EFFECT OF AGE AT SLAUGHTER AND TENDERIZER TYPE ON THE PROXIMATE COMPOSITION OF COOKED CAMEL (*Camelus dromedarius*) MEAT

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ABSTRACT
The study was conducted to determine the effect of age at slaughter (5, 10, & 15 years), tenderizer type (Potash & Ascorbic acid) on the proximate composition of cooked camel (Camelus dromedarius) meat. The meat samples from Longissimus dorsi of the camel were collected separately and cooked on a hot plate at 75^{0}C for 60 minutes. The samples were subjected to proximate analysis to determine protein, fat, moisture and ash contents. The result shows that, meat from 5 years camel had significantly (P < 0.001) higher ash content (1.743 %) than 10 and 15 years old camels. The protein content was significantly (P < 0.001) higher in meat from 10 years (22.024 %) old camel compared to 5and 15 years old camels which were 21.78 % and 21.59 %, respectively. However, fat content was significantly (P < 0.001) higher in meat from 15 years old (23.638). Protein level of 22.01 % was recorded on meat tenderized using ascorbic acid and was significantly (P < 0.001) higher. It could be concluded that the meat of 10 years old camel has the highest nutrient content and the addition of potash or ascorbic acid as tenderizers has no significant effect on proximate composition of cooked camel meat.
Keywords: Age, Tenderizer, Proximate Composition, Camel Meat

INTRODUCTION

Meat and meat products are vital sources of essential proteins and other nutrients required for healthy growth and development. The consumer attitude to meat shows preference depending on criteria considered important; such criteria may include species type, age at slaughter and eating quality of meat (Apata et al., 1998). The indisputable processing of meat prior to consumption is cooking, which influences its eating qualities (Aduku and Olukosi, 1990). Meat is processed in different ways which affects its proximate composition. Consumers use quite a wide range of processing methods have been identified which include; boiling frying, roasting, smoking and shedding among others (Okubanjo, 1988). Different methods have effect on doneness of meat as well as its desirability and acceptability (Ikemi, 1990). Camel meat is reported to taste like course beef, but older camels can prove to be very tough. The meat from older camels is best prepared by slow cooking (Serif, 2003). The concentration of both major and trace minerals is higher in camel meat than beef except Cu (cupper) (Muhammad, Mahmud and Mustapha, 2010). Camel meat is low in cholesterol and high in quality proteins of high biological value, it provides useful amount riboflavin, niacin, thiamine, iron, zinc and vitamin A and C (Lathan, 1997).
Camel carcass provides substantial amount of meat. The dromedary carcass weight 400 kg or more in males and 300 kg or less in females which vary from location to location and based on plane of nutrition prior to. slaughter (Kartu, 2004; Anon, 2002; Wilson, 1984). In Nigeria, a mean carcass weight 195 kg was reported for camels slaughtered in Kano Metropolitan Abattoir (Muhammad and Akpan, 2008). The consumption of camel meat in Nigeria is low compared to other livestock (Muhammad, 2008). An identified limitation to camel meat consumption has to do with its acceptability among meat consumers related to method of processing (Maya, 2004). The meat of different animal species has different degree of tenderness and composition. Therefore, a suitable method of processing is necessary to enable the release of desirable meat contents (Aduku and Olukosi, 2000).

MATERIALS AND METHODS

Sample Collection

Meat from 5, 10 and 15 year old camels (*Camelus dromedaries*) was used. The camel meat was purchased from Municipal Abattoir in Kano State Nigeria, immediately after slaughter. The longissimus dorsi muscle from the hind limb were purchased and used for this study.

Cooking Methods

Potash and ascorbic were used as tenderizers, and they were added separately each at 2.5g / 500ml (H_2O) and 5g / 500ml (H_2O) to the cut of each of the meat samples. The samples were cooked separately on a hot plate at 75^{O}C to 100^{O}C for 60 minutes. A cut of meat sample from each of the varying aged camels were also cooked separately without addition of any of these tenderizers, and served as the control for the experiment.

Proximate Analysis
The cooked camel meats were subjected to proximate analysis to determine the moisture, crude protein, fat and ash contents according to the method outlined by AOAC (1990).
Statistical Analysis
Data collected were subjected to analysis of variance (ANOVA) in form of 3x3x3 factorial arrangement of Completely Randomized Design (CRD).

RESULTS AND DISCUSSION
Table 1 shows the effect of age on proximate composition of cooked camel meat. The ash content was significantly ($P < 0.001$) higher in the meat of 5 years old compared with the meat of 10 and 15 year old camels. The moisture and ether extract were significantly ($P < 0.001$) higher in the meat of 15 years old camel. However, the meat from 10 years old camel had the highest crude protein (22.04 %) level.

Table 1: Effect of age on proximate composition (%) of cooked camel meat

	Age (years)		
Composition	**5yrs**	**10yrs**	**15yrs**
Ash	1.743^{a}	1.716^{b}	1.185^{c}
Moisture	6.067^{b}	4.668^{c}	8.296^{a}
Crude Protein	21.778^{b}	22.024^{a}	21.594^{c}
Ether Extract	18.995^{c}	21.379^{b}	23.638^{a}
P-Value	P<0.001	P<0.001	P<0.001

abc mean with different superscript within a row differ significantly ***(P<0.001)***

Chemical properties such as moisture, ash, fat and protein of camel meat as affected by age are presented in Table-1. DAA (2007) reported an average protein content value of 23.2 g/100g in lean component of Australian red meat. Hence, nutrient content of camel meat is similar to those of other red meat (Greenfield, 1987). However, the crude protein content in the present study was higher (22.04 %) in 10 years camel meat. Gamaleldin, et al. (2019) reported that the reason for the variations in the values of the chemical properties of meat is differences in animal age, feed and type of habitat. Moisture and ether extract were higher in the meat of 15 years old camel. Thus, as the age of camel increases, the fat content also increases to a parallel level but on the other hand, protein content of meat is decreased.

Table 2: Effect of tenderizer on proximate composition of cooked camel meat

	Tenderizer (g)		
Component	**Potash**	**Ascorbic Acid**	**Control**
Ash	1.835^{a}	1.326^{b}	1.415^{b}
Moisture	6.603^{b}	5.082^{c}	8.348^{a}
Crude Protein	21.885^{a}	22.101^{a}	21.019^{c}
Ether Extract	23.846^{a}	19.914^{b}	19.167^{c}
P-Value	P<0.001	P<0.001	P<0.001

abc mean with different superscript within a row differ significantly ***(P<0.001)***

The effect of tenderizer on proximate composition of cooked camel meat is shown in table 2. Potash treated meat had significantly ($P < 0.001$) higher ash (1.835 %) and ether extract (23.846 %) contents. The crude protein level (22.101 %) was significantly ($P < 0.001$) higher in ascorbic acid treated meat. The control had the highest moisture content (8.348 %).
The high amount of ash recorded from the Potash treated meat (1.835 %) could not be unconnected with the addition of the tenderizer. Potash is a salt, when potassium hydroxide is absorbed in to meat; it will add to the potassium ions the ash content of the meat (Fellows, 2000). The control of the study had the highest moisture value (8.348 %), the difference between the treatment's control and the other treatments could be attributed by the quantity of the tenderizers (potash/ascorbic acid) added to the treatments as well as the cooking temperature and cooking time. Desmond, (2006) reported that excessive use of potash or prolonged exposure can lead to extreme breakdown of muscle structure, giving the product a dry texture. The addition of ascorbic acid as tenderizer does not alter the protein value of the meat (Kumar et al., 2004). Thus, in the present study, the ascorbic acid treated meat recorded the highest CP value (22.101 %). The high or low fat content in the meat does not have direct connection with the presence of potash as tenderizer. However, the cut of the meat used may influence the general value of its fat content (Hamm, 1986).

CONCLUTION

It could be concluded that the meat of 10 years old camel has the highest nutrient content and the addition of potash or ascorbic acid as tenderizers has no significant effect on the proximate composition of cooked camel (*Camelus dromedarius*) meat.

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