

EFFECT OF PROTEIN LEVELS AND CASTRATION ON PERFORMANCE AND SOME BODY MEASUREMENTS OF MALE DESERT GOATS

M.O. Mudalal¹, D.K. Tarig², I. Bushara¹

¹Department of Animal Production, Faculty of Natural Resources and Environmental Studies, University of Kordofan, El-Obied, Sudan

²Ministry of Agriculture and Animal Wealth, Sudan

Abstract. The experiment was conducted in male desert goats to study the effect of protein levels and castration on performance and somebody measurements of male desert goats. Twenty four male desert goats aged 4-5 months and weighed 10 Kg were used in this study. The goats were divided into three groups of similar age and weight (8 males), every group was subdivided into two subgroup; (4 males) one was castrated (by using burdizo) and the other was left intact. Group one was *ad-libitum* fed on diet (A) (23 % crude protein), group two was fed *ad-libitum* on diet (B) (20% crude protein) and the third group was *ad-libitum* on diet (C) (18 % crude protein) in factorial experiment randomized complete design and the data was analyzed by statistics8 programme. The results revealed that crude protein levels had significant effect ($p<0.05$) on total, daily weights gain, total feed and daily feed intake, on the other hand castration and interaction of (crude protein levels and castration) had no significant effect ($p>0.05$) on total, final, daily weight gain, total, daily feed intake. Crude protein levels, castration and interaction had no significant effect ($p>0.05$) on heart girth and belly girth except the total change in belly girth which had significantly affected by crude protein levels. Interaction had significant effect ($p<0.05$) on total change on height at wither, but protein levels and castration had no significant effect ($p>0.05$) on height at wither and body length.

Keywords: desert goats, protein levels, castration, carcass and meat.

Corresponding Author: Dr. Ibrahim Bushara, Department of Animal Production, Faculty of Natural Resources and Environmental Studies, University of Kordofan El-Obied, Sudan,
e-mail: bushara3030@yahoo.com

Received: 11 February 2018; **Accepted:** 25 May 2018; **Published:** 31 August 2018

1. Introduction

The goat is an important animal for both meat and milk in Africa, Asia and the Far East and more important meat producing animals compared to sheep (Mahgoub & Lodge, 1998). Goat meat with its superior water holding capacity, dark red colour and low fat content could be a good raw material for meat processing and a healthy food commodity (Babiker *et al.*, 1999). Goat is one of the major livestock of the subcontinent in Sudan. They live mostly on grazing poor natural pastures in arid and semi area with no supplementary feeding. They live as scavengers in the streets of towns and cities requiring minimum care and attention despite the fact that they play a very important role in rural economy and provide many poor urban and rural families with milk and meat (Khadiga *et al.*, 2008). Most of the farmers manage their goats in free range system without supplementation. Kochapakdee *et al* (1994) reported that only grazing might not be sufficient for weight gain of goats. Energy and protein concentration of the diet play a significant role on growth of goats (Hadjipanayiotou *et al.*, 1996). Protein is an essential nutrient for animal growth and plays an important role in muscle growth

and animal development (Mtenga & Kitaly, 1990). In general, it is well known that feed intake increases with the increase in dietary CP level protein (Huston et al., 1988; Cheema *et al.*, 1991). Castration had significant effect ($p < 0.05$) on total changes in body length and height at wither (Mudalal, 2012). The objective of this research is to study the effect of protein levels and castration on performance and somebody measurements of male Sudan desert goats.

2. Materials and methods

This work was conducted at Animal Production Department, Faculty of Natural Resources and Environmental Studies, North Kordofan State, Sudan. Twenty four male desert goats aged 4-5 months and weighing 10 Kg were used in this study. The goats were divided randomly into three groups (8 males); each group was subdivided into two sub groups (4 males); one sub group was castrated (by using burdizo) while the other was left intact. Group one was *ad-libitum* fed on (Diet A) consist of (23% crude protein, 30% ground nut seed cake, 30% Dura grain fetareta, 19% wheat bran, 20% ground nut hay, 1% sodium chloride) given at a rate of 500 g/head/day. Group two was *ad-libitum* fed on (Diet B) consist of (20% crude protein, 20% ground nut seed cake, 30% Dura grain fetareta, 19% wheat bran, 30% ground nut hay, 1% sodium chloride) given at a rate of 500 g/head/day. Group three was *ad-libitum* fed on (Diet C) consist of (18% crude protein, 10% ground nut seed cake, 30% Dura grain fetareta, 19% wheat bran, 40% ground nut hay, 1% sodium chloride) given at a rate of 500 g/head/day. Feed intake estimated as the difference between feed offered and feed refusal. Live weight of each animal was recorded at the start of experiment, then weekly until the end of trial, using spring balance. The animals were weighed in the morning (before feeding), following over night fast except for water. The heart girth, body length, height at withers and belly girth of each animal were measured at the start of experiment, then weekly until the end of trial, using measuring tape.

3. Results and discussion

3.1 Effect of protein levels and castration on performance of male desert goats.

Protein levels had significant effect ($p < 0.05$) on daily, total body weight, daily feed intake and total feed intake Table 1. This result with in line with findings of Shahjalal et al. (2000) who study effect of diets with 16.9 and 20.3% CP in black Bengal goats indicated a higher live body weight gain with increasing dietary protein (20.3%) and was in line with Zundt et al. (2002) indicated a linear effect of protein level (12, 16, 20 and 24%) on average daily gain for lamb. This study was in disagreement with findings of Wiese et al. (2003) who found that increasing the dietary level of methionine by using Smartamine to Merino lambs did not lead to any increase in growth rate, daily feed intake, feed conversion or final body weight and was in disagreement with findings of Atti et al. (2004) and Soto-Navarro et al. (2004) who reported that the optimum crude protein level in growing goats concentrate (DM = 89.8%) for maximum performance is approximately 130 g/kg BW and that any increase above this level did not improve performance and in line with finding with of Ahn and Moon (1985) and Choi et al. (2005), who reported no significant differences in feed intake when sheep were fed diets with different CP levels which ranged from 9 to 13% and when Korean black goats consumed diets containing 12 to 18% C P, respectively.

This level of feeding protected methionine to goats which was reported by Wiese et al. (2003) caused very little effect on the studied traits and their effect was reduced significantly with high dietary crude protein feeding. These differences may be due to breed, feed type, stage of growth and environmental factors and different requirements of goats and lambs. Castration and interaction had no significant effect ($p>0.05$) on daily, total body weight and daily, total feed intake, this result in agreement with finding of Gizaw et al., (1991) and Abdullah et al., (2008) who reported that castration had no significant effect on body weight or average daily gain in Adal, Black and Arsi Bale.

Table1. Feed ingredient (% as fed) and chemical composition (%DM-basis)

<i>Type of diet ingredients of diet Item</i>	A	B	C
	%	%	%
Ground nut seed cake	30	20	10
Dura grain fetareta	30	30	30
Wheat bran	19	19	19
Ground nut hay	20	30	40
Sodium chloride	01	01	01
Chemical composition			
<i>Item</i>	%	%	%
Dry matter (DM)	93.5	93.4	93.2
Organic matter (OM)	87.0	86.5	86.0
Crude protein (CP)	23.7	20.6	18.4
Crude fiber (CF)	12.8	11.5	13.4
Ether extract (EE)	04.2	03.5	04.0
Nitrogen free extractive (NFE)	52.6	57.3	64.7
Ash	06.5	06.9	06.6
Energy density(ME/KgDM)	12.2	13.1	12.1

Calculated as in MAFF 1976.

3.2 Effect of protein levels and castration on heart and belly girth of male desert goats.

Protein levels had no significant ($p>0.05$) effect on final, total change in heart girth and final belly girth, but protein levels had significant ($p<0.05$) effect on total change in belly girth Table 2. For protein levels this result was disagreement with findings of Mudalal (2012) who claimed that nutrition had significant ($p<0.01$) effect on final, total change in heart girth, final and total change in belly girth, may be these differences may be due to breed, feed type, stage of growth and environmental factors, different requirements of goats and experiment period between the two studies. For castration this study was agreement with findings of Mudalal (2012) who reported that castration had no significant ($p>0.05$) differences on heart girth and belly girth.

3.3 Effect of protein levels and castration on height at withers and body length of male desert goats.

Protein levels and castration had no significant ($p>0.05$) effect on height at wither and body length, but the interaction had significant ($p<0.05$) on total change in height at wither Table 3. For protein levels This result was disagreement with findings of Mudalal (2012) who claimed that nutrition had significant ($p<0.01$) effect on final, total change in height at wither, final and total change in body length, these differences may

be due to breed, feed type, stage of growth and environmental factors, different requirements of goats and experiment period between the two studies.

For castration this study was in line with findings of Mudalal (2012) who reported that castration had no significant ($p>0.05$) differences on height at wither and body length.

Table 1. Effect of protein levels and castration on performance of male desert goats.

Crude protein levels	Initial body weight (kg)	Final body weight(kg)	Total weight Gain (Kg)	Daily weight(g)	Total feed intake (kg)	Daily feed intake (g)
A	12.61	13.70	1.09	20.53	23.09	435.64
B	12.70	13.27	0.57	11.32	23.85	450.81
C	13.94	13.45	0.51	9.66	24.08	454.32
SE	0.68NS	0.92NS	0.24*	4.32*	0.34*	6.48*
Castration						
Entire	13.01	13.83	0.82	15.89	23.67	446.63
Castrate	12.49	13.12	0.63	11.79	23.70	447.22
SE	0.68NS	0.92NS	0.20NS	3.53NS	0.28NS	5.29NS
Crude protein levels. X Castration						
Entire x A	13.07	13.92	0.85	16.07	22.69	428.07
Entire x B	13.10	13.93	0.83	16.98	24.27	457.90
Entire X C	12.85	13.63	0.78	14.61	24.06	453.92
Castrate X A	12.15	13.48	1.33	24.99	23.49	443.20
Castrate X B	12.30	12.60	0.30	0.05	23.52	443.73
Castrate X C	13.03	13.28	0.25	0.04	24.10	454.73
SE	0.97NS	1.31NS	0.34NS	6.11NS	0.49NS	9.19NS

A=crude protein 23%, B= crude protein 20%, C= crude protein 18%,* significant, NS= not significant

Table 2. Effect of protein levels and castration on heart girth and belly girth.

Crude protein levels	Initial heart girth (Cm)	Final heart girth (Cm)	Total change in heart girth (Cm)	Initial belly Girth (Cm)	Final belly Girth (Cm)	Total change in belly girth(Cm)
A	52.08	52.88	0.8	51.35	46.63	4.98
B	52.42	52.25	1.43	49.65	47.00	3.15
C	53.09	52.75	2.59	52.62	45.63	7.00
SE	1.44NS	1.33NS	1.00NS	1.74NS	0.95NS	1.43 *
Castration						
Entire	52.68	52.42	1.26	51.94	46.42	5.86
Castrate	52.38	52.83	2.38	50.47	46.42	4.23
SE	1.18NS	1.09NS	0.81NS	1.42NS	0.78NS	1.17NS
Crude protein levels. Castration						
Entire x A	52.13	52.00	0.63	52.08	47.75	4.83
Entire x B	52.22	53.25	1.48	51.25	47.25	4.50
Entire X C	52.68	52.00	1.68	52.50	44.25	8.25
A Cast	52.03	53.75	2.28	50.62	46.00	5.13
Castrate X B	51.63	51.25	1.38	48.05	46.25	1.80
Castrate X C	53.50	53.50	3.50	52.75	47.00	5.75
SE	2.04NS	1.9NS	1.41NS	2.47NS	1.34NS	2.02NS

A=crude protein 23%, B=crude protein 20%, C=crude protein 18%,* significant, NS= not significant

Table 3. Effect of protein levels and castration on height at withers and body length.

Crude protein levels	Initial height at wither (Cm)	Final height at wither (Cm)	Total change in height at wither (Cm)	Initial body length (Cm)	Final body length (Cm)	Total change in body length (Cm)
A	54.70	60.00	5.63	55.79	54.75	3.50
B	55.67	58.25	3.55	57.81	53.00	4.69
C	55.81	59.63	4.69	58.43	55.00	3.69
SE	1.24NS	1.91NS	1.68NS	2.49NS	2.23NS	1.64NS
Castration						
Entire	55.86	58.67	3.69	57.83	54.75	3.73
Castrate	54.92	59.91	5.56	56.86	53.75	4.17
SE	1.01NS	1.56NS	1.37NS	2.03NS	1.82NS	1.34NS
Crude protein levels.						
Castration						
Entire x A	54.52	60.50	6.52A	54.50	53.00	3.00
Entire x B	55.75	58.25	3.50A	59.63	54.75	4.88
Entire X C	57.30	57.25	1.05AB	59.38	56.50	3.30
Castrate X A	54.88	59.59	4.75AB	57.08	56.50	4.00
Castrate X B	55.58	58.25	3.60AB	56.00	51.25	4.50
Castrate X C	54.32	62.00	8.32B	57.50	53.50	4.00
SE	1.77NS	2.71NS	2.37 *	3.42NS	3.16NS	2.31NS

A=crude protein 23%, B= crude protein 20%, C= crude protein 18%, *= significant, NS= not significant

4. Conclusions

It could be concluded that the 23% crude protein had achieved higher total, daily weight gain and had no significant differences on heart; belly girth and height at wither and body length. Castration had no significant differences on above parameters.

References

- Abdullah, A.Y., Awawdeh, F.T., Musallam, H.S., Titi, H.H., Obeidat, B.S., Kridli, R.T., ... & Ishmais, M.A. (2008). Performance and carcass characteristics of intact and castrated male Black goat kids fed diets of various energy levels. *Australian Journal of Experimental Agriculture*, 48(9), 1217-1224.
- Ahn, B.H., & Moon, Y.H. (1985). Effect of dietary protein and calcium levels on nutrition in sheep, 1: effect of dietary protein and calcium levels on digestibility, nitrogen balance and some mineral retention in sheep. *Korean Journal of Animal Sciences*, 27, 507-514.
- Atti, N., Rouissi, H., & Mahouachi, M. (2004). The effect of dietary crude protein level on growth, carcass and meat composition of male goat kids in Tunisia. *Small Ruminant Research*, 54(1-2), 89-97.
- Babiker, S.A., El Khider, I.A., & Shafie, S.A. (1990). Chemical composition and quality attributes of goat meat and lamb. *Meat science*, 28(4), 273-277.
- Cheema, A.U., Galyean, M.L., Caton, J.S., & Freeman, A.S. (1991). Influence of protein levels and naloxone on intake, nitrogen metabolism and digestion kinetics in lambs fed oat hay or barley straw. *Small Ruminant Research*, 5(1), 35-46.
- Choi, S.H., Kim, S.W., Park, B.Y., Sang, B.D., Kim, Y.K., Myung, J.H., & Hur, S.N. (2005). Effects of dietary crude protein level on growth and meat quality of Korean native goats. *Journal of Animal Science and Technology*, 47(5), 783-788.
- Gizaw, S., Fletcher, I., Kebede, G., & Yacob, Y. (1993). Effects of castration and supplementary feeding on growth, carcass characteristics, and market value of Adal

- goats. In 4. *National Livestock Improvement Conference, Addis Abeba (Ethiopia), 13-15 Nov 1991*. IAR.
- Hadjipanayiotou, M., Koumas, A., Hadjigavriel, G., Antoniou, I., Photiou, A., & Theodoridou, M. (1996). Feeding dairy ewes and goats and growing lambs and kids mixtures of protein supplements. *Small Ruminant Research*, 21(3), 203-211.
- Huston, J.E., Engdahl, B.S., & Bales, K.W. (1988). Intake and digestibility in sheep and goats fed three forages with different levels of supplemental protein. *Small Ruminant Research*, 1(1), 81-92.
- Khadiga M.E. Balla., Mohamed-Khair A. Ahmed., Musa M.A. (2008). Estimates of phenotypic and genetic parameters of growth trails in Sudanese Nubian Goats. *Research Journal of Animal and Veterinary Science*, 3, 9 -14.
- Kochapakdee, S., Pralomkarn, W., Saithanoo, S., Lawpetchara, A., & Norton, B.W. (1994). Grazing management studies with Thai goats. I. Productivity of female goats grazing newly established pasture with varying levels of supplementary feeding. *Asian Aust. J. Anim. Sci.*, 7, 289-293.
- MAFF, Technical bulletin 33- energy allowances and feeding systems for ruminants. London: HoMeS.O.1976.
- Mahgoub, O., & Lodge, G.A. (1996). Growth and body composition in meat production of Omani Batina goats. *Small Ruminant Research*, 19(3), 233-246.
- Mtenga, L.A., & Kitaly, A.J. (1990). Growth performance and carcass characteristics of Tanzanian goats fed *Chloris gayana* hay with different levels of protein supplement. *Small Ruminant Research*, 3(1), 1-8.
- Mudalal, O.M. (2012). Effect of nutrition and castration on meat production of Sudanese male desert goat. PhD. Thesis, Univ. of Khartoum, Sudan.
- Shahjalal, M., Bishwas, M.A., Tareque, A.M., & Dohi, H. (2000). Growth and carcass characteristics of goats given diets varying protein concentration and feeding level. *Asian Australasian Journal of Animal Sciences*, 13(5), 613-618.
- Soto-Navarro, S.A., Goetsch, A.L., Sahl, T., & Puchala, R. (2004). Effects of level and source of supplemental protein in a concentrate-based diet on growth performance of Boer Spanish wether goats. *Small ruminant research*, 51(1), 101-106.
- Wiese, S.C., White, C.L., Masters, D.G., Milton, J.T.B., & Davidson, R.H. (2003). Growth and carcass characteristics of prime lambs fed diets containing urea, lupins or canola meal as a crude protein source. *Australian Journal of Experimental Agriculture*, 43(10), 1193-1197.
- Zundt, M., Macedo, F.A.F., Martins, E.N., Mexia, A.A., & Yamamoto, S.M. (2002). Desempenho de cordeiros alimentados com diferentes níveis protéicos. *Revista Brasileira de Zootecnia*, 31(3), 1307-1314.