

CARCASS CHARACTERISTICS AND MEAT PROXIMATE COMPOSITION OF EXTENSIVELY MANAGED RED SOKOTO BUCKS SLAUGHTERED AT DIFFERENT AGES IN ABEOKUTA METROPOLIS

S.D Amosu¹; B.O Babatunde¹; G.O Sanusi¹ O.A Oderinwale² and B.O Oluwatosin³

¹ Department of Animal Production and Health Federal University of Agriculture, Abeokuta, Ogun State,

² World Bank Africa Centre Of Excellence For Agriculture Development And Sustainable Environment Federal University of Agriculture, Abeokuta, Ogun State, ³ Institute for Food Security Environmental, Resources and Agricultural Research, Federal University of Agriculture, Abeokuta, Ogun State. PMB

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Corresponding author e-mail: amosudave2013@gmail.com

Abstract

This study was conducted to determine the carcass characteristics and meat proximate composition of extensively managed Red Sokoto bucks slaughtered at different ages in Abeokuta metropolis. A total of twenty four (24) intact Red Sokoto buck were sourced from reputable outlets within the metropolis. The animals were grouped into ≤ 1 year, 1-2 years and 2-3 years of age by the means of dentition before slaughtering to examine the effect of age on the carcass characteristics and meat proximate composition. The proximate analysis was carried out using AOAC, (2005) method. The carcass component were significantly ($P < 0.05$) affected by age while the non-carcass components were not significantly ($P > 0.05$) influenced by age. Meat from the loin, rib, thigh and flank indicated that the DM, crude protein, crude fat, NFE and total ash were influenced ($P < 0.05$) by the age, while the crude fiber and total ash from the loin cut were not influenced ($P > 0.05$) by the age. This study indicated that Red Sokoto bucks between the ages of 2-3 years may be slaughtered for high carcass yield, meat rich in crude protein and low in crude fat for consumption.

Keyword: Carcass yield, Carcass component, Non-carcass component, Red Sokoto bucks.

Introduction

Small ruminant animal husbandry is the most important and often the only living source of livelihood of people inhabiting the forest regions or regions not suitable for crop cultivation and cattle production (Daskiran *et al.*, 2006). They can digest and utilize cellulose and hemicelluloses, household waste and other range of feedstuff that are less important to man and other animals. Small ruminant animals also feed on varieties of edible plants; they make use of non-protein nitrogen (NPN) and synthesize most of the amino acid. They perform well on good forages most especially sown pastures (William, 2005). Goats like other ruminants, play an important role in the livelihood of rural people in communal farming systems. Indigenous goats constitute valuable genetic resources because of their ability to adapt to harsh climatic conditions, to better utilize the limited and often poor quality feed resources and their natural resistance to a range of diseases and internal parasites (Webb and Mamabolo, 2004). Nigeria indigenous goats which include West African dwarf, Sahel goats and Red Sokoto goats are more common in the rural areas, with each of the breeds been adapted to a particular geographical location. The West African dwarf goat is adapted to south-west or forest ecological zone, Sahel goat is common to the Sahelian North-West of Africa ecological zone and found in the

northern fringes of the country while the Red Sokoto goats are found in the Northwestern Nigeria and are the most popular breed of goats in Nigeria due to their wide acceptance for chevon production.

The Red Sokoto and the Sahel constitute majority of goats slaughtered in Nigeria. A choice between the meats of these breeds and age-related changes in macromolecular composition of their meats will allow for competitive maximization of nutritional and economic advantage (Jibir *et al.*, 2010). Meat is one of the most important constituents of the human diet as it provides protein, energy, vitamins and minerals. The demand for meat from goat obviously is increasing as seen in major cities of Nigeria. This probably could be as a result of its characteristics flavor or the advent of several food joints that have them as delicacy in the country. This study was therefore designed to determine the effect of age on carcass characteristics and meat proximate composition of extensively managed red Sokoto buck slaughtered at different ages in Abeokuta metropolis.

Materials and Methods

Study Area

Red Sokoto bucks were purchased from reputable source within Abeokuta metropolis. They were purchased in different batches consisting of 3

animals in a batch with age range of <1year, 1-2years and 2-3year. Abeokuta is the capital of Ogun state in south-west Nigeria. It is located on latitude 7° 07' 03" N and longitude: 3° 18' 23" E. It has a population of about 500,000 (Collins, 2012).

Experimental Animal

A total of 24 Red Sokoto bucks with the age range of <1, 1-2, and 2-3 was used for the study. The age ranges of the animals were determined through their dentition as described by Simela *et al.*, (2011). The animal age was estimated based on dentition; goat age is determined with different numbers of erupted permanent incisors.

Slaughtering Location and Method

The slaughtering was carried out at Small ruminant unit of Directorate of University farms (DUFARMS) Federal University of Agriculture, Abeokuta, Odeda Local government Ogun State, Nigeria. The animals were starved for 20hours before slaughtering. The live weight of the animals was determined using bathroom scale before slaughtering. The animals were slaughtered according to the method of severing the jugular veins of the throat and trachea without stunning. (Fasae *et al.*, 2011).

Carcass Evaluation

After thorough bleeding, the hair was scalded from the skin using warm water, evisceration was done to remove the internal organs and the following measurements were taken. The slaughter weight is the weight of the animal bleeding. The empty carcass weight was determined after the removal of internal organs. The hot carcass weight was estimated by subtracting the weight of the head and the weight of feet from the empty carcass weight. The internal organs (spleen, kidney, liver, heart, lungs, gut and empty gut) were carefully removed and weighed. The carcass was divided into two equal parts along the backbone to get the half carcass weight. Also the ribs, forelimbs, hind limbs, chest and scrotum were measured.

Chemical Analysis

The boneless meat cuts were taken from the loin, rib, thigh and flank, grouped according to ages of animal as ≤ 1year, 1-2years, and 2-3years and taken to the laboratory for meat composition analysis. The following parameters were determined using the (AOAC, 2005); Moisture content, dry matter, crude protein, crude fiber, crude fat and ash while the nitrogen free extract was determined using the formula; %NFE = 100-(%Moisture+%CF+%CP+%EE+%Ash).

Data Analysis

The experimental design adopted for the experiment was the complete randomized design (CRD). All the data generated were subjected to the one-way analysis of variance using the General linear model (GLM) procedures of Statistical Analysis System (SAS) (1999) to test the effects of age on the carcass characteristics and meat composition. The significant means were separated using Duncan multiple-range test (Duncan 1955)

Result and Discussion

Table 1, shows the effect of age on the carcass characteristics of Red Sokoto bucks slaughtered in Abeokuta metropolis. There were significant effect of age ($P<0.05$) on the major carcass components which includes; live weight, slaughter weight, dressed weight, chest weight, empty carcass weight, hot carcass weight and half carcass weight of the slaughtered bucks in Abeokuta metropolis which is in accordance with the findings of Simela *et al.*, (2011) for South African indigenous goats slaughtered at different pair of incisors. There was increase in the live weight, slaughter weight, dressed weight and other major carcass component as age increases from ≤ 1year to 2-3years which is in agreement with the reports of Assan (2012), Simela *et al.*, (2011) and Nsoso *et al.*, (2004).

The live weight is also observed to be small compared to other breeds of goats of lesser or the same age like the Spanish meat-type goat, South Africa indigenous goats and Karayaka lambs (Oman *et al.*, 1999, Simela *et al.*, 2011 and Ugur Sen *et al.*, 2011). There are no significant difference ($P>0.05$) between the age group for the non-carcass component which may be due to the fact that this organs being early maturing may not be affected by the age of the animal which is in accordance with the experiment earlier carried out by (Fasae *et al.*, 2011) on sheep. The significant difference ($P<0.05$) observed in the gut weight may be due to the fact that the capacity of the rumen differs with age and the ability of the animal to consume forages and other household waste.

The lungs weight were significantly different ($P<0.05$) between the age groups increasing markedly from 146.9g to 221.9g which shows that this organ is also affected by age.

The head weight varied significantly ($P<0.05$) with the age of the goats. This is due to the fact that as the animal matures, so the size of the head will increase in weight.

Table 1: Effect of age on the carcass characteristics of Red Sokoto Bucks.

Parameters	—	1-2year	2-3year	SEM	P-value
Live weight (kg)	8.375 ^c	10.875 ^b	14.630 ^a	0.677	0.001
Slaughter weight(kg)	7.375 ^b	9.625 ^b	13.630 ^a	0.686	0.001
Dressed weight(kg)	7.370 ^b	9.620 ^b	13.600 ^a	0.680	0.001
Chest weight(g)	146.880 ^b	156.250 ^{ab}	225.000 ^a	11.000	0.002
Empty carcass weight(kg)	5.887 ^b	6.925 ^{ab}	8.663 ^a	0.388	0.007
Hot carcass weight(kg)	4.590 ^b	5.660 ^{ab}	7.610 ^a	0.482	0.027
Half carcass weight(kg)	1.937 ^b	2.138 ^b	3.212 ^a	0.155	0.001
Kidney weight(g)	56.300	50.000	59.380	4.250	0.676
Liver weight(g)	228.100	221.900	287.500	15.000	0.144
Lungs weight(g)	146.900 ^b	206.300 ^{ab}	221.900 ^a	10.600	0.004
Heart weight(g)	78.100	56.260	62.500	5.170	0.211
Spleen weight(g)	37.500	31.250	31.250	2.880	0.614
Empty gut(kg)	0.881	1.063	1.575	0.153	0.160
Viscera/gut(kg)	2.113 ^b	2.537 ^{ab}	2.725 ^a	0.106	0.040
Scrotum weight(g)	206.300	184.400	253.100	14.600	0.145
Head weight(kg)	0.781 ^b	0.834 ^{ab}	1.106 ^a	0.080	0.001
Hind-leg(kg)	1.094 ^b	1.225 ^b	1.675 ^a	0.074	0.001
Fore-leg(kg)	1.016 ^b	1.125 ^b	1.700 ^a	0.085	0.001
Neck weight(g)	356.300	415.600	493.800	29.100	0.154
Rib weight(kg)	1.059 ^b	1.219 ^{ab}	1.625 ^a	0.066	0.047
Feet weight(g)	371.900 ^b	434.400 ^{ab}	490.600 ^a	18.800	0.028

Mean values in the same row with different superscripts a, b, c differ significantly

Table 2 shows the effect of age on the meat composition of Red Sokoto goats slaughtered in Abeokuta metropolis. The table present meat composition from different parts of the carcass which include; thigh, loin, rib and flank. The dry matter from all the parts are significantly different ($P<0.05$) across all the age groups apart from the flank cut. The dry matter content was high within the age group of 2-3years for all parts examined except for the flank that has the highest dry matter content in the age group of ≤ 1 year which is in agreement with Aganga *et al.*, (2003). The crude protein from the thigh cut is not significantly different ($p>0.05$) across the age groups while the crude protein from the rib, loin and flank were

significantly different ($p<0.05$) across the age groups.

The crude fat is significantly different for all the parts examined across the different age groups with the lowest (0.36%) value found in age group 1-2years from the loin and the highest (0.84%) value found in age group 1-2years from the flank.

Total ash from the loin not significantly different across the age groups while the total ash from thigh, rib and flank cuts are significantly different across the age groups, the 2-3years age group has 1.15% from the thigh cut while the 0.65% lower value was found in the thigh. The NFE was also found to be significant across the age groups for all the cuts which can be attributed to the age of the animal and management system.

Table 2: Effect of Age on Meat composition from different part of Red Sokoto buck carcass

Parameters		<1year	1-2years	2-3years	SEM	P. value
Dry matter	Thigh	23.64 ^b	22.31 ^c	25.87 ^a	0.532	0.000
	Loin	26.25 ^a	24.85 ^b	26.83 ^a	0.326	0.006
	Rib	21.67 ^a	23.37 ^b	24.60 ^a	0.43	0.000
	Flank	24.40 ^a	23.85 ^b	23.47 ^b	0.152	0.011
Crude Protein	Thigh	18.98	19.00	19.38	0.194	0.695
	Loin	18.39 ^c	20.01 ^a	19.13 ^b	0.246	0.001
	Rib	18.28 ^c	19.41 ^a	20.43 ^b	0.325	0.001
	Flank	19.06 ^b	20.27 ^a	19.31 ^b	0.189	0.000
Crude Fat	Thigh	0.49 ^b	0.52 ^b	0.78 ^a	0.052	0.015
	Loin	0.48	0.36	0.56	0.037	0.068
	Rib	0.49	0.69	0.44	0.491	0.059
	Flank	0.56 ^b	0.84 ^a	0.58 ^b	0.054	0.021
Total Ash	Thigh	0.65 ^b	1.03 ^a	1.15 ^a	0.079	0.001
	Loin	0.92	0.95	1.03	0.031	0.324
	Rib	1.07 ^b	1.34 ^a	1.35 ^a	0.047	0.001
	Flank	1.15 ^b	1.27 ^a	1.13 ^b	0.027	0.037
NFE	Thigh	3.52 ^a	1.75 ^b	4.56 ^a	0.481	0.020
	Loin	6.68 ^a	3.12 ^c	6.21 ^b	0.56	0.000
	Rib	1.28 ^b	0.09 ^c	2.37 ^a	0.345	0.001
	Flank	3.09 ^a	0.84 ^c	1.92 ^b	0.326	0.000

Mean values in the same row with different superscripts a, b, c differ significantly

Conclusion

The carcass characteristics of Red Sokoto buck is affected by age from the result obtained except for the few cases of the non-carcass components i.e. the organs. Also, age has an effect on the percentage composition of the meat cuts from different parts of the carcass examined except for the crude fiber which is not affected by the age of the age animals.

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