The Effect of Age and Castration on performance of Sudani Desert male goat, Jebal Kordofan-Elobied-Sudan

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ABSTRACT

Castrates consumed more feed and had higher feed intake as a percentage of body weight than intact Desert male goats. Older males had a higher dressing percentage than younger ones. Castration improved meat juiciness and tenderness scores and resulted in a relatively higher flavour score.

INTRODUCTION

Sudan Desert goats are found in arid and semi-arid areas of Sudan, especially in Kordofan and Darfur regions. They are adapted to survive under adverse conditions of feed limitation and water scarcity (Mason and Mule.1960). Total annual red meat production in Sudan is estimated 8830 goats contribute about 310 tons. The annual live goats exported to the Arab countries exceed 16,500 heads (MAR.2003). Despite the growing demand for goat meat worldwide, data on the meat producing characteristics of goats are scarce (Boyazoglu and Morand-Fehr 2001). This study investigated the effect of castration and age on performance of Sudani Desert male goats, and on the yield, chemical composition and organoleptic properties of their meat.

MATERIALS AND METHODS

Forty Sudani Desert male goats were used: where 20 of them were 3–5 months old and the other were 10–15 months old, with average initial body weights of 9.0±0.52 kg and 12.6±0.54 kg, respectively. Each age group was subdivided into two similar subgroups based on initial body weight. One subgroup was randomly chosen and castrated manually, while the other was left intact. They were accommodated individually in shaded pens (2 × 3 m), treated for internal and external parasites, and allowed a week of adaptation. Each animal was provided with individual feed and water troughs, that allowed free access to water and *ad libitum* feeding. The feed was compounded from 18% groundnut seed cake, 9% wheat bran, 9% sorghum grain, 1% mineral block and 63% forage-legume hay mixture. The hay mixture consisted of *Cajanus cajan*, *Lablab purpureus* and *Cyamopsis tetragonoloba*, which dried, grounded and mixed in equal proportions. The chemical composition of the feed (dry matter basis) was 13.4% crude protein, 18.0 % ether extract, 9.25MJ kg−1 metabolisable energy, 0.91% Ca, 0.42% P and 400 IU kg−1 vitamin D3. Body weight, girth and length were measured at the start and then weekly until end of the experiment. After feeding for 63 days during the hot summer months,March–June 2003, 12 animals (three from each subgroup) were randomly chosen and slaughtered. The hot carcass weight was recorded. The components of the digestive tract were washed, stored with the other internal organs at −18°C for 24 h then weighed. After chilling, the cold carcass weight was recorded and the carcass was carefully divided into two equal halves along the midline. The left side was cut into five wholesale cuts: shoulder, breast, rack (ribs), loin and leg (Kempster et al. 1982). The midrib eye muscle area of each carcass was dissected between the 9th and 12th ribs to determine lean muscle, bone, fat and connective tissue weights. The four components were then thoroughly mixed, grounded and analyzed for moisture, fat, protein and ash contents (AOAC. 1990). Samples from the *longissimus dorsi* muscle were selected, sliced into roughly equal proportions and boiled in water for 45 min with no salt or oil (Kempster et al. 1982). Five untrained panellists evaluated the juiciness, tenderness and flavor on a hedonic scale from 1 (excellent) to 5 (poor) (Watts et

al.1989). The data were analyzed as a 2 × 2 factorial experiment (age group vs. castration) in a randomized complete block design (Steel and Torrie.1980). In order to compensate differences in live weights at the start of the experiment, initial body weight was used as a covariate adjustment factor for the analysis of data on live animals and carcass yield (final body weight, weight gain, feed consumption, body measurements, carcass weights, dressing percentage). Similarly, hot carcass weight was used as a covariate adjustment factor for the analysis of data on carcass components (weight of wholesale cuts, internal organs, midrib eye muscle composition) (Ülker et al., 2002). Statistical analyses were performed with MSTAT-C software (Freed .1992).

RESULTS AND DISCUSSION

Castrates consumed significantly more total feed and had significantly higher feed intake as a percentage of body weight than intact male goats (Table 1). Zemmelink et al. (1985) reported that dry matter intake of goats can be higher than 3% of body weight if a high quality feed is offered, and this was achieved in the present trial (intact males 3.1% while castrates 3.9%). The overall daily weight gain was 0.13 kg day−1, which was higher than the 0.063 kg day−1 reported by El Muola et al. (1999) but lower than the 0.40 kg day−1 observed by Akinsoyinu et al. (1975) for West African Dwarf goats. The overall feed conversion ratio (feed : gain weight ratio) of 4.5:1 indicated a higher weight-gain efficiency than the range of 5.05:1 to 6.56:1 reported by Babiker et al. (1985).This difference may be attributable to differences in the ages of goats or feeding regime between the two studies. As expected, older Desert male goats had significantly higher initial body weight, and initial and final body length, than younger ones (Table 2). The absolute increases in body length were significantly different between the two age groups, since the older males showed greater growth, as previously noted by Owen (1975). Although the final body weights of the two age groups were not significantly different, which might due to the high variability among individuals, the older males were shown to yield significantly higher hot carcass weight than the younger ones, and the dressing percentage of the older goats was also greater (Table 2). However, there were no significant differences in carcass yield or dressing percentage between castrates and intact male goats. This contradicts with the findings of Singh et al. (1996) who stated that castration significantly improved dressing percentage. Castrates had significantly lower testis weights and significantly higher heart, liver and spleen weights than intact males (Table 1). Forrest et al. (1975) attributed such differences to hormonal changes associated with castration, but no observations on hormonal profiles of castrates and intact male goats were estimated in the present study. Overall, leg and shoulder cuts constituted over 65% of the whole cold carcass yield. Lean: bone ratios for intact males and castrates were 1.97 : 1 and 1.85 : 1, respectively, but the difference was not significant. These values are similar to those reported by Lanza et al. (2003) for lambs. The midrib eye muscle had mean crude protein content of 20.4% and fat content of 35.3%, which were within the ranges reported by El Muola et al. (1999). These proportions were not significantly affected by age or castration. Meat from castrates achieved significantly higher scores for juiciness and tenderness than meat from intact males (Table 1), but scores for r were not significantly higher for the meat of castrates.

Table 1. Effect of castration of Sudani Desert male goats on performance, body measurements and internal organs.

Parameter	Intact males	Castrates	SE±
Initial body weight (kg)	10.7	10.9	0.15NS
Final body weight (kg)	18.8	19.1	0.72NS
Total feed consumption (kg)	32	37.4	1.64*
Daily feed consumption (kg)	0.508	0.575	0.148*
Feed intake as % of body weight	3.1	3.9	0.14**
Body measurements			
Initial body length (cm)	47.8	45	0.54**
Final body length (cm)	51.2	49.3	0.66*
Change in body length (cm)	3.4	4.3	0.06**
Internal organs			
Testis (kg)	0.07	0.03	0.007**
Heart (kg)	0.06	0.09	0.004**
Liver (kg)	0.21	0.27	0.014*
Spleen (kg)	0.02	0.04	0.004*
Organoleptic scores			
Juiciness	1.86	2.19	0.076*
Tenderness	1.77	2.18	0.083*
Flavour	2.04	2.34	0.10NS

Table 2. Effect of age group of Sudani Desert male goats on performance, body measurements and carcass characteristics.

Parameter	Age group 3–5	Age group 10–12	SE±
Initial body weight (kg)	9	12.6	0.15**
Final body weight (kg)	17.80.37*	20.1	3.15NS
Body measurements			
Initial body length (cm)	44.7	48.1	0.54**
Final body length (cm)	48.3	52.1	0.66**
Change in body length (cm)	3.6	4	0.06**
Carcass characteristics			
Hot carcass weight (kg)	6.4	7.9	0.37*
Dressing percentage (%)	38.7	41.1	0.81*

Differences significant at * $p < 0.05$, ** $p < 0.01$;
NS = differences not significant.

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