



# Effect of Age and Castration on Primal Cuts, Carcass Composition, Heart Girth and Some Non Carcass and Internal Components of Male Desert Goats

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## Abstract

The experiment was conducted in male Desert goats to investigate the effect of age and castration on primal cuts, carcass composition, heart girth and some non carcass and internal components of male Desert goats. Twenty male Desert goats were used in this study. Ten mature bucks 9-12 months of age and average weighing 12.8Kg (11.8-13.9Kg), the other ten were immature kids 3-5 months of age and average weighing 9.7 kg (9.4-10.0Kg). The goats were divided into two groups, immature kid group 10 males and mature buck group 10 males. Each group was divided into subgroup; one subgroup was castrated, while the other subgroup was left intact in a factorial experiment randomized complete block design. The result revealed that age had no significant effect ( $p>0.05$ ) on primal cuts and carcass composition unless breast cut, the age had significant effect ( $p<0.01$ ) on heart girth, head, skin and feet and had no effect ( $p>0.05$ ) on intestine and four stomach. Castration management had no significant ( $p>0.05$ ) effect on primal cuts, carcass components, heart girth, head, skin and feet except breast cut, intestine and four stomach.

**Keywords:** Desert Goats; Age; Castration; Carcass; Non Carcass Components

## Abbreviations

ANOVA: Analysis of Variance.

## Introduction

Goats farming are practiced throughout the world, with goat products having a favorable image [1]. The number of goats has increased ecumenically, even countries with high and intermediate income [1]. In the tropics, meat is most important product raising goats. Goat meat account for about 30% of meat consumed in Africa [2] and most people prefer goat meat to other kinds of meat [3]. This preference due to attributes such as high tenderness and juiciness [4]. In addition, there are no religious or traditional taboos

against goat meat. Thus this product is an important source of animal protein in rural area. Sudan Desert goats are found in arid and semi arid area of Sudan, especially in Kordofan and Darfour region and are adapted to survive under adverse conditions of feed limitation and water scarcity [5]. Goats have been a common source of meat in many tropical and developing countries and they are more important meat producing animals compared to sheep. The age and sex of the goat influence meat properties and relative value. Young goats generally produce more tender meat than older goats [6-8]. Castration may reduce performance [9]. The presence of testicular hormones is related to greater muscle growth capacity in intact males [10]. The objective of this research is to study the effect of age and castration on primal cuts, carcass composition, heart girth and some non carcass and

internal components of male Desert goats.

## Materials and Methods

### Experimental Animals and Treatments

This work was conducted at El-Obeid Agricultural Research Station, North Kordofan State, Sudan. Twenty male Desert goats were used in this study. Ten males were mature bucks aged 9-12 months and average weighing 12.8 Kg ranged between (11.8-13.9) while the other ten were immature kids aged 3- 5months and average weighing 9.7 Kg ranged between (9.4-10.0). The males were divided randomly into two group; group one 10 immature kids, group two 10 mature bucks, each group was subdivided into two subgroups; 5 males per each subgroup; one subgroup was castrated, while the other subgroup was left intact. Each animal was provided with individual feeding and water troughs. Animals were allowed water once daily and feed was offered ad-libitum. The diet consisted of (18%) ground nut seed cake, (9%) wheat bran, (ferareta 9%) sorghum grain, (1%) mineral block and forage legumes hay mixture (*Cajanus cajanus*, *Lablab* and *Cyamopsis teteragonoloba* dried and mixed on equal proportions) at an inclusion rate of 63%. The chemical composition of experimental diet was shown in Table 1.

Ingredients	(%)
Forage legume hay	63
Ground nut seed cake	18
Wheat bran	9
Sorghum grains	9
Ground salt lick brick	1
Chemical composition: Item	(%)
Dry matter (DM)	95.7
Organic matter (OM)	79.6
Crude protein (CP)	13.4
Crude fiber (CF)	22.5
Ether extract (EE)	18
Nitrogen free extractive (NFE)	25.7
Ash	16.1
Energy density (MJME/KgDM) <sup>a</sup>	9.25
Calcium (%)	0.91
Phosphorus (%)	0.42
Vitamin D3	400IU/Kg

Energy density (MJME/Kg DM) was calculated according to McDonald et al. 1996.

**Table 1:** Feed Ingredient (% as Fed) and Chemical Composition (%DM-Basis).

Live weight and heart girth of each animal was recorded at the start of experiment then weekly until the end of experiment (49 days) using spring balance. The animals were weighed in the morning (before feeding) following over night fast.

### Slaughter Procedure and Data Collection

Ten animals were slaughtered during experiment. Two animals were slaughtered at the beginning of the trial (these were meant to represent the four treatments combination) then four animals were slaughtered every 23 days until the end of experiment. Prior to slaughter, each animal was weighed to get live body weight. Slaughter was performed according to Muslim practice by severing jugular vessels, esophagus and trachea without stunning. Following skinning and evisceration the external and internal offals including gut content were weighed. The hot carcass weight was recorded; the carcass was split along mid line. The weights of the carcass halves were registered. The left half was cut into wholesale cuts, each cut was dissected into muscle, fat and bone and then tissues separately were weighed, dissection was carried out according to procedure outlined by Arnold AM, et al. [11].

### Statistical Analysis

The data was analyzed using analysis of variance (ANOVA) according to Cuthberton AG, et al. [12].

## Results

### Chemical Composition of Diet (%DM-Basis)

The chemical composition of the current diet revealed that 95.7, 79.6, 13.4, 22.5 and 18.0 for dry matter, organic matter, crude protein, crude fiber and ether extract respectively.

### Effect of Age on Primal Cuts, Carcass Composition, Heart Girth, and Some Non Carcass and Internal Components of Male Desert Goats

The age had no significant ( $P>0.0$ ) effect on primal cuts, except breast cut which had significant ( $P<0.01$ ) affected by age, on the other hand, leg and shoulder had recorded relatively higher values compared with other cuts. The age had on significant ( $P>0.0$ ) effect on carcass composition, but relatively mature buck had registered values 0.042, 0.026, 0.028 and 0.005 for muscle, fat, bone and connective tissue respectively. The study exposed that the initial and final heart girth were affected significantly ( $P<0.01$ ) by age. The age had significant ( $P<0.01$ ) effect on head, skin and feet, on the hand, age had no significant ( $P>0.0$ ) effect on intestine and four stomachs (Table 2).

Parameters	No. of animals	Immature kid	Mature buck	Se
<b>Cuts (Kg)</b>				
Leg	6	1.65	1.65	0.169NS
Loin	6	0.42	0.44	0.065NS
Rack	6	0.45	0.44	0.041NS
Shoulder	6	1.60	1.60	0.166NS
Breast	6	0.82	0.97	0.037**
<b>Carcass composition (Kg)</b>				
Muscle	6	0.002	0.042	0.0172NS
Fat	6	0.015	0.026	0.0244NS
Bone	6	0.025	0.028	0.0060NS
Connective tissue	6	0.002	0.005	0.004NS
Lean: bone	6	2.896	2.888	0.3720NS
<b>Body measurements (Cm)</b>				
Initial heart girth	10	45.4	52.50	1.176**
Final heart girth	10	52.00	56.60	0.704**
Total	10	1.04	0.57	0.192NS
<b>Non carcass components (Kg)</b>				
Head	6	0.69	0.89	0.039**
Skin	6	0.70	0.91	0.059**
Feet	6	0.28	0.39	0.028*
<b>Internal components (Kg)</b>				
Intestine	6	0.6	0.71	0.042NS
Four stomach	6	0.44	0.51	0.026NS

**Table 2:** Effect of Age on Primal Cuts, Carcass Composition, Heart Girth, and Some Non Carcass and Internal Components of Male Desert Goats.

### Effect of Castration on Primal Cuts, Carcass Composition, Heart Girth, and Some Non Carcass and Internal Components of Male Desert Goats

Castration had no significant ( $P>0.0$ ) effect on primal cuts (leg, loin, rack and shoulder), on the other hand,

castration had significant ( $P>0.0$ ) effect on breast cut, castration management had no significant ( $P>0.0$ ) effect on carcass composition (muscle, fat, bone and connective tissue) and had no significant ( $P>0.0$ ) effect on heart girth, head, skin and feet, on the hand, castration had significant ( $P<0.01$ ) on intestine and four stomach (Table 3).

Parameters	No. of animals	Immature kid	Mature buck	Se
<b>Cuts (Kg)</b>				
Leg	6	1.68	1.63	0.169NS
Loin	6	0.43	0.43	0.065NS
Rack	6	0.46	0.43	0.041NS
Shoulder	6	1.54	1.66	0.166NS
Breast	6	0.89	0.77	0.037**
<b>Carcass composition (Kg)</b>				
Muscle	6	0.002	0.038	0.0122NS
Fat	6	0.011	0.031	0.0174NS
Bone	6	0.025	0.028	0.0043NS

Connective tissue	6	0.002	0.004	0.0010NS
Lean: bone	6	2.696	2.088	0.2655NS
<b>Body measurements (Cm)</b>				
Initial heart girth	10	48.7	49.2	1.176NS
Final heart girth	10	54.3	54.3	0.704NS
Total	10	0.83	0.78	0.192NS
<b>Non carcass components (Kg)</b>				
Head	6	0.74	0.84	0.039NS
Skin	6	0.78	0.83	0.059NS
Feet	6	0.31	0.36	0.028NS
<b>Internal components (Kg)</b>				
Intestine	6	0.56	0.74	0.042**
Four stomach	6	0.4	0.54	0.026**

**Table 3:** Effect of Castration on Primal Cuts, Carcass Composition, Heart Girth, and Some Non Carcass and Internal Components of Male Desert Goats.

## Discussion

### Effect of Age on Primal Cuts, Carcass Composition, Heart Girth and Some Non Carcass and Internal Components

Age had no significant effect ( $p>0.05$ ) on primal commercial cuts, These slight effect of age on carcass yield was supported by the fact that during growth it is natural for the percentage of the carcass to increase with age [13] also may be due to kids used in this study were physiologically mature. Also similar results were obtained by other in lambs of Karagouniko, Chios and Serres breeds [14-16]. In English meat type lambs the percentage of the first grade cuts was not found to be influenced by the age or slaughter weight of lambs [17] and no significant effect ( $p>0.05$ ) was found on muscles proportion, but muscles in whole carcass were increased with increasing age (Table 2). It is well known that the muscle tissue is reaching the maturation earlier in comparison with the organs or tissues of body weight of goats. Researchers obtained that a decreased in the muscle percentage when the slaughtered weight reached 40-76% of mature weight of sheep [18,19]. In Karagounilo and Kimis lambs a decrease in muscle percentage was noted with the increase the slaughter weight from 26 to 30Kg [14-20]. The fat weight was increase with increasing age Table 2 from this results and other studies the fat grow slowly in early stage of goat life. But with increasing age the growth rate of fat increase in comparison with body weight increase. The bone weight had relatively increased ( $p>0.05$ ) with increasing age (Table 2). This tendency was observed in lambs of other sheep exposing that bones have earlier growth comparing with muscle and fat [14,16-18]. This phenomenon can be explained by priority change of the blood nutrient use by the

body tissues of animals during the different stages of their Age had significant effect ( $p<0.01$ ) on initial and final heart girth, head, skin and feet. These differences were expected since buck had higher heart girth compared with kids. In the earlier stages of growth and development the age had significant effect on all tissues and organs.

### Effect of Castration on Primal Cuts, Carcass Composition, Heart Girth and Some Non Carcass and Internal Components

Castration had no significant effect ( $p>0.05$ ) on primal cuts (leg, loin, shoulder and rack), carcass composition, heart girth, head, skin and feet Table 3. This result was in line with findings of Devendra C, et al. [4] who reported that castration had no effect on carcass yield and dressing percentage and agreement with findings of Papadopoulou T, et al. [21] who reported that castration had no effect ( $p>0.05$ ) on primal cuts. On the other hand, castration had significant ( $p<0.01$ ) effect on intestine and four stomach. These differences could be due to hormonal changes associated with castration [13]. In contrast Mudalal OM, et al. [22] found that intact male goats had higher proportion of head on empty body weight basis (EBW) than castrated and females [23].

## Conclusions

It could be concluded that the age recorded higher value in breast cut compared with the other cuts and higher values in heart girth, skin and feet, on the other hand, castration had no significant ( $p > 0.05$ ) on primal cuts and carcass composition.

## Conflict of Interest

Author should clarify that 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.

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