JANA NEXUS: JOURNAL OF AGRICULTURAL, VETERINARY AND ENVIRONMENTAL SCIENCES

ISSN(O): 3139-0765

Journal Homepage: www. jananexusaves.com

JN:JAVES, Volume 02, Issue 7 *July 2026, 02(7)* *01- 06*

| RESEARCH ARTICLE

Article DOI: 10.21474/JNAVES01/140
DOI URL: http://dx.doi.org/10.21474/ JNAVES01/140

EFFECT OF CASTRATION AND DIETARY PROTEIN LEVELS ON CARCASS MEASUREMENTS AND CARCASS COMPOSITION OF MALE DESERT GOATS

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| ABSTRACT

The experiment was conducted to evaluate the effect of castration of male desert goat and dietary protein levels on carcass measurements, carcass composition of male desert goat. Weanling Desert goat kids (n=24; 4-5 month old and weighed 10 Kg) were used in work. The experimental animals were divided randomly into main three groups, similar in age and weight (8 males), each main group divided into two subgroup; (4 males) one of each subgroup was castrated (by using castrator) and the other was left entire. Group one was fed on diet (A) (23 % crude protein), group two was fed on diet (B) (20 % crude protein) and the third group was fed on diet (C) (18 % crude protein) in factorial experiment randomized complete design and the data was analyzed by statistic 8,version2.0 The results claimed that castration had significant (P<0.05) effect on external chest length and distal fore leg length and had no significant (P>0.05) effect on the other carcass measurements.

| KEYWORDS

Desert goats, protein levels, castration, carcass composition, carcass measurements.

| ARTICLE INFORMATION

RECEIVED: 08 May 2026 **ACCEPTED**: 10 June 2026 **PUBLISHED:** July 2026

Abstract:-

The experiment was conducted to evaluate the effect of castration of male desert goat and dietary protein levels on carcass measurements, carcass composition of male desert goat. Weanling Desert goat kids (n=24; 4-5 month old and weighed 10 Kg) were used in work. The experimental animals were divided randomly into main three groups, similar in age and weight (8 males), each main group divided into two subgroup; (4 males) one of each subgroup was castrated (by using castrator) and the other was left entire. Group one was fed on diet (A) (23 % crude protein), group two was fed on diet (B) (20 % crude protein) and the third group was fed on diet (C) (18 % crude protein) in factorial experiment randomized complete design and the data was analyzed by statistic 8,version2.0 The results claimed that castration had significant (P<0.05) effect on external chest length and distal fore leg length and had no significant (P>0.05) effect on the other carcass measurements. Protein levels had significant (P<0.05) effect on external chest, on the other hand, protein levels had no significant (P>0.05) effect on the other parts of carcass measurements. The interaction of (castration vs. protein levels) had significant (P<0.05) effect on distal foreleg length and proximal foreleg length.

Introduction:-

Goat is more distributable animal around the world, their meat highly demanded in many developing and subtropical countries (Caey et al., 2003) [1].The world total number of goats was estimated 861.9 million head [2]. Meat of goat (chevon) characterized by (lower fat and high muscle shear force) these attributes made chevon more attractive and healthier for human consumption compared to beef and mutton meat (McMillin and Brock, 2005) [3]. The indigenous desert goats are found in arid and semi arid areas of Sudan especially in the Kordofan and Darfor and live under adverse conditions, grazing on poor natural pastures with no supplementary feeding. They play crucial role in rural economy by cash and providing many poor urban and

rural families with milk and meat [4]. Animal protein requirements depend on species, breed, age, and physiological status and environment factors. Energy and protein concentration of the diet play a significant role on growth of goats [5]. Protein is an essential nutrient for animal growth and plays an important role in muscle growth and animal development [6]. In general, it is well known that feed intake increases with the increase in dietary CP level protein [7] and [8]. Nowadays the concept of protected protein/amino acid, such as protected methionine as first limiting amino acid was introduced to market using technology for maximum absorption in the small intestine tract (Shan et al., 2007) [9]. Castration had significant effect ($p<0.05$) on total changes in body length and height at wither [10]. NRC [11] Identifies the nutrient requirements of international temperate breeds which are not applicable to our desert goat. Unfortunately, there is a few data on desert goat protein requirements in Sudan. Therefore, this work was designed to investigate effect of castration of male desert goats and protein levels on carcass measurements and carcass composition.

Materials and Methods:-

Materials:-

24 male Desert goats, castrator, oven, knives, measuring tape. Balance loading 50Kg , diet and Pens.

Methods:-

Study area

This work was conducted at the Farm of Animal Production Department (long30.24037E and lat13.20372N), Faculty of Natural Resources and Environ- mental Studies, Kordofan University North Kordofan State, Sudan. North Kordofan State, located in the West of Sudan in arid and semi-arid zone, it characterized by adverse conditions of feed limitation and waters scarcity. The covering plant consist of acacia spp trees and shrubs and annual plant and green grass

Experimental Animals:-

This work was conducted at Animal Production Department, Faculty of Natural Resources and Environmental Studies, North Kordofan State, Sudan. Twenty four Desert kids male 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 Castrator) while the other was left entire.

Feed Intake:-

Group one was fed on (diet, A) (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 fed on (diet, B) (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 fed on (diet C) (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 calculated as the difference between feed offered and feed refusal. Daily feed samples were collected; dry matter estimated by dried the samples in an oven at 65c0 for chemical analysis as out lined by the [12]

Slaughter, Dressing and Weighing:-

Twelve animals (four from each treatment group) were slaughtered at the end of experiment .Islamic slaughter was done by using a knife to cut the jugular veins and carotid arteries , the slaughtered animal was immediately hoisted by the hind legs to bleed, removed the head, the fore and hind feet, skinning and evisceration were done. The offal, including gut content, was weighed. The hot carcass weighed and recorded. The carcass was split up along the vertebral column .The carcass halves were weighed and recorded.

Carcass Measurements:-

Carcass measurements were measured as in [13] and included**:-**

- Carcass length: measurement from the enterior edge of the puplic symphysis to the middle of the anterior f edge of the first rib.
- Distal foreleg length; measured from the point of the foot at the carpals (knees to the elbow.
- Proximal foreleg length: measured from the elbow to the shoulder joint.
- Distal hind leg length: measured from the point of the feet at the larsals (hock) to patella.
- Proximal hind leg length: measured from the patella to the hip joint.
- Circumference of fore leg: measured around the thickest portion between the elbow and shoulder.
- Circumference of hind led: measured around the patella and over the pin bones.
- Internal chest depth: measured from the dorsal edge of the ninth thoracic vertebra to the xiphoid cartilage in a straight live.
- External chest depth: measured from the dorsal surface of carcass over the dorsal surface of the carcass over the ninth vertebra to the Xiophoid cartilage in a straight live.

Carcass Composition:-
Carcass composition was measured by weighing dissected tissue (muscle, bone, and fat). Carcass were cut into wholesale cuts .Each cut was anatomized into lean, fat and bone and each tissue separately were weighed .Anatomy was done in the Laboratory as illustrated by [14].Because of the high temperate in the un cold Laboratory; the separated tissue were covered with a wetted cloth during dissection to reduced evaporation losses.

Results:-

Effect of castration and dietary protein levels on carcass measurements of male Desert goat (Cm):-
Castration had significant ($P<0.05$) effect on external chest length and distal foreleg length and had no significant ($P>0.05$) effect on the other parts of carcass measurements table, 2

Effect of castration and dietary protein levels on carcass composition of male Desert goats:-
Castration, protein levels and the interaction had no significant ($P>0.05$) effect on carcass composition table, 3.

Discussion:-

Effect of castration and dietary protein levels on carcass measurements of male Desert goat (Cm):-
Castration had significant ($P<0.05$) effect on external chest length and distal foreleg length and had no significant ($P>0.05$) effect on the other parts of carcass measurements table, 2This result was confirm with the findings of [13] who found that castration had significant ($P>0.05$) effect on some carcass, body measurement of male Desert goats and the interaction of (nutrition vs. castration) had significant ($P<0.05$) effect on distal foreleg length, distal hind leg length and hind leg circumference. Same results were supported by report suggested that castration had no significant ($P>0.05$) effect on carcass measurements (carcass length, internal and external chest length, distal and proximal foreleg length, distal and proximal hind leg length, distal and proximal circumference [15]. Protein levels had significant ($P<0.05$) effect on external chest length. On the other hand, protein levels had no significant ($P>0.05$) effect on other parts of carcass measurements table, 2. This result was in line with the findings of [16] who claimed that protein level had not affected the growth rate, slaughter weight, carcass yield, non carcass component and carcass composition and agreement with the findings of [14] who found that nutrition had significant ($P<0.05$) effect on some carcass measurement of male desert goats. The interaction of (castration vs. protein levels) had significant ($P<0.05$) effect on distal foreleg length and proximal foreleg length table, 2. This result was in line with the findings of [13]) who found that the interaction of (nutrition vs. castration) had significant ($P<0.05$) effect on distal foreleg length, distal hind leg length and hind leg circumference.

Effect of castration and dietary protein levels on carcass composition of male Desert goats:-
Castration, protein levels and the interaction had no significant ($P>0.05$) effect on carcass composition table, 3. For castration this result was in consistent with finding of [13] who pointed that castration result in non significant increase in tissue distribution in the carcass fat, muscle and bone of male Desert goats and was in disagreement with the findings of [17] who reported that castrated male goat of 4- months age increase muscle weight ($P<0.05$) and fat weight $P<0.001$) and increase in intramuscular fat and tenderness of the meat. Castrated male goat of 6- months of age increase $P<0.05$) in intramuscular fat and tenderness of meat and decrease in redness and cooking loss. This result agreed with [18] who reported that intact kids showed higher muscle percentage and lower fat percentage in male Black goat kids. [18] and [19] who found that castrated kids had lower carcass muscle percentage but higher subcutaneous fat percentage than intact. For protein levels, these results were in agreement with the finding of [20] who claimed that muscle, bone and adipose tissue mean weights did not follow the increase of protein levels in the diet, these results also were in line with [15] who stated that protein levels had not affect significantly the growth rate, slaughter weight, carcass yield, non carcass components and carcass composition of growing sheep from three breeds. Bone is a tissue with early development in all-animal species and does not depend on regimen at older ages. On the other hand, muscle and especially fat depots depend on nutrient utilization. Animals fed medium CP diet had more muscle than those receiving a diet rich on CP, and nitrogen was efficiently used in the medium (130 g/kg DM) than in the high (160 g/kg DM) protein diet. Furthermore, meat of kids receiving the medium diet contented more protein and less fat in LD muscle than that of goats on high protein diet. Such a result suggests that 130 g CP/kg DM could be an optimum dietary nitrogen level for growing kids. Other dietary factors could change deposition and distribution of lean tissues in kids. For the interaction of (protein levels vs. castration) this result was in consistent with finding of [13] who reported that the interaction of (protein levels vs. castration) had no significant ($P>0.05$) effect on carcass composition (fat, bone and muscle).

Conclusion:-

The study concluded that castration had significant ($P<0.05$) effect on external chest and distal foreleg length. Protein levels had significant ($P<0.05$) effect on external chest length. The interaction of castration Vs protein levels had significant ($P<0.05$)

effect on distal and proximal foreleg length. Castration, protein levels and interaction had no significant (P>0.05) effect on carcass composition

Conflicts of Interest:-

Authors should clarify that the there is no conflict of interest with any financial, personal or other relationships with other people or organizations related to the material discussed in the manuscript.

Table,1. Feed ingredient (% as fed) and chemical composition (%DM-basis).

Type f diet	A	B	C
Ingredients of diet Item	%	%	%
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			
Item	%	%	%
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 [21]. DM= Dry matter, OM= Organic matter, CP= Crude protein, CF= Crude fiber EE= Ether extract, NFE= Nitrogen free extractive, ME= metablizable energy Diet, A 23% crude protein, Diet, B 20% crude protein) Diet, C 18% crude protein

Table, 2. Effect of castration and dietary protein levels on carcass measurements of male Desert goats (Cm).

Treatment	No. of anim	Carcass length (Cm)	Internal chest length (Cm)	external chest length (Cm	Distal foreleg length (Cm)	Proximal foreleg length (Cm)	Distal hind leg length (Cm)	proximal foreleg length (Cm)
castration								
intact	12	48.7	18.4	22.5	17.5	14.1	23.4	15.4
castrated	12	48.9	19.2	22.7	18.8	15.0	24.5	16.1
SE		1.7NS	0.8NS	0.9*	0.5*	0.4NS	1.0NS	0.9NS
Protein levels								
A	8	48.4	17.9	20.5^{B}	17.9	14.3	23.4	15.5
B	8	48.5	19.5	23.4^{A}	18.6	14.4	24.3	16.3
C	8	49.5	19.0	23.8^{A}	18.6	14.9	24.1	15.6
SE		2.1NS	0.9NS	1.1*	0.7NS	0.5NS	1.2NS	1.1NS
Castration X protein levels								
AX intact	4	49.0	17.8	20.5	17.8^{AB}	15.5^{AB}	22.3	15.8
AX castrate	4	47.7	18.0	20.5	18.0^{AB}	14.0^{AB}	24.5	15.3
BX intact	4	48.5	19.0	23.4	17.3^{B}	13.3^{B}	23.7	15.0
BX castrate	4	48.5	20.0	23.5	20.0^{A}	15.5^{A}	25.0	17.5
CX intact	4	48.5	18.8	23.5	17.5^{B}	14.5^{AB}	24.3	15.5
CX castrate	4	50.5	19.5	24.0	18.5^{AB}	15.4^{A}	24.0	15.8
SE		3.0NS	1.4NS	1.6NS	0.9*		1.8NS	1.8NS

*= (P<0.05), NS= not significant. A and B in the same column with different superscripts are different at (P>0.05)) Diet, A 23% crude protein, Diet, B 20% crude protein, Diet, C 18% crude protein

Table, 3. Effect of castration and dietary protein levels on carcass composition of male Desert

Treatment	No. of animals	Total fat (kg)	Total muscle (Kg)	Total bone (Kg)
castration				
intact	12	12.8	13.8	0.8
castrated	12	12.4	21.2	10.5
SE		0.6NS	0.8NS	0.2NS
Protein levels				
A	8	1.3	26.2	0.9
B	8	1.6	13.3	0.6
C	8	1.2	13.1	0.5
SE		0.4NS	0.9NS	0.3NS
Castration X protein levels				
AX intact	4	12.6	13.9	0.9
AX castrate	4	12.6	12.5	0.9
BX intact	4	13.1	13.9	0.9
BX castrate	4	12.3	12.6	0.3
CX intact	4	12.9	13.6	0.8
CX castrate	4	12.4	12.7	0.3
SE		1.0NS	1.3NS	0.4NS

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

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