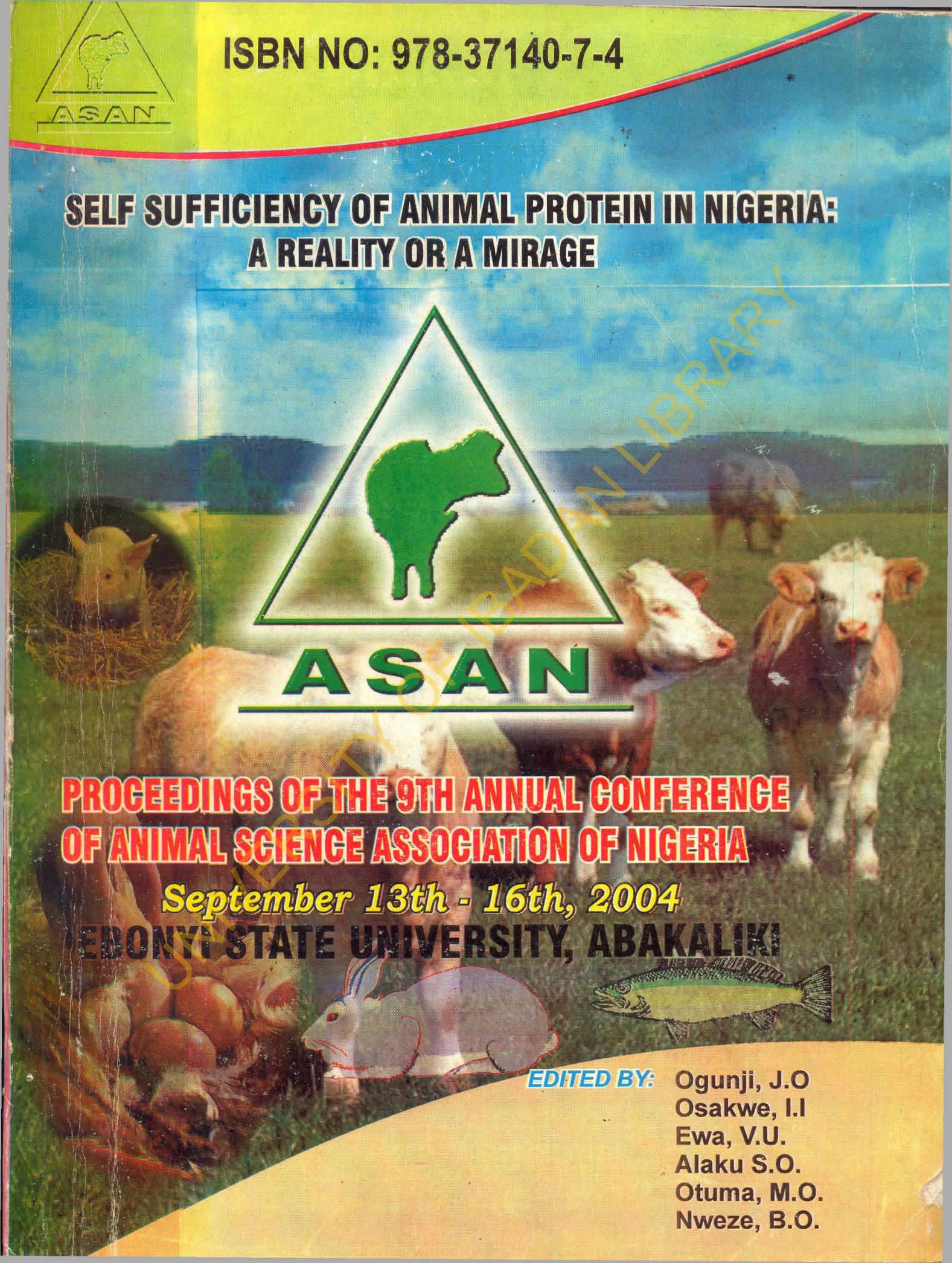
ISBN NO: 978-37140-7-4

SELF SUFFICIENCY OF ANIMAL PROTEIN IN NIGERIA: A REALITY OR A MIRAGE



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PROCEEDINGS OF THE 9TH ANNUAL CONFERENCE OF ANIMAL SCIENCE ASSOCIATION OF NIGERIA

September 13th - 16th, 2004

EBONYI STATE UNIVERSITY, ABAKALIKI

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ANIMAL SCIENCE ASSOCIATION OF NIGERIA

Proceedings of the 9th Annual Conference

THEME:

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ISBN NO: 978 – 37140 – 7 – 4

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Printed By:
Nwamazi Printing And Publishing Co. LTD Abakaliki, Nigeria

Published by:
Innarrok Syndicate in Association with Nwamazi Printing & Publishing Co. Ltd.

Copies Of The Proceedings Can Be Purchased From:
The National Secretary,
Animal Science Association Of Nigeria (ASAN)
Institute of Agricultural Research and Training, Moor Plantation, Ibadan.
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Sensory Score of Rabbit Meat as affected by delayed bleeding

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Introduction

Rabbit meat is a rich source of protein and vitamins. It is highly digestible (Rice, 1970). It is low in fat (10 – 11 %), cholesterol and sodium. Therefore, it is recommended for heart disease patients (American Heart Association, USDA, 1973).

Meat quality is defined as a combination of traits that provide an edible product that is attractive, appetizing, nutritious, and palatable after cooking (Kauffman *et al.,* 1969). A major requirement for these qualities is the removal of as much blood as possible from the carcass since too much blood in the carcass results in an unpleasant appearance. Excessive blood also creates a conducive environment for the growth of micro-organisms.

William *et al.,* (1983) reported that delayed bleeding has little or no effect on the eating quality of meat though, this does not imply that carcasses should not be properly bled. In fact, poor bled-out increases the prevalence of carcass down grading conditions (Gregory and Wilkins, 1989).

A poorly bled carcass will be less appealing to consumers since the appearance of meat on display is the most important factor that determines retail selection (Van Oeckel *et al.,* 1999).
The study was therefore designed to evaluate the influence of delayed bleeding on sensory characteristics of rabbit meat.

Materials and methods

A total of twenty-four (24) matured New Zealand rabbits, twelve (12) males and twelve (12) females with an average weight of 2.15 ± 0.50 kg were used for the study. The rabbits were reared in hutches and fed concentrate diets containing 19.11% crude protein (CP) and 25143 Kcal/kg metabolizable energy for a period of twenty four (24) days.

Four treatment groups were designed for the experiment. Each treatment comprise of 6 rabbits (3 males and 3 females) which were randomly allocated to the different groups. Treatment 1 served as the control (where animals were bled immediately after stunning). Animals in treatments 2, 3, and 4 were bled 5, 10, 15 minutes respectively after stunning.

The rabbits were starved for 16 hours prior to stunning. Stunning was achieved by means of a wooden club directed at the base of the head behind the ears. Following stunning, the animals in treatment 1 (Control) were bled immediately. Those in treatments 2, 3 and 4 were bled after 5, 10, 15 minutes respectively. The carcasses were hanged upside down on a rail for twenty (20) minutes to allow proper bleeding. The carcasses were skinned and decapitated by the atlas joints. The carcasses were eviscerated, washed and halved into two equal parts. Samples for sensory evaluation were taken from the thigh muscle. The samples were cooked using similar spiced mixtures.

Taste Panel Evaluation

A total of 16 trained individuals were used. These panelists were randomly allocated to the four treatments of the cooked rabbit meat. The panelists were made to rate each of the three replicates of the meat. Equal bite size samples from the four treatments were coded and served on a plate to each of the sixteen panelists. Each sample was evaluated independent of the other.

The panelist rated the samples on a 9 – point hedonic scale for colour, flavour, juiciness, tenderness and overall acceptability.

Experimental Design and statistical Analysis

A 2 x 4 factorial design was employed. The data collected were analysed using the procedure of SAS (SAS, 1988).

Results And Discussion

Colour is an important indicator of the quality of fresh or cooked meat as such, the appearance of meat influences the consumers acceptance of the meat (Van Oeckel *et al.,* 1999). The panel score for colour showed that no matter the level of blood retention as a result of delayed bleeding within the limit of the experiment, the colour of the meat samples were not significantly ($P > 0.05$) affected.

Uncooked meat has little odour and only a blood-like taste. Cooking is necessary to develop the flavour. Mastication breaks down the fibre matrix and releases flavour-juices and the volatile aroma components into the mouth. The result of this study as assessed by the taste panelists showed no significant ($P > 0.05$) difference irrespective of the time of bleeding after stunning.

Table 1: Feed Composition

Ingredients	Percentage
Composition	
Maize	30.00
Brewery Dry Grain	22.00
Palm Kernel cake	30.0
Groundnut Cake	15.00
Oyster Shell	1.00
Bone meal	1.50
Mineral premix	0.25
Salt	**0.25**
	100.00
Crude Protein %	= 19.11
Metabolizable energy	= 2514.3 Kcal/kg.

Juiciness of meat is directly related to the intramuscular lipids and moisture content of the meat (Cross *et al.,* 1986). In combination with water, the melted lipids constitute a "broth", which when retained in the meat, is released upon chewing. Table 2 showed the mean values for juiciness. The panel scores showed that there were no significant ($P > 0.05$) differences between treatment means for juiciness except for female animals in T_3 and T_4 (10 and 15 minutes delayed bleeding) with values of 5.50 ± 0.74 and 2.50 ± 0.71. This could be attributed to the reproductive status of the animals. The female animals in T_3 may have been exposed to more numbers of parturitions, therefore having more intramuscular fat than the female animal with least score (T_4) for juiciness (Schonfield *et al.,* 1993).

Tenderness is regarded as the most important sensory attribute affecting meat acceptability (Quali, 1990 and Warkup *et al.,* 1995). As stated by Quali (1990) and Smulders *et al.,* (1991), meat tenderization is a multifactorial process dependent on a number of biological e.g. species, age, sex, and muscle type) and environmental factors (nutrition, ante-mortem stress, slaughter conditions etc.).
The result in table 2 showed that there were no significant ($P>0.05$) differences for tenderness between all treatment means.

Overall Acceptability
The panel rating showed that the overall acceptability of the rabbit meat was not dependent on immediate exanguination after stunning. Delayed bleeding did not have any deleterious effect on the overall acceptability of rabbit meat as no significant ($P > 0.05$) differences were observed among the treatment means.

Conclusion
The result of this study showed that there is little indication that the residual blood which may have been retained in muscle when bleeding was delayed had any influence on palatability traits of the meat. No significant difference ($P > 0.05$) existed in the sensory evaluations between samples from control and other treatments.
The panel score for colour, flavour, juiciness and tenderness shows an overall acceptability of rabbit meat in accordance with the findings of Briedentein and Carpenter (1983) that colour, flavour, juiciness and tenderness are the primary determinants of eating quality, with tenderness being the most important. It should however be noted that a poor bled-out increases the prevalence of carcass down-grading conditions (Gregory and Wilkins, 1989).

References
Briedenstein, B. C., Carpenter, Z. L. (1983). Nutrient value of meat. J. Anim. Sc. 57: 119.

Cross, H. R., Quland, P. R.; Seldeman, S. C. (1986). Muscle as food. Ed. P. P. J. Bechtel. Academic Press, F. L. P. 45 – 52.

Gregory, N. G. and Wilkins, L. J. (1989). Effect of slaughter method on bleeding efficiency in chickens. J. Sci. Fd. Agric. 47: 13 – 20.

Kaufmann, R. G., Kolb, Q. E., Briedenstein, B. C., Carligan, D. S. (1969). Meat quality, Univ.III. Coop. Ext. Serv. Cir. 1007.

Quali, A. (1990). Post-mortem changes in muscle tissue. J. Muscle Foods, Vol. 1: 129 – 134.

Rice, E. E. (1970). The nutritional content and value of meat and meat product. In: "The science of meat and meat products" ed. Price J. F 2nd ed P 287 W. H Freeman and Co. San Francisco.

SAS (1988). SAS/STAT User's guide (release 6.03) Statistical System Institute, Carry, North Caroline.

Smulders, F. J. M., Vanloack, R., and Ellelenboom, G. (1991). In: The European Meat Industry in the 1990's. Ed. F. J. M. Smulders. Audet. Nijmogen. P. 121 – 129.

USDA, (1973). The a, b, c of domestic farm raised rabbit meat. Circular N. 549, Washington.

Van Oeckel, M. J., Warmant, N. and Bonkque, L. V. (1999). Measurement and prediction of pork colour. Meat Sci. 52:347 – 354.

Warkup, C. C., Marie, S., and Harrington, G. (1995). Expression of tissue proteinases and regulation of protein degradation as related to meat quality ed. A. Quali, D. Demeyer and F. J.M. Smulders. Ecceamst. Utrecht. The Netherlands. P, 225 – 231.

Williams, J. C., Vimini, R. J; Field R. A., Riley, M. L. Kunsman, J. E. (1983): Influence of delayed bleeding on sensory characteristics of beef. J. Meat Sci. 9: 181 – 190.

Table 2: Sensory Scores of Organoleptic traits of Rabbit Meat as influenced by delayed bleeding

Traits	T_1		T_2		T_3		T_4	
	F	M	F	M	F	M	F	M
Colour	5.00±0.01	6.00±0.41	4.50±2.12	4.00±1.40	5.00±1.41	4.50±1.41	3.00±1.41	4.00±1.39
Flavour	5.50 ± 0.71	5.00±0.02	6.50±0.71	5.50±0.92	6.50±0.71	6.50±0.86	6.60±0.52	6.00±0.71
Juiciness	4.50^{ab}±2.12	5.00^{ab}±1.41	4.50^{ab}±0.71	4.00^{ab}±1.41	5.50^{a}±0.74	4.50^{ab}±0.71	2.50^{b}±0.71	4.00^{ab}±0.06
Tenderness	4.50±0.50	5.00±0.41	7.00±0.04	5.00±0.06	6.50±1.41	5.00±1.41	4.00±0.39	5.00±2.10
Overall acceptability	5.00±0.65	5.00±1.41	7.00±0.81	5.50±2.12	6.00±0.75	6.00±0.80	6.00±1.41	6.00±1.50

Means in the same row with similar superscript are not significantly ($P > 0.05$) different.