THE CARCASS PROXIMATE AND FATTY ACID COMPOSITION OF BOAR GOATS AND SOUTH AFRICAN MUTTON MERINOS RAISED UNDER INTENSIVE FEEDLOT CONDITIONS

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Background

Exploitation of unconventional livestock such as goats is advocated as a means of increasing global meat production and consumption. Goat populations in developing countries represent 94% of the world total. Despite their numerical importance goat meat is little consumed and attains a low price compared to beef and mutton. This is attributed to a general belief that goat meat is inferior to mutton and beef (Babiker *et al.*, 1990).

In 2000, Africa had 22.8% and 29.1% of the total world's sheep and goat populations, respectively (FAO, 2001). Within the African society, sheep and goats comprise a greater proportion of the total wealth of poor families (Peacock, 1996) and are the primary source of meat and meat products. These flocks are raised under a wide variety of ecological zones and are able to survive and produce in harsh environmental conditions that are difficult for cattle to survive in (El Khidir, Babiker & Shafie, 1998).

Objectives

There is also a tendency worldwide to import the Boar goat from South Africa for use in improving local and indigenous breeds as pertaining to meat and chevon production. A question frequently posed is how would this breed perform under intensive feedlot conditions? The present investigation compares the performance of Boar goats (BG) with that of the South African Mutton merino (MM), a sheep breed that has a proven feedlot performance, under feedlot conditions.

Methods

Thirty-two BG kids and 32 MM lambs were used for this investigation. All the animals were castrated and weaned before entering the feedlot. Two pelleted diets (fed to 16 animals/species) with either a low (LE; 8.9 MJ/kg DM) or a high (HE, 10.9 MJ/kg DM) metabolisable energy level were fed individually, *ad lib* for either 28 or 56 days. After either 28 or 56 days, the animals were slaughtered and the 8-9-10-rib cut of each carcass was dissected for determination of chemical composition (included bone, fat and meat). Proximate composition of the 8-9-10-rib cut wase determined according to AOAC (1995). The analysis included determination of moisture, protein (N x 6.25) and ash. The lipid content was determined by solvent extraction according to the method of Lee, Trevino & Chaiyawat (1996). Fatty acid methyl esters (FAME) were prepared according to the method of Morrison & Smith (1964).

Analyses of variance were performed on all the variables measured using the General Linear Models (GLM) procedure of SAS (1990).

Results and discussion

In the 8-9-10-rib cuts BG's had significantly more moisture and protein and lower fat and energy values than MM's (Table 1). DM, fat and energy values increased with an increase in slaughter age in both species. BG carcasses had a lower carcass cholesterol content than that of lamb (66.77 vs. 99.28 mg/100g, respectively). Palmitic (C16:0), stearic (C18:0) and oleic (C18:1n9) acid comprised the greatest proportions of fatty acids in the 8-9-10-rib cut for both species (Table 2). On a LE-diet there was no significant difference between the saturated fatty acid (SFA) to unsaturated fatty acid (UFA) ratio of goat meat and lamb. However, on the HE-diet, lamb had a significantly higher SFA:UFA ratio than chevon (1.407 vs. 0.892).

Table 1. LSMean proximate analysis (on an *as is* basis) of the 8-9-10-rib cut of the BG kids and MM lambs fed either a low (LE) or a high energy (HE) diet for 28 or 56 days

	BGLE28	BGHE28	MMLE28	MMHE28	BGLE56	BGHE56	MMLE56	MMHE56	SEM
Moisture (%)	65.14[c]	62.13[a]	54.70[f]	50.21[d]	59.47[ab]	58.97[b]	45.37[e]	43.96[e]	0.941
Ash (%)	3.39	3.30	2.99	3.05	2.94	3.26	2.90	2.88	0.203
Protein (%)	17.68[a]	17.17[a]	15.26[b]	14.64[b]	17.00[a]	17.30[a]	13.41[c]	12.99[c]	0.328
Fat (%)	13.47[b]	17.57[a]	24.47[f]	30.31[d]	21.24[cf]	20.22[ac]	35.49[e]	36.85[e]	1.169
Energy (kJ)[5)]	798.82[b]	941.89[a]	1164.73[f]	1370.48[d]	1074.97[cf]	1042.33[ac]	1540.93[e]	1584.19[e]	40.10

[a,b,c] Means in the same row with different superscripts differ (P<0.05)

It can be concluded that the meat from young feedlot goats is not inferior to that of lamb and it has a higher protein percentage and lower fat percentage. Therefore, it can be considered as a healthy food commodity, especially among low-income groups or people wishing to consume a low calorie diet.

Pertinent Literature

AOAC, Official methods of analysis of the Association of Official Analytical Chemists (16'th ed.). Arlington, Virginia, USA, AOAC International (1995).
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Table 2. LSMean fatty acid profile of the 8-9-10-rib cut of the BG kids and MM lambs (% of identified fatty acids)

Fatty acid	BGLE[1)]	BGHE[2)]	MMLE[1)]	MMHE[2)]	SEM
C14:0	1.95^{a}	1.35^{a}	2.76^{c}	1.75^{a}	0.255
C16:0	23.06^{ac}	24.83^{a}	20.62^{c}	28.89^{b}	1.006
C18:0	20.19^{a}	20.46^{a}	26.10^{b}	27.04^{b}	0.924
C20:0	0.34^{a}	0.33^{a}	0.30^{a}	0.59^{b}	0.030
C22:0	0.04^{b}	0.01^{a}	0.05^{b}	0.02^{c}	0.004
C24:0	0.03^{a}	0.03^{a}	0.09^{a}	0.06^{a}	0.031
SFA[3)]	45.59^{a}	47.01^{ac}	49.93^{c}	58.31^{b}	1.048
C16:1n7	1.99^{ac}	2.21^{a}	1.61^{c}	1.20^{b}	0.141
C18:1n9	48.89^{a}	46.91^{ac}	44.19^{c}	37.62^{b}	1.058
C20:1n9	0.13^{ab}	0.12^{ab}	0.15^{b}	0.09^{a}	0.015
C24:1n9	0.05^{a}	0.02^{a}	0.12^{a}	0.01^{a}	0.047
MUFA[4)]	51.06^{a}	49.26^{a}	46.07^{c}	38.92^{b}	1.080
C18:2n6	2.21^{a}	2.51^{a}	2.44^{a}	2.12^{a}	0.178
C18:3n6	0.13^{a}	0.17^{a}	0.04^{b}	0.06^{b}	0.011
C18:3n3	0.37^{b}	0.27^{a}	0.71^{c}	0.29^{a}	0.026
C20:2n6	0.04^{a}	0.03^{a}	0.14^{b}	0.02^{a}	0.019
C20:3n6	0.05^{a}	0.06^{a}	0.04^{ab}	0.02^{b}	0.007
C20:4n6	0.29^{a}	0.31^{a}	0.19^{c}	0.09^{b}	0.020
C20:3n3	0.01^{a}	0.00^{a}	0.03^{b}	0.00^{a}	0.005
C20:5n3	0.04^{a}	0.04^{a}	0.04^{a}	0.03^{a}	0.006
C22:2n6	0.02^{a}	0.02^{a}	0.08^{a}	0.02^{a}	0.027
C22:4n6	0.06^{ab}	0.06^{ab}	0.10^{b}	0.01^{a}	0.022
C22:3n3	0.00^{a}	0.00^{a}	0.06^{b}	0.00^{a}	0.006
C22:5n3	0.15^{a}	0.17^{a}	0.11^{c}	0.06^{b}	0.014
C22:6n3	0.06^{a}	0.09^{a}	0.03^{ab}	0.02^{b}	0.014
PUFA[5)]	3.35^{ab}	3.73^{ac}	4.00^{c}	2.77^{b}	0.217
UFA[6)]	54.41^{a}	52.99^{ac}	50.07^{c}	41.69^{b}	1.048
SFA:UFA	0.845^{a}	0.892^{a}	1.030^{c}	1.407^{b}	0.0431
(C18:0+C18:1):C16:0	3.04^{a}	2.74^{a}	4.45^{b}	2.26^{a}	0.427
DFA[7)]	74.60^{a}	73.45^{a}	76.17^{a}	68.73^{b}	1.176

1)BGLE/MMLE: Low energy diet, fed to Boer goats or Mutton merinos, BGHE/MMHE: High energy diet, fed to Boer goats or Mutton merinos, 3) Saturated fatty acids, 4) Mono-unsaturated fatty acids, 5) Poli-unsaturated fatty acids, 6) Unsaturated fatty acids, 7) Desirable fatty acids (total of all UFA and C18:0)

^{a,b,c} Means in the same row with different superscripts differ ($P<0.05$)