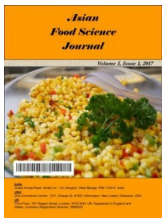

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Carcass Characteristics of Red Sokoto Buck Goat as Affected by Singeing, Scalding and Skinning

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Authors' contributions

This work was carried out in collaboration between both authors. Author PIO designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Author ABO managed the analyses of the study. Author PIO managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

A study on carcass characteristics of Red Sokoto (RS) Buck goat as affected by singeing, scalding and skinning was carried out. Twelve intact RS buck goats with an average live-weight of 18.00 ± 0.65 Kg were allocated to these post-slaughter processing treatments. Parameters like temperature, pH, dressing percentage, wholesale cuts, Water Holding Capacity (WHC) among others, were taken. The experimental model was a Complete Randomized Design (CRD), while data generated were analyzed by the procedure of SAS (1999). Results from the study showed that singeing of RS goat meat significantly ($P<0.05$) elevated the internal temperature, initial pH and the WHC of the meat. Scalding significantly ($P<0.05$) increased the dressing percentage and wholesale cuts of the carcass. While skinning exerted significant ($P<0.05$) increase on the drip loss and cold loss of RS carcass Post-mortem. By this, it can be said that post-mortem handling of carcasses affects to a large extent the quality traits of the meat.

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Keywords: Carcass; red sokoto buck; singeing; scalding; skinning.

1. INTRODUCTION

Goats are important meat animals in the tropics [1]. The Goat meat (Chevon) is judged as the preferred meat to beef or mutton because of its low subcutaneous fat [2], which makes it increasingly important in the health management of people. Several studies have indicated that goat meat is inherently less tender because of its higher collagen content than sheep [3,2]. Also, that goat muscle fibres are thicker and the fibre bundles larger than sheep, thus given goat meat a characteristic courser grain texture and a higher shear force value than sheep [4].

However, in Nigeria, there are three main breeds of goat namely, the Red Sokoto (RS), Sahel and West Africa dwarf (WAD) goat. The RS goat is the most predominant, widely used and distributed breed in the Northern belt of the country [5]. The goat is a prolific meat-producing breed compared to other breeds. However, the overall acceptability of the meat is dependent on its general qualities. These qualities which can be both physical and chemical depend on a lot of factors such as pre and post-slaughter conditions of animals [6].

Previous reports by [7,8] have shown that post-slaughter handling of meat carcass affects to a large extent the quality traits of the meat. Paramount among the post-Slaughter processing of meat known to affect the eating and organoleptic properties is the dressing methods employed, which may include Singeing, Scalding or Conventionally Skinning methods.

According to [9], singeing is a method used to burn off the hair, thus given the carcass skins a golden brown colour and an enhanced smoky flavour in the processed meat. This method is widely practised in the home processing of small stocks like sheep, goats, rabbits and grasscutter. This is because it is much easier and saves considerable time and energy relative to the scalding and the conventionally dressing method of skinning [9].

Monin et al. [10] reported that scalding is a method of floating carcass or dipping of well-bled animals in hot water to loosen the skin follicles in order to ease its removal. They added that scalding has an advantage of reducing surface bacteria counts as well as helping to remove hair. Also, that scalding may reduce the rate of carcass cooling and in some situations, this can influence the rate of pH fall.

Okubanjo [9] however reported that skinning or conventional dressing is a simple act of pulling the subcutaneous skin, thereby removing some subcutaneous fat and exposing the internal carcass body. According to [11], skinning helped to reduce the rate of pH fall by allowing the carcass to cool more rapidly. These post-slaughter processing methods will not only affect the temperature and its rate of decline but will also affect the intimate pH and other meat characteristic including its eating qualities.

This present study, therefore, sorts to investigate some carcass characteristics of Red Sokoto Buck goats as affected by singeing, scalding and skinning.

2. MATERIALS AND METHODS

Twelve Red Sokoto (RS) Buck goats with an average live-weight of 18.00 $\pm$ 0.65 Kg were used for this experiment. The goats were purchased from Bodija market in Ibadan, and taken to the Department of Animal Science's goat unit where they were weighed and properly identified.

The animals were allotted to three deharing methods, viz singeing, scalding and skinning. They were bled by severing the carotid and Jugular veins before being processed.

2.1 Dressing Methods / Procedures

Singeing – using hardwood as source of firewood, the goats hairs were flamed off and scrapped using a metal scrapper, creating a brown golden impact on the carcass.

Scalding – it was done by dipping the bled goats in hot water (85c) for 30 seconds, after which the hairs were scrapped off with a hard mental scrapper until the carcass was clean.

Skinning – it was carried out by first making a ring round one of the hind legs with a scalpel, which was then inserted under the skin of the leg to open it up to the root of the tail. The same was repeated with the other leg. While, from the pelvis region, another incision was made up to the neck region. The hair was then pulled along with the skin, thereby exposing the internal carcass.

Parameters: The parameters taken were as follows;

Temperature and meat pH - Internal temperature was measured at a depth of l cm on the loin of carcass immediately after dressing (0 hour post-mortem) and subsequently at 30 mins interval over a period of 3 hrs post – mortem. Meat pH was sampled directly by introducing the pH meter electrode into the fresh slit made in the carcasses.

Dressing percentage – The carcasses were then washed and eviscerated, while the warm carcass weights and dressing percentage were determined.

Drip loss- This was measured by the mothod of [12] with some modifications. Cuts from the L-dosi, semitendinosus and semimembranous muscles were weighed immediately after cutting, hung in a laminate bag and closed tightly with string. The meat samples were weighed again after 24 hours at room temperature and drip loss calculated.

Cold loss – Warm carcass weights were recorded before cooling. Difference in weight after cooling was taken as cold loss. Carcasses were then splitted symmetrically and fabricated into wholesale cuts using a meat saw.

Wholesale cuts – After determining cold loss, the carcass were splinted symmetrically with a meat saw, using reference points for splitting into wholesale cuts as documented by [13].

Thermal shortening – This was determined according to the procedure described by [14].

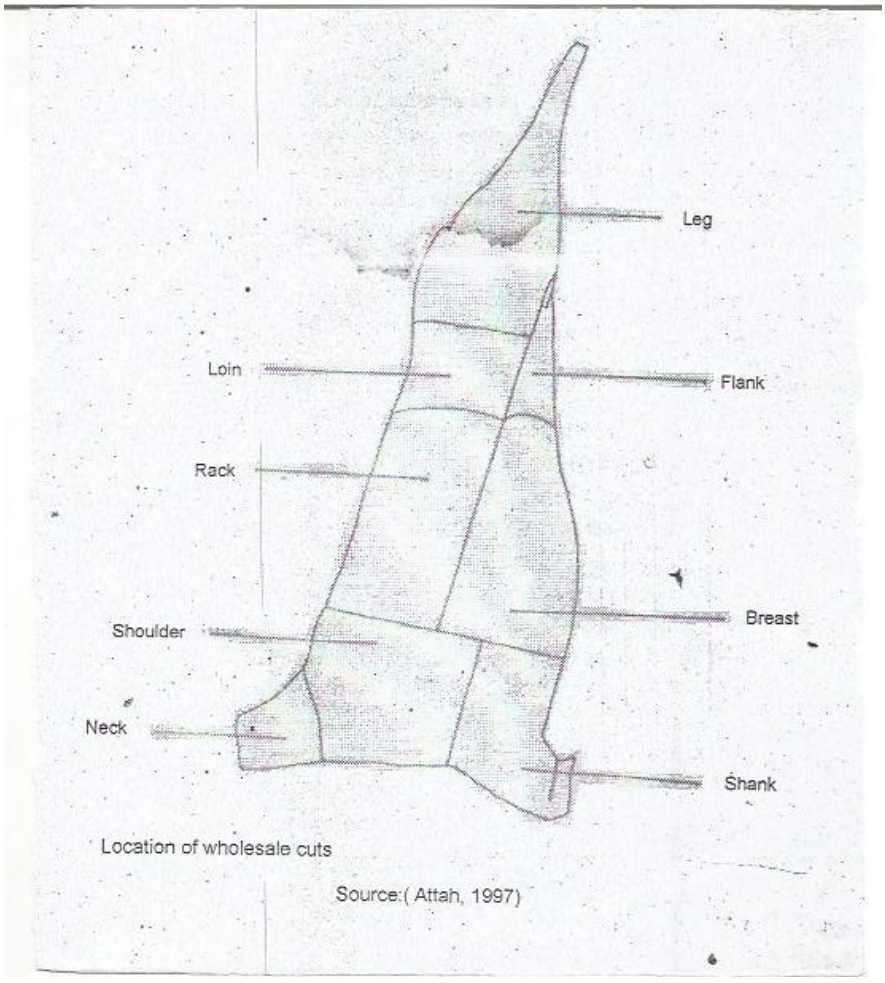

Fig. 1. Location of wholesale or primal cuts

Meat colour and marbling scores – The meat samples were evaluated following the method of [15].

Water Holding Capacity (WHC) – WHC was determined using meat samples obtained from L. dorsi (thoracic region), semitendinosus (right thigh) and semimembraneous (left thigh) muscles, following slightly modified method of [16].

Experimental Design - The design used for this experiment was a Complete Randomized Design (CRD), one way analysis of variance.

Statistical Analysis - All data obtained were subjected to analysis of variance using [17] package.

3. RESULTS AND DISCUSSION

The data on carcass characteristic of RS Buck Goat as affected by the three dehairing methods reported on the leg, are shown in table 1. Internal temperature of intact carcass was significantly ($P<0.05$) elevated to 54.3+ 3.25 in singeing, from 37.33± 0.00 and 39.73± 1.62 observed in skinning and scalding which were not significantly ($P>0.05$) different. This evened out as time post-mortem increased. This result followed a similar trend reported by [6] for the rabbit carcass. This would suggest even greater temperature differentials on the respective carcass surfaces following different intensity of heat among the processing (dehairing) methods.

Based on this observation still [18] earlier established that the muscle is metabolically active and generates heat during the pre-rigour period, mainly due to the conversion of glycogen to lactic acid and also, due to the hydrolysis of creatine phosphate and adenosine triphosphate (ATP). Consequent upon this, the constant elevated temperature during the first 30 minutes can be considered as an effect of continued heat production as long as energy in the form of creatine phosphate and ATP were left. While the subsequent temperature decline after 30 mins coincides with exhaustion of creatine phosphate [19].

Initial pH at 0 hour postmortem was higher in the singed (6.44± 0.14) followed by the scalded (6.39± 0.16) and least in the skinned carcass (6.36± 0.17), which also evened out as time post-mortem increased. The increase in pH of the singed carcass at 0 hour post mortem could be due to modification of electric charges of acid groups, separation of peptide chain and production of new components [20], while the gradual fall in pH from 0 hour post mortem was as a result of rigour mortis action, where the circulatory system has stopped functioning.

The relationship between Temperature and Time Post mortem (PM) as well as pH and Time PM are shown in Figs. 2 and 3 below. Here, temperature and pH of intact carcass decreased as Time post mortem increased.

Scalding significantly ($P<0.05$) elevated the dressing percentage of RS carcass from 45.71 and 50.51 in skinned and singed carcasses to 56.59. This is attributed to the added weight and toughened protective effect of the skin which was retained on the scalded and singed carcasses compared with the skinned carcass. [21] did not observe any significant difference ($P< 0.05$) between the dressing percent of singed and scalded rabbits, which was contrary to the result in this study. The improvement in dressing percent of scalded and signed carcass over that of the skinned one is of economic significant especially as meat payment is based on weight [22].

Table 1. Characteristics of singed, scalded and skinned RS buck goat carcass

Parameters	Singeing	Scalding	Skinning
Internal Temperature (ºC)	54.43 ± 3.25^{a}	39.73 ± 1.62^{b}	37.33 ± 2.00^{b}
pH	6.44 ± 0.12^{a}	6.39 ± 0.16^{b}	6.13 ± 0.17^{b}
Dressing percentage (%)	50.51 ± 0.12^{b}	56.59 ± 0.14^{a}	45.71 ± 0.13^{c}
Drip loss (%)	5.57 ± 0.02^{b}	5.09 ± 0.02^{b}	12.55 ± 0.03^{a}
Wholesale cuts wt (kg)	0.97 ± 0.03^{b}	1.12 ± 0.03^{a}	0.82 ± 0.03^{c}
Water holding capacity (%)	68.96 ± 1.00^{a}	66.72 ± 1.58^{b}	60.57 ± 0.50^{c}
Thermal shortening (%)	16.83 ± 1.61^{b}	22.12 ± 0.54^{a}	24.33 ± 1.15^{a}
Cold loss (%)	31.45 ± 1.99^{b}	25.50 ± 4.11^{c}	37.37 ± 2.90^{a}
Marbling scores (%)	7.25 ± 1.29^{a}	7.70 ± 0.96^{a}	6.20 ± 0.70^{b}
Colour scores (%)	7.43 ± 0.40^{a}	6.83 ± 0.99^{ab}	6.30 ± 0.69^{b}

abc: Means in the same row with similar superscripts are not significantly (P<0.05) different

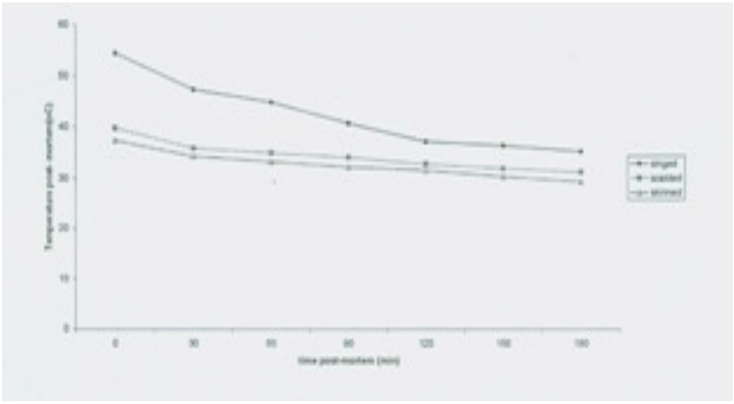

Fig. 2. Changes in internal temperature of goat carcass as influenced by processing methods and time post-mortem

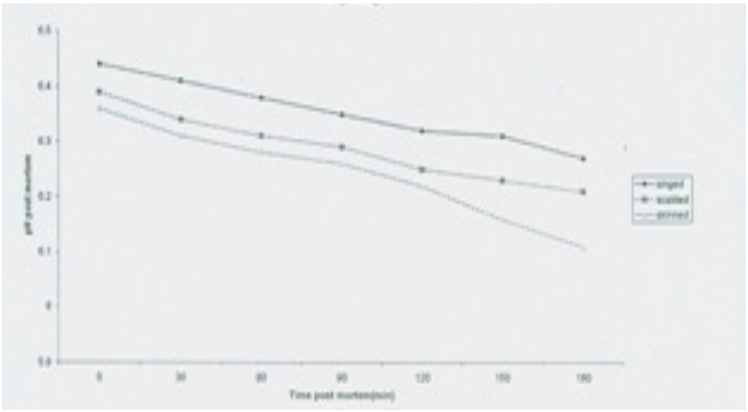

Fig. 3. Changes in pH of goat carcass as influenced by processing methods and time post mortem

Drip loss was significantly (P< 0.05) higher in skinned carcass compared to singed and scalded carcasses. This result was contrary to the findings of [6] for the Rabbit carcass, where drip loss was highest in the singed carcass. It is generally accepted that the source of drip is intracellular water which is lost from the muscle fibre post-mortem, driven by a pH and calcium induced shrinkage of myofibrils during rigour development [23,18]. The rate and quality of drip formation in fresh meat is believed to be influenced by the extent of rigour, shrinkage and the permeability of the cell membrane to water as well as other factors, such as the extent of protein denaturation [22].

The yields of wholesale cuts were significantly (P<0.05) increased by scalding compared with singeing and skinning. The reason for this result can be attributed to the added weight and protective effect of the skin which was retained on the carcass, which led to an initially increased dressing percent [6].

Water Holding Capacity (WHC) was significantly (P<0.05) affected by singeing compared to scalding and skinning. The singed carcass exerting higher water retention can be attributed to the fact that a portion of the water present was in the bound form [24]. The implication of this is that meat from the singed carcass will be much tender and exudes more juice because of its high WHC, while the skinned carcass will exhibit a great loss of weight (Shrinkage) during cooking and storage because of its low WHC. This result contradicts the findings of [6] where WHC was less in the singed carcass of rabbit.

Values of thermal shortening (differences in length of meat samples after cooking) showed that the skinned carcass was higher compared to the scalded and singed carcasses. Though the skinned carcass was not significantly (P> 0.05) different from the scalded carcass, but imposed a significant (P<0.05) difference in the singed carcass. The high value of shortening in the skinned carcass is expected as it earlier showed

the lowest value of water holding capacity. WHC affects both length (thermal shortening) and weight (cooking loss) of meat on cooking, which is the resultant shrinkage [24]. The implication of this is that meat from the skinned carcass will have high weight loss, very firm and a tough texture.

Values of cold loss (differences in weight of hot carcass after chilling) as observed from this study showed that the skinned carcass was higher when compared to scalded and singed carcasses. This was again expected as a result of the processing (dehairing) methods applied, resulting to loss of skin cover for the skinned carcass, which will accelerate cold loss of Hot carcass PM.

Marbling (the thing flakes of fat deposited in the connective tissues that surround the muscle bundles and the individual muscle fibres) was observed to be higher in scores in the scalded carcass than in the singed and skinned carcasses. The result was not significantly ($P>0.05$) different from the singed carcass but significantly ($P<0.05$) different from the skinned carcass. The low marbling score for the skinned carcass was expected, as it could be attributable to the fact that removal of the skin cover led to removal of some of the underlying fat during the dehairing process. Naturally, a degree of fat is laid beneath the skin of animals and when processed by skinning, a lot of this fat will be removed [6].

Values of the colour scores from raw goat meat samples of the signed carcass were higher than those from the scalded and skinned carcasses. The result of the singed carcass was not significantly ($P>0.05$) different from the scalded but significantly ($P<0.05$) different from the skinned. The implication of this is that the meat from the skinned carcass will be less acceptable to consumers, since meat colour is the first criteria used to judge meat quality and acceptability [25].

4. CONCLUSION

Processing (dehairing) methods to a large extent affected the meat characteristics of RS goats Post mortem, with Singeing elevating the internal temperature, initial pH and water holding capacity of the carcass. Scalding showing an increase in the dressing percent and wholesale cuts of meat, while Skinning increased the drip loss and cold loss of carcass. By this result, Scalding processing method is recommended for meat processors to assure better carcass weight and dressing percent, Singeing is recommended for the sustenance of a better meat colour, while for consumers who cherish lean meat, the skinning method is recommended.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard written ethical permission has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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