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# Body Measurements and Their Correlation Between, Slaughter Weight and Hot Carcass Weight of Sudanese Desert Goats as Affect by Feeding Regimen and Castration

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## Abstract

The experiment was conducted on desert male goats to evaluate the effect feeding regimen and castration on body measurements and their relationship between carcass measurements, slaughter weight and hot carcass weight. Seventy two (72) male desert goats aged 4-5 months and weighing 12.1 Kg (11.7-12.4 Kg) were used in these experiments. Goats were divided randomly into three groups; each group (24 males) was divided into two sub groups (12 males) in Factorial experimental randomized design. The results revealed that nutrition had significant ($p<0.01$) effect on all body measurements (body length, belly girth, heart girth, height at wither, width of hips and height at rump), on the other hand castration and interaction of (feeding regimen and castration) had significant ($p<0.01$) effect on total change in body length and total change in height at wither. Correlation coefficients between slaughter weight and body measurements were significant in all feeding regime except heart girth and belly girth in grazing with supplementation and zero grazing goats respectively were significant. All correlation coefficients between hot carcass weight and body measurements were significant in all feeding regime except the wither height in free grazing goats and wither height and rump height in zero grazing goats were significant.

**Keywords:** Goat, Body measurement, Height, Hot carcass.

## Contents



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# 1. Introduction

Goat is a multi-functional animal and plays an important role in economy and nutrition in rural communities. Sudan desert goats were found in arid and semi arid areas of Sudan, especially in Kordofan and Darfour regions and are adapted to survive under adverse conditions of feed limitations and water scarcity [1]. 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 [2]. In meat production body measurements are indices of skeletal developments and indirectly help to determine carcass composition [3]. Also there were strong correlation coefficients between carcass weight and external body measurements [4]. This study was carried out to establish the relationship between body measurements, slaughter weight and hot carcass weight.

# 2. Materials and Methods

## 2.1. Experimental Animal's Management

This work was conducted at El-Obeid Agricultural Research Station, North Kordofan State, Sudan. Seventy two male desert goats aged 4-5 months and weighing 12.1 Kg ranged between (11.7- 12.4 Kg) were used in this experiment. The goats were divided randomly into three groups; each group (24 males) was divided into two sub groups (12 males); one sub group was castrated while the other was left intact. Group one was kept on free grazing only which consist of some dry grasses (Bano *Eragrotis turmula*, Sheeleni, *Zornia glochiidiata*, Haskaneet, *Cenphrus spp*) and browse (Sedeer, leaves, *Ziziphus spina chritis*, Hegleeg leaves, *Balanite aegyptiaca* and Ushar dried leaves and flowers, *Calotropis purocera*). Group two was kept on grazing plus concentrate supplement with experimental diet which consist of (wheat bran38%, sorghum 30%, ground nut cake 20%, ground nut hay 10%, sodium chloride 1% and limestone 1%) given at a rate of 324g/head/day. Group three was *ad libitum* fed the experimental diet (zero grazing). The chemical composition of some range plants and experimental diet were shown in Table (1). Live weight and external body measurements of each animal were recorded at the start of experiment, then weekly until the end of the experiment, using spring balance. The animals were weighed in the morning (before grazing), following over night fast except for water.

**Table-1.** Chemical composition of some plants from range and experimental diet

| Chemical composition | Some plant from range | Experimental diet |
|---|---|---|
| Dry matter (DM %) | 95.9 | 98.6 |
| Organic matter (OM %) | 84.2 | 87.7 |
| Crude protein (CP %) | 10.0 | 22.0 |
| Crude fiber (CF %) | 32.0 | 25.0 |
| Ether extract (EE %) | 07.0 | 12.0 |
| Nitrogen free extract (NFE %) | 36.0 | 31.0 |
| Ash (%) | 10.0 | 08.0 |
| Energy density (MJME/KgDM) | 09.0 | 120.0 |

* Calculate as in MAFF [5]

## 2.2. Slaughter Procedure and Data Collection

At the end of experiment which extends for 90 days twelve animals from each treatment group were slaughtered. Slaughter was performed according to Muslim practice by severing jugular vessels, esophagus and trachea without stunning. Following skinning and evisceration, the external and internal offal's including gut content were weighed. The hot carcass weight was recorded; the carcass was split along midline. The weights of the carcass halves were recorded. On the left half carcass measurements were done according to procedure of Owen [4] then the left half was cut into wholesale cuts, each cut was dissected into lean, fat, and bone and then tissues separately were weighed, dissection was carried out according to procedure outlined by Cuthbertson, et al. [6].

## 2.3. Statistical Analysis

The data were statistically analyzed according to factorial experimental Factorial experimental randomized design as a 3×2 (management Vs sex). Multiple range tests were used to compare the means using [7].

# 3. Results and Discussion

## 3.1. Effect of Feeding Regimen and Castration on Body Measurement

The results in Table (2) indicated that body measurements of zero grazing group recorded the highest values ($p<0.001$) than the other two groups. These changes may be due to the free growth and development of the different parts and tissues of animal body by *adlibitum* feeding of concentrates, when compared with data obtained by Pal and Agnihotir [8] he was in disagreement and could be due to different management conditions between the two studies. Entire males had greater body measurements than castrates, irrespective of management system, possibly due to the effect of sex hormones which favour growth.

## 3.2. Effect of Feeding Regimen and Castration on Relationship between Body Measurements, Slaughter Weight and Hot Carcass Weight

The correlation coefficients between body measurements and slaughter weight (Table 3, 4 and 5). The correlation coefficients ranged between 0.85 for heart girth (the highest) and 0.33 for body length (the lowest). Heart girth had registered highest correlation coefficients than body length, height at wither and width of hips. Heart girth is known to correlate higher with slaughter weight and is taken as predict of live weight. Atta, et al. [9] reported that for Sudanese goats heart girth was best predictor of live weight. The high correlation coefficient between heart girth

and hot carcass weight and width of hips suggested the use of these measurements to predictor hot carcass weight in goats. These body measurements in this study were in line with the findings of Srivastava and Sharma [10].

**Table-2.** Effect of feeding regimen and castration on body measurements (Cm) of Sudanese desert male goats

| Factors | Initial body Length | Final body length | Total change in body length | Initial heart girth | Final heart Girth | Total change in Heart girth | Initial rump height | Final rump height | Total change in Rump height |
|---|---|---|---|---|---|---|---|---|---|
| Feeding regimen | | | | | | | | | |
| Free grazing | 50.7 | 54.1$^{a}$ | 3.4$^{a}$ | 51.4 | 54.0$^{a}$ | 2.6$^{a}$ | 56.8 | 60.8$^{a}$ | 4.0$^{a}$ |
| Grazing+ supplementation | 49.0 | 56.3$^{b}$ | 7.3$^{b}$ | 50.9 | 58.9$^{b}$ | 7.6$^{b}$ | 55.1 | 63.1$^{b}$ | 8.0$^{b}$ |
| Zero grazing | 49.8 | 56.5$^{b}$ | 6.7$^{b}$ | 51.7 | 59.5$^{b}$ | 7.8$^{b}$ | 56.6 | 64.3$^{b}$ | 7.8$^{b}$ |
| SE | 0.7 NS | 0.7** | 0.6*** | 0.4 NS | 0.5 *** | 0.5 *** | 0.6 NS | 0.7 *** | 0.6 *** |
| Castration x management | | | | | | | | | |
| Intact | 49.6 | 55.8 | 6.2$^{a}$ | 51.2 | 57.1 | 6.0 | 55.9 | 63.2 | 7.3 |
| Castrated | 50.1 | 54.6 | 4.5$^{b}$ | 51.5 | 57.4 | 5.9 | 56.4 | 62.2 | 5.8 |
| SE | 0.5NS | 0.6 NS | 0.5 * | 0.4 NS | 0.4 NS | 0.4 NS | 0.5 NS | 0.5 NS | 0.5 NS |

abc Values in same columns with different superscripts differ at P<0.001, P<0.01 and P<0.05 respectively, NS= non significant

**Continue: Table-2.** Effect of feeding regimen and castration on body measurements (Cm) of Sudanese male desert goats

| | Initial hips Width | Final hips width | Total change in hips width | Initial wither height | Final wither Height | Total change in Wither height | Initial belly girth | Final belly girth | Total change in Belly girth |
|---|---|---|---|---|---|---|---|---|---|
| Feeding regimen | | | | | | | | | |
| Free grazing | 2.9 | 4.0$^{a}$ | 1.1$^{a}$ | 52.3 | 53.0$^{a}$ | 0.6$^{a}$ | 5.7.5 | 62.7$^{a}$ | 5.2$^{a}$ |
| Grazing+ supplementation | 2.6 | 4.9$^{b}$ | 2.3$^{b}$ | 51.3 | 56.4$^{b}$ | 5.1$^{b}$ | 55.3 | 69.0$^{b}$ | 13.8$^{b}$ |
| Zero grazing | 2.8 | 5.1$^{b}$ | 2.4$^{b}$ | 53.3 | 56.4$^{b}$ | 3.1$^{b}$ | 57.5 | 70.0$^{b}$ | 12.5$^{b}$ |
| SE | 0.1 NS | 0.1 *** | 0.2 *** | 0.6 NS | 0.6 *** | 0.4 *** | 0.8 NS | 0.8 *** | 0.8 *** |
| Castration x management | | | | | | | | | |
| Intact | 2.8 | 4.7 | 1.9 | 51.8 | 55.6 | 3.8$^{a}$ | 56.3 | 67.6 | 11.3 |
| Castrated | 2.7 | 4.6 | 1.9 | 52.7 | 54.9 | 2.2$^{b}$ | 57.2 | 66.8 | 9.6 |
| SE | 0.1 NS | 0.1 NS | 0.1 NS | 0.5 NS | 0.5NS | 0.4 * | 0.7 NS | 0.6 NS | 0.6 NS |

abc Values in same columns with different superscripts differ at P<0.001, P<0.01 and P<0.05 respectively, NS= non significant

**Table-3.** Correlation coefficient between slaughter weights, hot carcass weight and body measurements in free grazing Sudanese male desert goats

| | Body length | Heart girth | Belly girth | Wither height | Rump height | Hips width |
|---|---|---|---|---|---|---|
| Slaughter weight | 0.37*** | 0.85*** | 0.84*** | 0.66*** | 0.84*** | 0.67*** |
| Hot carcass weight | 0.60* | 0.71*** | 0.73*** | 0.38 NS | 0.73*** | 0.79*** |

**** ,** and * Significant at P<0.001, P<0.01 and P<0.05 respectively, NS= non significant

**Table-4.** Correlation coefficient between slaughter weights, hot carcass weight and body measurements in free grazing Sudanese male desert goats

| | Body length | Heart girth | Belly girth | Wither height | Rump height | Hips width |
|---|---|---|---|---|---|---|
| Slaughter weight | 0.52** | 0.43 NS | 0.38* | 0.54** | 0.47** | 0.59** |
| Hot carcass weight | 0.84*** | 0.92*** | 0.64* | 0.84*** | 0.72*** | 0.89*** |

**** ,** and * Significant at P<0.001, P<0.01 and P<0.05 respectively, NS= non significant

**Table-5.** Correlation coefficient between slaughter weights, hot carcass weight and body measurements in free grazing Sudanese male desert goats

| | Body length | Heart girth | Belly girth | Wither height | Rump height | Hips width |
|---|---|---|---|---|---|---|
| Slaughter weight | 0.62*** | 0.70*** | 0.33 NS | 0.59** | 0.62*** | 0.86*** |
| Hot carcass weight | 0.40 NS | 0.78*** | 72*** | 0.37 NS | 0.34 NS | 0.86*** |

****,** and * Significant at P<0.001, P<0.01 and P<0.05 respectively, NS= non significant

# 4. Conclusions

It could be recommended that the feeding program can improve body measurement of the desert goats that depend on natural pasture must be supplemented with concentrates as to improve the growth performance and carcass characteristics, also can show high Correlation coefficients between slaughter weight and body measurements and between hot carcass weight and body measurements.

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