MEAT CHARACTERISTICS OF AFRICAN ANTELOPE *(ANTILOPE CERVICAPRA)* IN AGO-IWOYE AREA OF OGUN STATE, NIGERIA

***Apata, E. S.**
Eniolorunda, O. O.
Ajayi, K. I.
Meat Science Laboratory, Department of Animal Production
Olabisi Onabanjo University,Yewa Campus, Ayetoro, Ogun State. Nigeria.
**E-mail:ebunoluapata2008@yahoo.com*

Okubanjo, A.O.
Department of Agriculture and Industrial Technology
Babcock University, Ilishan Remo, Ogun State, Nigeria.

ABSTRACT

The objective of this experiment was to evaluate the percentage of some selected muscles of antelope relative to its half carcass weight, proximate composition of raw and cooked antelope meat as well as sensory attributes of the meat. Four antelopes of mixed sex and of 2-2.5years were used for this study. They were purchased live from Ago-Iwoye market in Ogun State, Nigeria and were transported to Meat Science Laboratory of the Department of Animal Production, Olabisi Onabanjo University, Yewa Campus, Ayetoro for processing. They were weighed, bled, eviscerated, washed and chilled at 4°C for 24 hours. The carcasses were sawed into two halves and one half was weighed and fabricated into primal cuts. Selected muscles were excised from the cuts weighed and their percentages relative to chilled half carcass weight were determined. Proximate composition of raw and cooked semimembranosus and longissimus dorsi muscles as well as the taste panel evaluation of the two muscles was conducted on a 9-point hedonic scale I correspond to dislike very much and 9 like very much after broiling the meat at 160°C for 25min. The results showed that longissimus dorsi muscle was biggest followed by biceps femoris, quadriceps femoris and semimembranosus muscles, while vectus abdomimis, bradclialis and biceps brachii muscles were smallest. Crude protein, ash, nitrogen free extract and tenderness were higher in cooked meat, while fat was lower. In conclusion, antelope (Antilope cervicapra) should be domesticated to complement the conventional livestocks so that adequate meat supply to growing human population can be achieved.

Keywords: *African antelope, Meat characteristics, Ago-Iwoye, Ogun State, Nigeria.*

INTRODUCTION

Human population explosion continues unabated in all developing countries and the nutritional problem of protein and energy shortage has remained endemic while population explosion is not matched with commensurate increase in food production. However, the problem of animal protein shortage is more serious than that of energy as protein of high biological value from animal protein is limited in supply (Asibey, 1996). The animals which furnish protein for human consumption are drawn mainly from domesticated ruminants and poultry. Though, Nigeria and other developing

countries are blessed with a variety of domesticated animals and poultry, yet animal protein intake per caput is still about 14% below the standard requirement of 35g/ day by FAO (Child, 2007). Therefore, the alternative to solving protein inadequacy in the developing countries is to divert attention into wild life and the most promising wildlife to urgument protein supply from domesticated animals are rodents and antelopes (Antoon de vos, 2008).

Antelopes are the easiest wild animals to hunt and have the same nutritional requirement as that of deer (Wheeler, 2008). Antelope and other wild species are prolific with high turnover rates and readily utilize waste fibrous materials not usable by man and his domestic livestock (Okubanjo, 1990). They can also serve as food for the majority who because of taboo restrict the consumption of certain species of domesticated animals as well as serve as form of delicacy for the urban dwellers thus having a variety of diet and improving their protein intake (Brooks et al., 1991). Kingdom (1997) reports that in terms of meat quality, antelope meat is of great quality, the skinned and dressed cold carcass of antelope yielded an average boneless meat tissue and furnished average proximate composition energy and cholesterol contents, and high levels of essential amino acids comparable with lean beef. This experiment was conducted therefore, to evaluate the meat characteristics of African antelope *(Antilope cervicapra).*

MATERIALS AND METHODS

Antelopes used for this study were four in number and of mixed sexes. They were purchased live from local hunters at Ago-Iwoye market and transported to the Meat Science Laboratory of the Department of Animal Production, Olabisi Onabanjo University Yewa Campus, Ayetoro where this study was carried out. The antelopes were of age between 2 and 2 ½ years which was determined using teeth method according to Jensen (1998). The antelopes were slaughtered and their Carcasses were shanked, skinned, eviscerated and dissected into two equal halves using a meat hand saw. They were washed and chilled at 4^{o}C for 24 hours. The two halves were fabricated into primal cuts - leg, loin, rack, shoulder, and breast, shank and flank (BSF) according to Okubanjo (1997).

Muscles used in this study were dissected from pectoral limb (shank), pelvic limb (leg) abdominal part (flank), back and loin following the procedures of Apata et al., (2006). Proximate composition of Antelope meat was determined following the procedures of AOAC (2000). Meat samples were taken from the longissimus dorsi and semimembranosus muscles and were analyzed on fresh and cooked bases. Longissimus dorsi and semimembranosus muscles were broiled at 16000 for 25 minutes with intermittent turning on a gas oven. The meat samples were removed from the oven cooled to room temperature and wrapped in transparent polythene bags.

A total of 10 members were used in the taste panel for sensory evaluation of the meat samples. They were drawn from the Students and Staff of the Department of Animal Production of Olabisi Onabanjo University, Yewa Campus, Ayetoro. They

were trained on how to fill the questionnaire to assess the meat samples for aroma, flavour, tenderness, juiciness, texture and overall acceptability and each trait was scored on a 9-point hedonic scale on which 1=dislike extremely and 9=liked extremely according to AMSA (1995). The experimental design for this study was completely randomized design and all data collected were analysed using descriptive statistics as mean (X), Standard Deviation (SD) and range for each parameter (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

The results of weight of some selected muscles of antelope and their percentage relative to chilled half carcass are presented on table 1. Longissimus dorsi muscle 238.75g and percentage of 11.27 was the biggest muscle followed by biceps femoris muscle (140.00g) with percentage of 6.59, then quadriceps femoris muscle (138.75g) with percentage of 6.55, while rectus abdominis (12.50g), brachialis (12.50g) and biceps brachii (12.50g) muscles were the smallest in weight as well as their percentages relative to chilled half weight of antelope carcass of 0.59% respectively. Taiwo (1980) reports individual muscles selected as percentage of total lean of the Nigerian dwarf sheep as 4.52% for biceps femoris, 2.03% for semitendinosus, 2.44% for gastrocemius, 1.23% for Psoas major, 6.25% for longissimus dorsi, 6.77% for quadriceps femoris, 4.40% for triceps brachii and 4.75% for seminembranosus indicated that muscles of antelope compared favourably with those of the Nigerian dwarf sheep thus denotes the meatiness of antelope.

Table 2 highlights the mean proximate composition of raw and cooked semi membranosus and longissimus dorsi muscles of antelope. Cooked meat of both longissimus dorsi and semimembranosus muscles had higher ash contents of 2.95±0.21% and 3.35±0.21% than raw meat ash content of 1.65±0.07% and 1.40±0.14% respectively. Similarly protein contents of cooked meat of longissimus dorsi and semimembranosus muscles had greater percentages of 34.45±0.49 and 33.50±0.42 compared with the protein content of raw meat with 17.10±0.57% and 17.20±0.57% respectively. In contrast fat content of raw meat in both semimembranosus and longissimus dorsi muscles with 6.50±1.41% and 6.50±1.13% were higher compared with the cooked meat of the muscles with 5.25±0.92% and 5.20±0.42%. Moisture content was higher in both raw muscles with 71.80±1.56% and 71.15±1.77% compared with 53.70±0.57% and 52.95±0.07 for cooked meat.

Protein and ash contents were higher in cooked semimembranosus and longissimus dorsi muscles perhaps these nutrients could have coagulated in cooked, than in raw meat due to heat; conversely percentage fat was higher in raw than in cooked meat. This could be due to the action of heat that would have melted some of the fat content of the meat during cooking. The same explanation could be made of the moisture contents of the two muscles. Field et al. (2003) have reported chemical composition of male and female antelope carcass as follows: fat component 62% and 48%, crude protein, 22.1% and 22.4%, moisture contents as 70.0% and 71.2%, ash

contents 1.2% and 1.2% respectively, energy as 18kg, and 17kg, collagen 1.7% and 1.4% and pH of 5.7 and 6.0 respectively. These data indicated that antelope meat is high in protein and low in fat component and compared well with the results obtained in this study (table 2). Mostert and Hoffman (2007) also observed that Kudu (Tragelaphus strepsiceros) another species of antelope meat has high protein and low fat content. In his report (Okubanjo, 1990) gave the proximate composition of lean meat of royal antelope as 74.50% moisture, 23.40% protein, 0.90% fat and 1.20% ash while the duiker another species of antelope muscle had moisture content of 71.3%, protein of 25.7% and 2.06% fat. Hoffman and Ferreira (2003) reported that sodium, zinc, potassium and phosphorus as well as alanine, leucine, lysine were minerals and amino acids that are in high concentration in antelope meat.

Table 3 shows the mean sensory scores of cooked meat (semimembranosus and longissimus muscles). The mean sensory scores for all the eating attributes were the same in both muscles except in their tenderness scores, with semimembranosus muscle having higher tenderness score of 5.75±0.31 than longissiums dorsi muscle with 4.20±0.68 score. The results obtained in their study agreed with that of Field et al (2003) who report high score for tenderness of pronghorn antelope meat. The flavour scores for antelope roast in males and females are 4.06 and 4.07. Gamey flavour of antelope meat could be offset by actions of microorganisms and release of enzyme catepsins over a period of time after killed, hence antelope meat should be cooked soon after evisceration so as to improve its flavour and texture, high acceptability of antelope meat (Field et al, 2003).

Table 1: Mean weight of some selected muscles of antelope and their relative percentage to chilled half carcass weight.

	Weight of muscles (g)		% Relative to chilled half carcass weight	
Muscles	$\bar{x}$	S.D	$\bar{x}$	S.D
Half carcass weight	2127.50	235.28	100.00	-
Semi tendinosus	42.50	5.00	2.01	0.19
Bicepsfemoris	140.00	14.72	6.59	0.23
Semimembranosus	103.00	4.76	4.87	0.41
Adductor	42.50	5.00	2.01	0.19
Tensor Fascialatae	26.25	4.79	1.26	0.35
Quadriceps femoris	138.75	8.54	6.55	4.04
Gastrocnemius	52.50	5.00	2.47	2.28
Triceps brachii	51.25	1.89	2.27	0.45
Trapezius	30.00	11.54	1.42	0.16
Latissimus dorsi	38.75	1.89	1.83	0.16
Pectoral muscle	55.00	5.77	2.47	0.23
Serratus ventralis thoraxis	55.75	9.54	2.66	0.65
Rhomboideus	20.75	0.96	0.99	0.15
Supraspinatus	30.00	4.08	1.42	0.16
Subscapularis	17.50	2.38	0.83	0.15
Rectus abdominis	12.50	2.89	0.59	0.11
Internal abdominal oblique	29.50	6.03	1.39	0.29

External abdominal oblique	40.50	0.33	1.92	0.19
Transverse abdominis	21.75	2.36	1.03	0.06
Gluteus medius	67.50	5.00	3.19	0.28
Psoas major	42.00	2.16	1.99	0.21
Longissimus dorsi	238.75	16.52	11.27	0.75
Brachialis	12.50	2.89	0.59	0.11
Biceps brachii	12.50	2.89	0.59	0.11
Intraspinatus	30.00	4.08	1.42	0.16

Table 2: Mean Proximate composition of raw and cooked semimembranosus and longissimus dorsi muscles

	Raw meat				Cooked meat			
	SMB		LNG		SMB		LNG	
Variable	$\bar{x}$	S.D	$\bar{x}$	S.D	$\bar{x}$	S.D	$\bar{x}$	S.D
Moisture (%)	71.80	1.56	71.15	1.77	53.70	0.57	52.95	0.07
Crude protein (%)	17.20	0.57	17.10	0.57	33.50	0.42	34.65	0.49
Fat (%)	6.50	1.41	6.50	1.13	5.25	0.92	5.20	0.42
Ash (%)	1.40	0.14	1.65	0.07	3.35	0.21	2.95	0.21
NFE (%)	3.10	1.65	3.60	1.60	4.30	0.56	4.25	0.52

Table 3: Mean sensory scores of semimembranosus and longissimus dorsi muscles of antelope

	Semimembranosus			Longissimus dorsi		
Variable	$\bar{x}$	S.D	Range	$\bar{x}$	S.D	Range
Aroma	4.30	0.37	4.00 - 4.60	3.88	0.87	2.80 - 4.90
Flavour	4.23	0.34	3.90 - 4.70	4.65	0.44	4.30 - 5.30
Tenderness	5.75	0.31	5.50 - 6.20	4.20	0.68	4.40 - 5.90
Juiciness	5.65	0.70	4.80 - 6.40	5.33	0.66	4.50 - 5.90
Texture	4.85	0.49	5.20 - 6.40	4.18	0.62	4.30 - 5.70
Overall acceptability	4.33	0.79	5.50 - 7.00	4.53	1.25	3.90 - 6.90

CONCLUSION

It is necessary to direct attention into domesticating some wild life species such as antelope *(Antilope cervicapra)* and others in order to mitigate the problem of protein shortage in the world especially in developing countries. This is because; it is very prolific with high turnover rates and readily utilizes waste fibrous materials not usable by man and conventional domestic livestock. Its meat is not affected by taboo and is of high quality with low fat content. The selected muscles of antelope compared favourably with those of conventional livestock in terms of weight, proximate composition and sensory characteristics. Antelope meat is well accepted for its tenderness, flavour and aroma. Livestock producers and scientist alike should therefore, expedite the process of completely domesticating antelope so as to complement those conventional ones for more protein to be made available for human consumption.

REFERENCES

AMSA (1995). Research Guidelines for Cookery, Sensory evaluation and Instrumental Measurements of fresh meat. National livestock and meat Board, Chicago IL, USA.

Antoon devos (2008). Game as food. A report on its significance in Africa and Latin America. Rome: F.A.O Wildlife project.

A.O.A.C. (2000). Official Methods of Analysis (19th edition). Washington, D.C.: AOAC Inter. Inc.

Apata E. S., Omojola A. B., Akinfemi A. and **Osineye O.** (2006). Effects of four different additives on organoleptic characteristics of Red Sokoto and West African Dwarf buck meat JOAFSS 4(1):175 - 182.

Asibey, E. A. O. (1996). Why not bush meat? *Ghana Farmer,* 10, 165-170

Brooks M. K., Gauash L. J. and **Braverna A.** (1991). Agriculture another Transition to market policy. Research and External Affair paper. Department of Agriculture and Rural Development. World Bank WPS 666, 20 - 40.

Child, G. S. (2007). Role of Forest in Combating Desertification "Utilization of Wildlife". Wildlife and Protected Area Management. Rome: Forest Resources Division FAO,

Field R. A., Smith F. C., Hepworth W. G. and **Means W. J.** (2003). The Pronghorn Antelope carcass. Bulletin, 565 R, Agricultural Experimental Station, University of Wyoming, Laramie.

Hoffmann, L. C. and **Ferreira, A. V.** (2003). Chemical composition of two muscles of the common Duiker (Sylvicapra grimia). *Journal of Science and Food Technology,* 50 (1&2), 57 - 66.

Jensen, W. (1998). Aging Antelope. Its all in the teeth. North Dakota Outdoor, James Town, N.D. Northern Prairie Wildlife Research Centre Online 612, 16 - 20.

Kingdom (1997). The kingdom field guide to African Mammals. Sam Diego: Academic Press.

Mosert, R. and **Hoffmann, L.C.** (2007) Effects of Gender on the Meat quality characteristics and chemical composition of Kudu (Tragelaphus strepsiceros) an African Antelope species. *Food chemicals,* 104(2), 545 - 570.

Okubanjo, A. O. (1990). Meat for Nigeria's Million Faculty Lecture Series, Faculty of Agriculture and Forestry, University of Ibadan. No. 3.

Taiwo, B. B. A. (1980). Reproductive Performance, Growth and Carcass Merit of Nigerian Dwarf Sheep and their croses. Ph.D Thesis, Department of Animal Science, University of Ibadan, Nigeria.

Wheeler, R. K. (2008). Preparing and using Antelope meat *(www.medicine.bow.org).*

Steel, R. G. D. and **Torrie, J. H.** (1980). Principles and Procedures of Statistics. A biometrical approach (2nd ed.) North Carolina: McGrawhill Book Col Inc. Carry, .