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INFLUENCE OF SLAUGHTER AGE ON CARCASS COMPOSITION AND BEEF YIELD OF WHITE FULANI CATTLE

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Abstract

This study was conducted to investigate the influence of age on carcass composition of white Fulani beef cattle grazed on tropical pasture till slaughter in Akwa Ibom State University Obio Akpa, Akwa Ibom State.A total of nine (9) male white Fulani cattle were used for the study, which were categorized into three different age groups (3-3.5, 4-5 and 5.5-6.5 years) respectively. Data on the animal carcass composition and external offal (slaughter weight, carcass weight and dressing percentage) were obtained and used to investigate the effect of age on them.Data collected were subjected to one way analysis of variance (ANOVA). The results indicated that there was no significant different (P<0.05) in dressing percentages (%) for the three age groups. The age significantly (P<0.05) influenced the live weight, carcass composition and some external offals. Thus, it was concluded that age had no influence on the dressing percentage of the studied White Fulani bulls. However, increase in beef yield was accompanied with advancement in age.

Key words: Beef, Carcass composition, Carcass yield, Slaughter age, white Fulani

INTRODUCTION

The knowledge of carcass composition of an animal is very important to consumers and processors. This is because it aids in solving the conflict that normally exist between processors, farmers and consumers in relation to beef yield of cattle as the dressing percentage does not always reflects the beef yield of an animal (Madziga *et al*., 2016). Carcass composition of various species differs considerably in terms of carcass weight, percentage of fat, muscle and bone (Irshad *et al*., 2013). The current need for animal protein in Nigeria, like any other developing countries of the world posed a serious challenge to the Nigeria livestock farmers and therefore calls for contributions from different species of livestock (Madziga *et al*., 2016). Beef carcass compositions is of high economic important to the beef industry and cattle command a prominent position in meat supply and livestock industry (Saulo *et al*., 2012).
Beef carcass varies in composition due to genetic, age and sex of animal, nutritional and environment effect (Irshad *et al*., 2013). According to Afolayan *et al*., 2002, the ability of the producers and buyers of livestock to relate objectively live carcass characteristics to carcass characteristics is essential for optimum production and value base trading system. Fatness level and carcass composition of various species might differ because of carcass weight and slaughter age, as animal become older proportion of fat in their carcass increases and the proportion of muscles and bones decreases (Crouse *et al*., 1986; Irshad *et al*., 2013). Steen and Kilpatrick (1995) demonstrated that increasing slaughter age contributed to higher carcass fat content, particularly in heifers and steers, and to a lesser extent in bulls
Understanding how much meat to expect from a beef carcass is the problem currently existing between farmers, meat processors and consumers of beef carcass, as the price of animal is based on live weight or visual body conformation assessment other than on beef yield which is of interest to meat industries and consumers. Consumers who purchased live cattle often have problem with the processor as they at times feels that their meat is not enough when the dressing percentage of the animal does not relate

with their take home meat. This question often comes "where are my beef", this the meat processor finds it difficult to answer. Therefore, the objective of this study was to investigate the effect of slaughter age on carcass composition and beef yield of white Fulani cattle, thus facilitate the operation of a payment based on meat yield which would reward consumers and beef industries equitably.

Materials and Methods

Experimental site

This researched was carried out at the Akwa Ibom State University Commercial Farm Abattoir, Obio Akpa Campus, Oruk Anam Local Government Area Akwa Ibom State. Obio Akpa campus is situated between latitudes $4^0$30N and $5^0$30N and longitude $7^0$30N and $8^0$00E of the Greenwich meridian with an annual rainfall ranging from 3500mm – 5000mm and average monthly temperature of 25^0C, and relative humidity between 60-90%. (Wikipedia, 2017).

Experimental Animal and Management

The animals used in the study were nine (9) white Fulani beef cattle (bull) of different ages at slaughter. The animals were obtained from the Akwa Ibom State University Commercial Cattle Farm. The animals were grass finished prior to slaughter and managed under semi-intensive system of animal husbandry at Akwa Ibom State University Commercial Farm. The cattle grazed on natural mixed pastured that were available in and around the university environment. The ages of the animals were identified using dentition method as described by Sam, (2012).

Slaughter Procedure

The animals to be slaughtered were usually rinsed with clean water in order to get rid of sand and other contaminant, after which, they were carefully slaughtered by the Commercial Farm butcher, by severing both jugular veins and carotid arteries with a sharp knife without stunning. After complete bleeding the head were removed at the atlanto-occipital joint and weighed. Blood was usually collected and weighed after the animal stopped bleeding, the hide was cut along the limbs and down the abdomen then removed manually and weighed. The fore and hind feet were

removed with knife at the proximal end of the metacarpal and metatarsal joints, respectively and each of them was weighed with its hide cover. The tail was separated at the first inter-coccygeal articulation and weighed. After dressing and evisceration, the internal organs and offal were individually weighed. The carcass was usually dissected into different parts (left and right thigh, rib cage, pelvic, waist, cervix etc.) of which were later trimmed or debone to separate the beef from the bones. The weight of the different body parts were carefully weighed alongside with the weight of the blood, alimentary tract (gut filled), internal and external offal were usually added to obtain the live weight of the animal as there was none availability of scale to take the weight of the animal before slaughter. The carcass weight was usually obtained by subtracting the weight of alimentary tract, internal and external offal weight by the live weight.

Data collection

The different parts of the beef carcass were weighed using weighing scale. The beef, bone, visceral organs (Gut filled and empty) were carefully weighed. The animals were weighed in parts, the head, the neck, the hind limb and forelimb, pelvic, lower and upper ribcage, hump back. The different parts of the carcass were carefully deboned and weighed followed by the visceral organs.

Statistical analysis and model

Data collected during the experiment were subjected to one way ANOVA using SPSS, 2007

significant means were separated using DMRT (Duncan multiple Range Test) Steel and Torrie, (1989).

Results and discussion

The effect of slaughter age on carcass parts of White Fulani cattle is shown in Table 1. All the carcass parts studied (Head, Tail, Beef, Bone, Neck and Humpback) were significantly (P< 0.05) affected by slaughter age except the weight of neck. Animals slaughter at the age 5.5 - 6.5 years had higher (P< 0.05) values of head (23.50kg), Tail (5.83kg), Beef (122.00kg), Bone (72kg) and Humpback (5.33kg) than those slaughtered at 3 - 3.5 years and 4 - 4.5 years. The weight of the neck was similar in all age groups, Tefera *et al*.(2019) reported similar results when they compared three breeds of cattle with different age class. This result is also in agreement with the reports of Polidori *et al*. (2015), who concluded that carcass weight increase in animals slaughtered at an older age. Thus, the differences in the carcass weight of different age class are expected because each class differ from the other with at least one and a half(1½) years. This result is also in line with reports of Franco *et al*. (2013) and Lorenzo *et al*. (2014) in foals receiving a finishing diet and slaughtered between 15 and 18 months of age.

Table 1: Effect of age on carcass parts of white Fulani cattle studied

Age	3 – 3.5 years	4 – 5 years	5.5 – 6.5 years
Head (kg)	$13.67^{b} \pm 0.57$	$17.17^{b} \pm 4.19$	$22.50^{a} \pm 1.32$
Tail (kg)	$3.53^{b} \pm 0.92$	$4.33^{ab} \pm 1.04$	$5.83^{a} \pm 0.76$
Beef (kg)	$70.00^{b} \pm 2.00$	$80.00^{b} \pm 33.05$	$122.00^{a} \pm 2.65$
Bone (kg)	$47.63^{b} \pm 3.60$	$57.73^{b} \pm 2.65$	$72.00^{a} \pm 4.50$
Neck (kg)	9.17 ± 0.29	11.00 ± 1.00	10.50 ± 1.80
Humpback kg)	$1.73^{b} \pm 0.68$	$2.37^{b} \pm 1.53$	$5.33^{a} \pm 1.04$

$^{a, b, :}$ *means in the same row with different superscripts are significantly different (P<0.05)*

The effect of slaughter age on live weight, carcass weight, dressing percentage and carcass part weights are shown in Table 2. The result indicated that Live weight, carcass weight and carcass parts weight were significantly affected by slaughter age. Animals slaughtered at 5.5 – 6.5 years of age had higher (P<0.05) values of live weight (389.20kg) and carcass weight (209.80kg) than those slaughtered at 3 – 3.5 years of age (248.97 and 128.50 for Live Weight (LW) and Carcass Weight (CW) respectively). However, those that were 4 – 5years of age recorded 284.73kg and 151.10kg for LW and CW respectively. This report is in consonance with earlier reports by Polidori *et al*., 2015 who stated that live weight and carcass weight increase as the animal slaughter age increases. Thus, the differences observed in live weight and carcass weight could be due to the fact that animals from each age class differs from each other with more than one year. This result is in line with the work of Franco *et al.* (2013) and Lorenzo *et al*. (2014) in foals receiving a finishing diet and slaughtered between 15 and 18 months of age.

The result indicated that Dressing percentage was not affected by Slaughter age (51.62%, 53.06% and 53.90% from animals slaughtered at 3 – 3.5 years, 4 – 5 years and 5.5 – 6.6 years respectively). This was an indication that animals under different ages yielded similar proportion of their live weight as carcass weight. It also showed that age had no effect on Dressing percentage of the animals studied. There was no significant difference observed in fat content of the cattle across the different age class (P<0.05) rather 5.5 – 6.5 age group was observed to possess the lowest percentage of fat. The result of this study differs from the reports of Crouse *et al.* (1986) and Ishad *et al*. (2013) who stated that as

animals became older, the proportion of the fat in their carcass increases and the proportion of muscles and bones decreases. However, the results obtained from this study could be due to the animal's diet. The White Fulani cattle used in this study were fed solely on tropical pasture till slaughter. The result of this study is also not in agreement with Mckiernan (2007), who reported that bone accounted for roughly 16 – 20% of carcass weight in cattle, in the present study bone accounted for 37.01, 37.21, 34.29% in the 3.0 – 3.5, 4.0 – 5.0 and 5.5 – 6.5 age class respectively.

Table 2: Effect of age on Liveweight, carcass weight and Dressing Percentage of white Fulani cattle studied

Age	3 -3.5 YEARS	4 -5 YEARS	5.5 -6.5 YEARS
Live weight (kg)	248.97^{b}± 23.35	284.73^{b} ±78.81	389.2^{a} ± 14.45
Carcass weight (kg)	128.5^{b} ± 5.71	151.10^{b}±43.12	209.8^{a} ± 5.11
Dressing percentage	52.93 ± 1.18	52.84 ±0.53	53.92 ± 0.95
Beef (kg)	70.00^{b} ± 2.00	80.00^{b} ± 33.05	122.0^{a} ± 2.65
(%)	54.48 ± 0.90	51.78 ± 6.19	58.15 ± 1.28
Bone (kg)	47.63^{b} ± 3.60	57.73^{b} ± 7.77	72.00^{a} ± 4.50
(%)	37.01 ± 1.19	37.21 ± 5.31	34.29 ± 1.40
Fat (kg)	10.90^{b} ± 0.53	13.37^{ab} ± 2.37	15.83^{a} ± 0.76
(%)	8.49^{b} ± 0.46	9.01^{ab}± 0.89	7.55^{a} ± 0.51

$^{a, b, :}$ *means in the same row with different superscripts are significantly different (P<0.05)*

Conclusion and recommendations

The study indicated that there were no significant differences in the dressing percentage of the studied White Fulani bulls, across the three age groups. Increase in beef yield was accompanied with advancement in age. Therefore, age could be use to determine carcass composition and milk yield in White Fulani cattle.

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