



## Preference for grasscutter offal by some consumers in the Greater Accra and Ashanti regions of Ghana

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**Abstract**

The objective of this study was to assess the preference for grasscutter offal among consumers in the Greater Accra and Ashanti regions of Ghana. The stratified three-stage random sampling was adopted for the selection of respondents. A total of 140 respondents (120 consumers; 20 operators) were used in this study. In the Ashanti region, 93 consumers and 13 chop bar operators were considered. Within the Greater Accra region, only one market was selected (Agbogbloshie market), where 27 consumers and seven chop bar operators were considered. Relevant information was collected through the administration of well-structured questionnaires. Results obtained showed a relatively higher offal preference by consumers in the Ashanti region (91.4%) as compared to the Greater Accra region (81.5%). Most consumers preferred the intestines and intestinal contents in both represented areas 60% from the Ashanti region and 45.6% from the Greater Accra region. 90.6% and 81.8% of the consumers from the Ashanti and Greater Accra regions, respectively preferred cooked offal to either smoked or roasted. These regional differences were not statistically significant. The rate of offal consumption was higher in the Ashanti region (i.e., on a weekly basis) as compared to the Greater Accra region (i.e., occasionally), represented by 63.5% and 68.2%, respectively. This difference was statistically significant ( $p < 0.05$ ). The taste was considered the most significant, relevant and important factor affecting consumer preference for grasscutter offal consumption in both regions. It is concluded in this study that the grasscutter offal has relatively high patronage by the respondents in this study. Further studies should be focused on the possible health implication of offal consumption on consumers as the intestines, and their contents might contain some parasites and other bacteria which can be harmful to humans. Further studies should be carried out to obtain a nationwide view of grasscutter offal consumption.

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### Introduction

Livestock and associated products make up more than 50% of the total value of gross agricultural production in developed countries but only one-third

of this figure is realized in developing countries (Cimino, 2009). Game meat has been an important protein source for many West African countries over

the centuries with its consumption increasing in Ghana and the world at large (Paulsen *et al.*, 2011) since game meat products tend to be low in kilojoules and cholesterol and are protein dense (Hoffman & Wiklund, 2006).

In Ghana, bush animals are sold in Ghanaian markets and restaurants and are eaten as source of food. Grasscutter meats have been reported to be high in amino acids, vitamins, minerals, antioxidants such as ubiquinone as compared to other animals like rabbit among others (Hernández & Gondret, 2006; Golden *et al.*, 2011;). In recent times Ghana's bushmeat trade has been characterized as being highly commercialized, supplying both households within the rural community and urban areas. Rural people continue to consider bushmeat as one of the forest's most valuable food products and an important component of their livelihoods (Crookes *et al.*, 2007). City dwellers may eat bushmeat as a means of culturally re-connecting to their place of origin, where they or their parents consumed bushmeat (Luiselli *et al.*, 2017, Luiselli *et al.*, 2018, Luiselli *et al.*, 2019). In large metropolitan cities, consumers usually have the choice of several sources of domestic animal protein, but many opt for bushmeat for reasons other than its nutritional importance (Chausson *et al.*, 2019).

Van Heerden & Morey (2014) described offal as the internal organs and entrails of a butchered animal, which have a considerable amount of an animal's meat weight. Offal products include the heart, liver, lungs, tails, feet, and head including brains and tongue. Game offal is obtained as a by-product of commercial game harvesting, trophy hunting and biltong hunting. These materials are valuable sources of animal protein that could be supplied to both soup kitchens and school kitchens or could be made available to informal meat traders (McCrinkle, 2009; Ramrajh *et al.*, 2011). These offal or edible by-products contain many essential nutrients of which some are utilized pharmaceutically due to certain contents such as amino acids, hormones, minerals, vitamins and fatty acids. Some meat by-products (e.g. lung, kidney, brains, spleen, and tripe) show a higher level of moisture compared to meat. Moreover, certain organs such as the liver and kidney have a higher content of carbohydrates than other meat materials. Organs are usually richer in vitamins than lean meat (Liu, 2002). Globally, consumption of bushmeat specially grasscutter has been published with a pool resource of literature on its patronage and consumption pattern. However, the issue of grasscutter offal and its consumer preference has not been tackled. This study, therefore, seeks to find out

the consumer preference for grasscutter offal in two regions in Ghana and to evaluate factors affecting consumer acceptability of grasscutter offal.

## Materials and Methods

### Study area

The Accra metropolis in Greater Accra region and Kumasi Metropolis in Ashanti region were selected for the study.

In the Ashanti region, the human population stood at 4,780,280 representing 19.4% of the country's population with agriculture including forestry but little fishing being their leading economic activity. In the region, Akan is the predominant ethnic group (74.2%), followed by Mole-Dagbon (11.3%), Ewe (3.8%), Gurma (2.8%), Mande and Grusi (2.0% each), Guan (1.5%) and Ga-Dangme with the lowest proportion (1.2%). In the region, 25.4% of the populace are involved in livestock farming of which chicken is the most important livestock forming 64.0% while grasscutter makes up 0.4% of the livestock population (Ghana Statistical Service, 2010). The Kumasi metropolis in the Ashanti region has an area of approximately 254 square kilometres and is located between latitudes 6°03'5" and 6°04' N and longitudes 1°03'0" and 1°03'5" E. It was selected because of the dense population of consumers who have high preference for animal protein and the characteristic populace of grasscutter offal consumers can be found in this Metropolis (Ghana Statistical Service, 2010).

In the Greater Accra region, the human population stood at 4,010,054 (16.3%) of the country's population with industrial services being the major economic activity. In the region, Akan is the predominant ethnic group (52.2%), followed by Ga-Dangme with the lowest proportion (41%). In the region, 35.7% of the populace are involved in livestock farming of which chicken is the most important livestock kept by 49.1% of the populace while grasscutter is kept by 1.5% of the population (Ghana Statistical Service, 2010). The Accra Metropolis was also selected for this study with specific emphasis on the Agbogbloshie Market where the consumers of grasscutter and other bushmeat animals are populated. Agbogbloshie market is one of the largest markets in Accra for all sorts of commodities such as food stuff, scrap metals, e-waste etc. The market covers approximately four acres and is situated on the banks of the Korle Lagoon, northwest of Accra's Central Business District. Agbogbloshie extends from latitudes 5°33'00"N and

longitude 0°12'00"W, serves as the central hub for most food products from all part of the country.

#### *Study design*

The survey was a cross-sectional study, which sought to evaluate the preferential consumption of grasscutter offal in the various retailed markets in the Kumasi metropolis. Structured questionnaires were administered to 120 consumers of grasscutter offal and 20 chop bar operators who were randomly selected before sample collection, based on data from a preferential consumption survey.

#### *Study population*

Adult members who demonstrated a preference for grasscutter offal were subsequently selected for this investigation, also included were sellers of the offal within Kumasi and Accra metropolis.

#### *Sampling technique*

The sampling technique used involved a stratified sampling technique followed by a simple random sampling technique. The regions which had grasscutter populations namely the Eastern, Greater Accra, Ashanti, Brong Ahafo, Western and Central regions were considered and served as the strata and based on proximity to the researcher and population size, the first two regions with the highest human population were selected thus Greater Accra and Ashanti regions. Within these two selected regions, consumers and chop bar operators within the markets where the grasscutter trade was eminent were selected using a simple random sampling technique for this study.

#### *Sample size determination*

The sample size required was determined using the formula as stated by Cochran (1977):

$$n = \frac{t^2 \times p(1-p)}{m^2}$$

where; n = required sample size, t = confidence level at 95% (standard value of 1.96), and p = estimated prevalence in the project area was estimated at 5% (0.05) since there was no previous report on the grasscutter offal consumption level in Ghana and m = margin of error at 5% (standard value of 0.05).

Therefore,  $n = (1.96)^2(0.05)(0.95)/0.05^2 = 73$ .

The adequate sample size was 73, however, 140 respondents were sampled.

A total of 140 respondents were used in this study. This included 120 consumers and 20 chop bar operators. In the Ashanti region, 93 consumers were

selected whilst in the Greater Accra region, 27 consumers were selected. Concerning the chop bar operators, 13 (Ashanti region) and 7 (Greater Accra region) chop bar operators were considered.

#### *Data collection*

The method of data collection was using a structured questionnaire and a five-point balanced Likert scale. The questionnaire method of collecting data was chosen for its versatility speed and cost benefits. The data collection lasted 5 months (from September 2016 to February 2017). A total of 140 well-structured questionnaires were administered as a tool for evaluation of the preference of selected participants for grasscutter offal. The respondents' data were collected and analysed for preferential consumption of such an offal. A research instrument is a testing instrument that measures a given phenomenon. The survey instrument (questionnaire) contained two sections. Section 1 included different personal and demographic variables. This section helped obtain the respondents' information about gender, age, education, and status. Section 2 includes the variables that were important in the current study.

#### *Data analysis*

The data collected were analysed in percentages utilizing the Statistical Package for Social Sciences (SPSS) version 20.0 suits and Microsoft Office Excel was used in the plotting of graphs. Data results were represented in frequencies and percentages as well as in mean response and standard deviations. Ranking of mean scores for the relevance of the factors included; 'very important' ranged from 1.0 – 1.80, 'important' ranged from 1.81– 2.60, 'neutral' ranged from 2.61 – 3.40, 'unimportant' ranged from 3.41 – 4.20 and 'very unimportant' ranged from 4.21 – 5.00.

#### **Results**

Out of the sampled population of grasscutter offal consumers, 12.5% were between the ages of 15-20 years, also 37.5% were between the ages of 21-30 years. Moreover, 35% of the respondents were aged between 31-41 years while 15% of the respondents were 42 years and above (Table 1). Deducing the information obtained shows that the youth and the adults of different ages are involved in the consumption of grasscutter offal. Out of the 120 respondents (consumers) who took part in the study, the males accounted for 60% whilst 40% represented females, which implies that both males and females

were involved in the chain of the grasscutter offal commodity in the study areas, but males seem to consume grasscutter offal more than their female counterpart.

The study revealed that 27.5% of the consumers had informal education, 32.5% had completed basic education and 32.5% had completed secondary education whilst 7.5% have had tertiary education (Table 1). With respect to religion, 40% of the respondents were identified as Christians with 50% identified to be Muslims while 10% were identified to be of other religions though they did not state categorically the type of religion (Table 1).

The age and gender characteristics of the chop bar operator is represented in Table 2. The results obtained on the age of the chop bar operators revealed that; 70% were between the ages of 31-40 years, whilst 30% of the respondents were between the age ranges of 21-30 years. From Table 2, the chop bar operators who were considered in the study comprised of 80% the females and 20% males. The educational background of the chop bar operators revealed that 60% of the respondents had basic education, 35% had informal education whilst 5% had completed secondary education whilst none of them had tertiary education. The

religious affiliation of the respondents shows that 90% of the respondents were identified as Christians with 10% identified to be Muslims (Table 2).

Table 3 describes the responses of consumers for the study as far as the consumption of grasscutter offal is concerned, the responses revealed that out of the sample population from the Ashanti region, 91.4% indicated that they consume grasscutter offal whilst 8.6% indicated that they do not consume grasscutter offal. It was identified that 81.5% of the consumers from Greater Accra consume grasscutter offal whilst 18.5% did not consume grasscutter offal (Table 3). The differences in the population consumption of grasscutter offal for the region were not statistically significant ( $p=0.144$ ).

In Table 3, the response by the consumers on their preference for grasscutter offal is displayed. The results revealed that with consumers from the Ashanti region, 60% of the consumers preferred the intestines and the intestinal contents, 12.9%

**Table 1:** Demographic characteristics of consumers (n=120)

Variable	Categories	Frequency	Percentage (%)
Age (years)	15-20	15	12.5
	21-30	45	37.5
	31-41	42	35.0
	42 and above	18	15.0
Gender	Male	72	60.0
	Female	48	40.0
Educational Background	Informal	33	27.5
	Basic	39	32.5
	Secondary	39	32.5
	Tertiary	9	7.5
Religion	Christianity	48	40.0
	Islam	60	50.0
	Others	12	10.0

**Table 2:** Demographic characteristics of chop bar operators

Variable	Categories	Frequency	Percentage
Age of operators (years)	21-30	6	30
	31-40	14	70
Gender of operators	Male	4	20
	Female	16	80
Educational Background	Informal	7	35
	Basic	12	60
	Secondary	1	5
Religion	Christianity	18	90
	Islam	2	10

preferred the liver, and 7.1% of the consumers preferred the kidneys. Stomach contents of grasscutters were preferred by 20% of the consumers in the Ashanti region. With the offal preference by consumers from the Greater Accra region, 45.6% of the consumers preferred the intestines and the intestinal contents, 22.7% preferred the liver, 13.6% of the consumers preferred the kidneys whilst 18.2% preferred the stomach contents of grasscutter. This finding shows that the intestine and intestine contents of grasscutter which has been noted as a delicacy in Ghana is not refuted in this study based on the response of the consumers. The differences in the grasscutter offal preference for the region of consumers were not statistically significant ( $p=0.441$ ) (Table 3).

The study identified the state of grasscutter preferred by the consumers as shown in Table 3. It was revealed that among consumers from the Ashanti region, 90.6% preferred cooked offal, 8.2% preferred smoked

**Table 3:** Results on preference for grasscutter offal by consumers from Ashanti and Greater Accra regions

Variable	Categories	Region of Consumer		Chi-square value	P-value
		Ashanti	Greater Accra		
Offal consumption	Yes	85 (91.4%)	22 (81.5%)	2.13	0.144
	No	8 (8.6%)	5 (18.5%)		
Type of offal consumed	Intestines and contents	51 (60%)	10 (45.6%)	2.70	0.441
	Liver	11 (12.9%)	5 (22.7%)		
	Kidney	6 (7.1%)	3 (13.6%)		
	Stomach contents	17 (20%)	4 (18.2%)		
Nature of offal preferred	Smoked	7 (8.2%)	3 (13.6%)	1.66	0.437
	Toasted/ Roasted	1 (1.2%)	1 (4.6%)		
	Cooked	77 (90.6%)	18 (81.8%)		
Frequency of offal consumption	Daily	10 (11.8%)	2 (9.1%)	15.21	0.000*
	Weekly	54 (63.5%)	5 (22.7%)		
	Occasionally	21 (24.7%)	15 (68.2%)		
Factor influencing offal consumption	Taste	75 (88.2%)	16 (72.7%)	8.38	0.039*
	Religion	2 (2.4%)	1 (4.5%)		
	Economic	6 (7.0%)	1 (4.5%)		
	Health	2 (2.4%)	4 (18.2%)		

offal whilst 1.2% of the consumers preferred toasted/roasted offal. With the state of offal preferred by consumers from the Greater Accra region, 81.8% of the consumers preferred cooked offal, 13.6% preferred smoked offal whilst 4.6% of the consumers preferred toasted/roasted offal (Table 3). This finding shows that in both regions, consumers prefer cooked offal as compared to it being smoked or roasted. The differences in the state of grasscutter offal preferred with respect to the region of consumers were not statistically significant ( $p=0.437$ ).

The frequency of the grasscutter offal consumption among consumers was ascertained. Among consumers from the Ashanti region, 63.5% of consumed grasscutter offal on a weekly basis, whilst 24.7% consume grasscutter offal occasionally and 11.8% consume grasscutter offal daily (Table 3). With the response by consumers from the Greater Accra region, 68.2% of the consumers consumed grasscutter offal occasionally, with 22.7% consuming offal weekly and 9.1% consuming offal daily (Table 3). This finding shows that offal consumption is more frequent in the Ashanti region as compared to the Greater Accra region. The differences in the frequency of grasscutter offal preference with respect to the region of consumers were found to be statistically significant ( $p=0.000$ ) (Table 3).

The choice or preference for grasscutter offal by consumers is influenced by some factors or reasons. This was sought from the consumers in this study. The results revealed that with consumers from the

Ashanti region, the taste of offal affected 88.2% of the consumer's choice to consume grasscutter offal. It was found that 7.0%, 2.4% and 2.4% of the consumers of grasscutter offal in the Ashanti region attributed their preference for the offal to economic, religious and health reasons respectively (Table 3). In the Greater Accra region, offal preference by consumers was influenced mainly by taste as indicated by 72.7% of the consumers. Health reasons influenced the choice of 18.27% of the respondents to consume offal whilst religion and economic reasons affected the choice of 4.5% and 4.5% of the consumers respectively (Table 3). This finding indicates that taste is the major reason for consumption of offal by the consumers in both regions. In addition, the differences in the responses by consumers on the factors affecting grasscutter offal preference with respect to the regions were statistically significant ( $p=0.039$ ) (Table 3).

The sale of grasscutter offal by chop bar operators might be influenced by some factors or reasons. This was sought in this study as to why chop bar operators prefer to sell grasscutter offal to consumers. The study revealed that 61.5% of the chop bar operators from the Ashanti region were selling grasscutter offal as a business they are engaged in, whilst 23.1% indicated that it is because of consumer taste preference that is why they sell grasscutter offal and 15.4% of the chop bar operators indicated that the consumer demand is what engages them to sell grasscutter offal. In the Greater Accra region, 57.1%

of the chop bar operators were selling grasscutter offal as a business they are solely engaged in, whilst 28.6% and 14.3% of the chop bar operators were selling grasscutter offal as a result of consumer taste preference and consumer demand respectively as shown in Table 4. The differences in the responses by chop bar operators on the purpose of selling grasscutter offal with respect to the regions were not statistically significant ( $p=0.964$ ) (Table 4).

The response of chop bar operators on the offal mostly preferred by consumers was taken into consideration to find out if there are any discrepancies in the response provided by the consumers. It was identified that in the Ashanti region, the intestine and intestinal contents were the offal mostly preferred by the consumers as ascertained by 38.4% of the chop bar operators. Consumption of intestinal contents was counted as the offal that followed closely which was ascertained by 30.8% of the chop bar operators. It was seen that 23.1% of the chop bar operators said that the consumers preferred the intestines and the liver whilst 7.7% of the chop bar operators queried said that the consumers preferred the liver of the grasscutter. In the Greater Accra region, the intestine and liver were the offal mostly preferred by the consumers as ascertained by 42.8% of the chop bar operators. Consumption of intestinal contents was counted as the offal that followed closely which was ascertained by 28.6% of the chop bar operators. It was seen that 14.3% of the chop bar operators in the region said that the consumers preferred the

intestines and the intestine contents whilst 14.3% of the chop bar operators queried said that the consumers preferred the liver of the grasscutter. The differences in the responses by chop bar operators on the type of grasscutter offal preferred by consumers with respect to the regions were not statistically significant ( $p=0.939$ ) (Table 4).

The fundamental sources of retail of grasscutter offal for the chop bar operators included the markets and the hunters (Table 4). In the Ashanti region, 69.2% of the chop bar operators obtained their offal from the markets whilst 30.8% obtained their offal from hunters. In the Greater Accra region, 85.7% of the chop bar operators obtained their offal from the markets whilst 14.3% obtained their offal from hunters. This finding shows that the marketplace is the major source of offal purchase by chop bar operators in both regions. The differences in the responses by chop bar operators on the source of grasscutter offal with respect to the regions was not statistically significant ( $p=0.659$ ) (Table 4).

The study revealed in the Ashanti region, 76.9% of the chop bar operators sold cooked offal to most of their consumers. Also, 15.4% asserted selling dried form of the grasscutter offal to the consumers, whilst 7.7% usually sold the smoked grasscutter offal to the consumers (Table 4). With respect to the Greater Accra region, 71.4% of the chop bar operators sold cooked offal to their consumers whilst 28.6% sold dried offal to their consumers. The differences in the responses by chop bar operators were not statistically significant ( $p=0.952$ ) (Table 4).

**Table 4:** Response on grasscutter offal by chop bar operators from Ashanti and Greater Accra regions

Variable	Categories	Region of chop bar operators		Chi-square value	P-value
		Ashanti	Greater Accra		
Reason for selling offal	Consumer taste preference	3 (23.1%)	2 (28.6%)	0.073	0.964
	Consumer demand	2 (15.4%)	1 (14.3%)		
	Business	8 (61.5%)	4 (57.1%)		
Type of offal sold	Intestine contents	4 (30.8%)	2 (28.6%)	0.4029	0.9396
	Liver	1 (7.7%)	1 (14.3%)		
	Intestine and Intestine contents	3 (23.1%)	1 (14.3%)		
	Intestine and liver	5 (38.4%)	3 (42.8%)		
Nature of offal sold	Dried	2 (15.4%)	2 (28.6%)	0.9524	0.6211
	Cooked	10 (76.9%)	5 (71.4%)		
	Fresh and smoked	1 (7.7%)	0		
Factor influencing consumer purchase	Taste	8 (61.5%)	5 (71.4%)	0.5538	0.7581
	Taste and health	4 (30.8%)	1 (14.3%)		
	Health	1 (7.7%)	1 (14.3%)		
Selling price of offal	1-5 cedis	11 (84.6%)	5 (71.4%)	0.4945	0.7032
	6-10 cedis	2 (15.4%)	2 (28.6%)		
Source of Purchase of offal	Markets	9 (69.2%)	6 (85.7%)	0.6593	0.4168
	Hunters	4 (30.8%)	1 (14.3%)		

The price at which chop bar operators sell their grasscutter offal was sought in this study. Results in Table 4 showed that in the Ashanti region, a majority (84.6%) of the chop bar operators sold their grasscutter offal for a price ranging from 1 to 5 Ghana Cedis whilst the remainder of them representing 15.4% were selling their offal for a price range of 6-10 Ghana Cedis. In the Greater Accra region, 71.4% of the chop bar operators sold their grasscutter offal for a price ranging from 1 to 5 Ghana Cedis, whilst 28.6% were selling their offal for a price range of 6-10 Ghana Cedis. The differences in the responses by chop bar operators on the price of sale of grasscutter offal with respect to the regions was not statistically significant ( $p=0.495$ ) (Table 4).

The choice or preference for grasscutter offal by consumers is influenced by some factors or reasons. This was sought for from the chop bar operators to validate the response of the consumers in this study. From Table 4, in the Ashanti region taste was indicated by 61.5% of the chop bar operators as the factor influencing consumer preference for offal. Also, 30.8% attributed consumer preference for offal to a combination of taste and health reasons; whilst 7.7% of the chop bar operators attributed consumer preference for offal to health reasons. In the Greater Accra region, the taste was indicated by 71.4% of the chop bar operators as the factor influencing consumer preference for offal. Also, 14.3% attributed consumer preference for offal to a combination of taste and health reasons; whilst 14.3% of the chop bar operators attributed consumer preference for offal to health reasons. The differences in the responses by chop bar operators with respect to the regions were not statistically significant ( $p=0.5538$ ) (Table 4).

In order to explore the relevance of every factor affecting grasscutter offal consumption to consumers, the mean responses were calculated and ranked in Table 5. In the Ashanti region, taste was ranked as a very important factor affecting consumer preference for grasscutter offal with a mean response of  $1.07 \pm 0.863$ , economic reason was ranked as

unimportant with a mean response of  $3.76 \pm 0.032$ . In addition, consumers were neutral on health as a factor relevant to their preference for grasscutter offal with a mean response of  $4.8 \pm 0.134$ . Religion was considered a very unimportant factor affecting consumer preference for grasscutter offal in the Ashanti region (Table 5).

For the Greater Accra region, taste was ranked as the very important factor affecting consumer preference for grasscutter offal with a mean response of  $1.44 \pm 0.927$ , consumers were neutral on economic reason being a relevant factor affecting their preference for grasscutter offal with a mean response  $2.99 \pm 0.558$ . In addition, consumers considered religion and health as factors that are unimportant in affecting preference for grasscutter offal with a mean response of  $3.54 \pm 0.062$  and  $3.97 \pm 0.054$  respectively in the Greater Accra region (Table 5).

### Discussion

This investigation evaluates consumer preference of grasscutter offal in the Greater Accra and Ashanti regions. In this study, it was observed that grasscutter offal enjoyed a relatively high consumer preference of 91.4% and 81.5% of the respondents were involved in offal consumption in Ashanti and Greater Accra regions respectively. The finding of this study corroborates the previous finding of Asibey (1974) who reported that the majority of Ghanaians of approximately 75% of the Ghanaian population consume bushmeat which includes its offal. The higher percentage preference for grasscutter offal in this study as compared to that of Asibey (1974) could be attributed to the increase in the population size as well as the increased consumer base for grasscutter meat and its offal. The preference for grasscutter offal was higher in the Ashanti region (91.4%) as compared to the Greater Accra region (81.5%). The differences in the preferences could be attributed to the seeming abundance of the grasscutter in the rainforest which is the preferred habitat of the grasscutters and characteristic of the geography of the Ashanti region.

**Table 5:** Mean response on the relevance of factors affecting consumer preference for grasscutter offal

Factor	Region of consumers			
	Ashanti		Greater Accra	
	Mean $\pm$ SD	Rank	Mean $\pm$ SD	Rank
Taste	$1.07 \pm 0.863$	Very important	$1.44 \pm 0.927$	Very important
Religion	$4.32 \pm 0.531$	Very unimportant	$3.54 \pm 0.062$	Unimportant
Economic	$3.76 \pm 0.032$	Unimportant	$2.99 \pm 0.558$	Neutral
Health	$4.8 \pm 0.134$	Very unimportant	$3.97 \pm 0.054$	Unimportant

Mean response scale: 1-1.80= very important, 1.81-2.60= important, 2.61-3.40= neutral, 3.41-4.20=unimportant, 4.21-5.00= very unimportant

In addition, the culture of the populace in the Ashanti region promotes the higher consumption of grasscutter offal as compared to the Greater Accra region with varied cultural beliefs. The findings of this study agreed with a different survey in Ghana which revealed that grasscutter meat and offal are the most preferred by chop bar operators (cooked food vendors) and consumers (Owusu *et al.*, 2006) since it is a delicacy.

In this study, it was also observed that the preferred grasscutter offal of the consumers in both regions was the intestines and the contents as seen in Table 3. The intestines and their contents were consumed by the majority of the respondent in the Ashanti region (60%). This is because in the region, it is a delicacy, especially of the populace in Kumasi and its environs and it is believed that the intestine contents contain some herbs fed to the grasscutter which adds flavour and gives it a distinctly delicious taste when used in soups (Owusu *et al.*, 2006). The liver was the second most preferred offal in the Greater Accra region and this finding could be because the liver contains nutrients as well as used for medicinal purposes. The edible by-products such as the liver contain many essential nutrients of which some are utilized pharmaceutically due to certain contents such as amino acids, hormones, minerals, vitamins and fatty acids (Liu, 2002).

Cooked offal was the most preferred state of the offal by the consumers in the two regions considered in this study. This finding agrees with Tomberg (2005) who found that cooked offal is mostly preferred by consumers. The reason consumers prefer cooked offal to smoked or roasted offal is that cooking makes the offal more palatable, and easily digest. In addition, the offal becomes microbiologically safe for consumption as well as aroma development during cooking (Tomberg, 2005; Walsh *et al.*, 2010).

The frequency of grasscutter offal consumption was found to be different among the consumers in the two regions. The majority of the offal consumers in the Ashanti region (63.5%) consumed offal on weekly basis whilst the majority (68.2%) of the consumers in the Greater Accra region consume grasscutter offal occasionally. These difference in frequency of offal consumption was statistically significant ( $p < 0.05$ ). The difference in consumption rate by region is attributed to the differences in cultural and geographical settings. The populace in the Ashanti region is known to be more inclined towards consuming grasscutter and its offal as farming is one of their major economic considerations hence, they

are exposed more to these animals in the wild. In addition, the belief of the exceptional taste in consuming the grasscutter intestines and its contents fully persuades most of the populace to have much preference for grasscutter offal.

In this study, the trade of grasscutter offal was mainly ventured into as a business for most of the chop bar operators in both the Ashanti region and Greater Accra region represented by 61.5% and 57.1% respectively. This finding corroborates some previous reports in Ghana which have stated that the bushmeat trade provides the main source of income to a chain of bushmeat traders involving wholesalers and retailers (Tutu *et al.*, 1993). It was ascertained in this study that 80% of the chop bar operators who dealt in the grasscutter offal trade were females which indicate that women dominate the grasscutter trade as the sellers while men are mainly involved as hunters as indicated by the findings of Ntiamoa-Baidu (1998).

In this study also, it was observed that the source of the offal to the chop bar operators was more from the market than the hunters in the two regions. This could be explained by the fact that chop bar operators have easy accessibility to the grasscutter offal in the markets as compared to the hunters. In the Ashanti region, grasscutter and other bush meat from the wild are conveyed at the "Adehyeman" Gardens serving as the central market for grasscutter and bushmeat in general, whilst in Greater Accra, grasscutter and bush meat are obtained from hunters who sell to the market women who further sell them to chop bar operators.

In this study, grasscutter intestines and contents were preferred by the consumers because of the exceptional taste that it provides consumers with. Most of the consumers in both the Ashanti and Greater Accra regions represented by 88.2% and 72.7% respectively, mentioned taste as the factor influencing their offal consumption. Whilst 18.2% of consumers in the Greater Accra region mentioned health reasons as the second factor influencing offal consumption as compared to 2.4% of the consumers in the Ashanti region. These differences were found to be statistically significant and could be attributed to the differences in the knowledge base, beliefs and the understanding of health implications when it comes to offal consumption of the consumers in the different regions.

The study also revealed taste as the most important factor of relevance by consumers of both regions in consuming grasscutter offal in addition to health,



economic considerations and religious reasons. This finding supports the findings of Schenck *et al.* (2006) as well as van Vliet & Mbazza (2011) who reported in their various studies that bushmeat (including its offal) consumption is influenced by taste preferences in addition to health, cultural, and spiritual/religious reasons. The grasscutter meat and its products despite its good nutritional values has an exceptional taste (Fayenuwo *et al.*, 2003; Olomu *et al.*, 2003), it has wide acceptability and greatly appreciated for its taste. Grasscutter offal consumption transcends religious prohibitions because Muslims who do not consume rabbit or guinea pigs consume grasscutter. In conclusion, grasscutter offal has relatively higher patronage by the consumer respondents considered in this study. Offal consumption was relatively high in the Ashanti region as compared to the Greater Accra region. Most consumers preferred the intestines and intestinal contents in both regions and preferred their offal to be cooked. The rate of offal consumption was higher in the Ashanti region (i.e on weekly basis) as compared to the Greater Accra region (i.e. occasionally). The taste was considered the most significant and relevant factor affecting consumer preference for grasscutter offal consumption in this study.

It is recommended that further studies should be focused on the possible health implication of offal consumption on consumers as the intestines and their contents might contain some parasites which can be harmful to humans. Further studies should be carried out to obtain a nationwide view on grasscutter offal consumption in Ghana.

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#### Conflict of Interest

The authors declare that there is no conflict of interest.

#### References

Asibey EOA (1974). Some Ecological and Economic Aspects of the Grasscutter (*Thryonomys Swinderianus*, Temminck) in Ghana. PhD Thesis, Department of Animal Science, University of Aberdeen, UK. Pp. 141–176.

Chausson AM, Rowcliffe JM, Escoufflaire L, Wieland M & Wright JH (2019). Understanding the Sociocultural Drivers of Urban Bushmeat Consumption for Behavior Change Interventions in Pointe Noire, Republic of

Congo. *Human Ecology*, doi.10.1007/s10745-019-0061-z.

Cimino A (2009). Food Security and Nutrition in West Africa: Bushmeat, Overfishing, Industrial Agriculture and Alternatives to the Consumption of Animal Protein. *Swarm Intelligence Symposium*, 795. Pp. 2-4.

Cochran WG (1977). *Sampling Techniques*. Third edition. New York: John Wiley & Sons.

Crookes DJ, Humphreys D, Masroh F, Tarchie B & Milner-Gulland EJ (2007). The role of livelihoods in village hunting in the Ashanti region, Ghana. *South African Journal of Economic & Management Sciences*, doi.10.4102/SAJEMS.V10I4.1059.

Fayenuwo JO, Aknde M, Taiwo AA, Adebayo AO, Saka JO, Lawal BO, Tiamiyu AK & Oyekan PO (2003). Guidelines for grasscutter rearing. Technical Bulletin, IAR&T, Ibadan. Pp 38.

Ghana Statistical Service (2010). Population & Housing Census. Summary Report of Final Results. Sakoa Press Limited. Accra- Ghana.

Golden CD, Fernald LC, Brashares JS, Rasolofoniaina BJ & Kremen C (2011). Benefits of wildlife consumption to child nutrition in a biodiversity hotspot. *Proceedings of the National Academy of Sciences of the United States of America*, **108**(49): 19653–19656.

Hernández P & Gondret F (2006). Rabbit Meat Quality. In: L Maerterns, P Coudert, editors. Recent Advances in Rabbit Sciences, ILVO, Melle, Belgium. Pp 269-290.

Hoffman LC & Wiklund C (2006). Game and Venison – Meat for the Modern Consumer, *Meat Science*, **74**(1):197-208.

Liu DC (2002). Better utilization of by-products from the meat industry. Food & Fertilizer Technology. Center for the Asian and Pacific Region. Pp 1-15.

Luiselli L, Petrozzi F, Akani GC, Di-Vittorio M, Amadi N, Ebere N, Dendi D, Amori G & Eniang EA (2017). Rehashing bushmeat –interview campaigns reveal some controversial issues about the bushmeat trade dynamics in Nigeria. *Revue d' Ecologie* (Terre 216 et Vie) **72**(1): 3-18.

Luiselli L, Hema, EM, Ségniagbeto G, Ouattara V, Eniang E, Parfait G, Akani GC, Sirima D, Fakae B, Dendi D & Fa J (2018). Bushmeat consumption in large urban centres in West Africa. *Oryx Journal*, doi.10.1017/S0030605318000893.

- Luiselli LB, Hema EM, Segniabeto GH, Ouattara V, Eniang EA, Vittorio MD, Amadi N, Parfait G, Pacinih N, Akani GC, Sirima D, Guenda W, Fakae BB, Dendia D & Fa JE (2019). Understanding the influence of non-wealth factors in determining bushmeat consumption: Results from four West African countries. *Acta Oecologica-International Journal of Ecology*, doi.10.1016/J.ACTAO.2017.10.002.
- McCrinkle CME (2009). Improving food security and safety through the use of edible by-products from wild game. University of Pretoria, Department of Paraclinical Sciences, Section Veterinary Public Health, Private Bag X04, Onderstepoort 0110, South Africa. Pp 2.
- Ntiamoa-Baidu Y (1998). Wildlife Development Plan 1998-2003. Volume 6: Sustainable Use of Bushmeat. Wildlife Department, Ministry of Lands and Forestry, Republic of Ghana, Accra. Pp 5.
- Olomu JM, Ezieshi VE & Orheruata AM (2003). *Grasscutter production in Nigeria. Principles and practices*. Jachem Publishers. Pp 62.
- Owusu EH, Ntiamoa-Baidu Y & Ekpe EK (2006). The dependence of local people on bushmeat in the Afad-jato and Agumatsa Conservation Area, Ghana. *Nature & Faune*, **21**: 33-44.
- Paulsen P, Bauer A, Vodnansky M, Winkelmayr R & Smulders E (2011). Game meat hygiene in-focus: Microbiology, epidemiology, risk analysis and quality assurance. Wageningen: Wageningen Academic Publishers. Pp 352.
- Ramrajh S, McCrinkle CME, Heeb AW, Makita K & Grace D (2011). Participatory risk analysis to ensure food safety of edible offal from game meat. Paper presented at the First International Congress on Pathogens at the Human-Animal Interface (ICOPHAI), Addis Ababa, Ethiopia, 15-17 September 2011. <https://hdl.handle.net/10568/16292>, retrieved 25-06-2021.
- Schenck M, Nsame-Effa E, Starkey M, Wilkie D, Abernethy K, Telfer P, Godoy R & Treves A (2006). Why people eat bushmeat: Results from two-choice, taste tests in Gabon, Central Africa. *Human Ecology*, **34**(3): 433-445.
- Tomberg E (2005). Effect of heat on meat proteins-implication on structure and quality of meat product. *Meat Science*, doi.10.1016/j.meatsci.2004.11.021.
- Tutu KA, Ntiamoa-Baidu Y & Asuming-Brempong S (1993). *The economics of living with wildlife in Ghana*. Report prepared for the World Bank, Environment Division. Pp 85.
- Van Heerden S & Morey L (2014). 'Nutrient content of South African C2 beef offal', *Journal of Food Measurement and Characterization*, **8**(3): 249-258.
- van Vliet N & Mbazza P (2011). Recognizing the multiple reasons for bushmeat consumption in urban areas: A necessary step toward the sustainable use of wildlife for food in Central Africa. *Human Dimensions of Wildlife*, doi.10.1080/10871209.2010.523924.
- Walsh H, Martins S, O'Neil E, Kerry J, Kenny T & Ward P (2010). The effect of different cooking regimes on the cook yield and tenderness of non-injected and enhanced fore quarter beef muscles. *Meat Science*, doi.10.1016/j.meatsci.2009.09.014.