن الذبيحة ومخلفات الذبيح. أظهرت النتائج أفضلية نسبية للعليقة القياسية مقارنة بعليقة التجربة (القوار) دون وجود فارق معنوي. استغرقت التجربة 101 يوما. بالنسبة للمجموعة القياسية كان معدل كفاءة التحويل الغذائى 5.04 وزن مادة جافة / كجم اضافة فى الوزن الحى و معدل الزيادة اليومية 1.05 كجم بينما كانت كمية العلف الجاف المتناول يوميا 5.3 كجم مادة جافة. أظهرت المجموعة الأولى (القياسية) نسبة تصافى اعلى لجسم الذبيحة الباردة بالنسبة للوزن الفارغ و الممتلئ (59.8 % و57.8 %) على التوالى مقارنة بالمجموعة الأخرى (القوار) ان هذه الفروقات لم تكن معنوية ($P > 0.05$). بالنسبة لقياسات الجسم اظهرت الدراسة وجود اختلاف طفيف فى محيط البطن والحوض بين المجموعتين دون وجود اي فروقات معنوية ($P > 0.05$). بالنسبة لوزن كل من الراس و الجلد و الرئتيين و الطحال و الامعاء الفارغة و دهون المساريقا فقد وجد ان الوزن اكبر فى المجموعة القياسية مقارنة مع المجموعة الاخري (القوار). كما اظهرت النتائج تماثل فى وزن وصفات الذبيحة للمجموعتين بينما وجد ان الوزن الحى قبل الذبيح ووزن الذبيحة البارد ووزن الحيوان الفارغ اعلى فى المجموعة القياسية. لم يلاحظ وجود اى فروقات معنوية ($P > 0.05$) بين المجموعتين فى نسبة الدهون و نسبة الانسجة الضامة . المجموعة القياسية اعلى فى العضلات و الانسجة الضامة بينما المجموعة الثانية اعلى فى الدهون و نسبة العظام. كما اظهرت الدراسة عدم وجود فروقات معنوية بين المجموعتين فى نسبة الرطوبة والرماد والايثر ومحتويات البروتين.