Full Length Research Paper

Beef consumption and consumer's knowledge on meat quality in Maroua in the Far North of Cameroon

Ronald Romuald Bebey Ngom Vougat[1]*, Steven Chouto[2], Harquin Simplice Foyet[3], Rebecca Garabed[4], Roland Ziebe[1] and André Pagnah Zoli[5]

[1]Department of Agriculture, Livestock and By-Products, The Higher Institute of Sahel, University of Maroua, Cameroon.
[2]Department of Geography, The Higher Teachers Training College, University of Maroua, Maroua, Cameroon.
[3]Department of Biological Sciences, Faculty of Sciences, University of Maroua, Maroua, Cameroon.
[4]Department of Veterinary Preventive Medicine, College of Veterinary Medicine, The Ohio State University, OH, USA.
[5]School of Veterinary Medicine and Sciences, University of Ngaoundéré, Cameroon.

The objective of this study was to determine beef consumption and evaluate the knowledge of consumers on meat quality in Maroua city in the Far North Region of Cameroon. To achieve this, 202 households selected using a gripped map and random selection method were surveyed. The cookers or cooks were surveyed and observed in each household. During this survey, the pieces of beef, as cuts before cooking, were weighted and the quantity of beef consumed per person was calculated. The influence of socio economic and demographic factors related to consumer (religion, age, monthly income, number of person in the household and district) on beef consumption was also evaluated. Overall, 96% of the surveyed households consumed meat and among them, 98% eat beef. Beef is consumed the most (72%), followed by goat (21%), sheep (5%), chicken (1%) and pork (1%). In majority of the beef-eating households (39%), cattle meat was eaten two or three times per week. In addition, a person consumed 133.25 ± 33.49 g of beef per day and this consumption rate was affected by the age, monthly income and the district position. During the evaluation of consumer's knowledge on meat quality, color and tenderness were found to be the most important factors for consumers. These findings suggest that meat consumption in the livestock production area in Cameroon is very important as it is higher than that observed in the whole Cameroon and in Africa. Thus Cameroonian government should focus on improving meat consumption in consumption zones.

Key words: Beef, consumer, consumption, household, meat.

INTRODUCTION

Worldwide, meat and meat products are important sources of protein in the human diets. Their consumption varies among and within countries and according to different factors related to a consumer and his environment. But the perception of their quality by consumers varies according to many factors (intrinsic and

extrinsic) (Van Loo et al., 2010; Font-i-Furnols and Guerrero, 2014).

With about 5.001 million cattle, Cameroon is a great country of livestock production, which occupies a prominent place in the sub region of Central Africa and in the sub-Saharan Africa area (FAOSTAT, 2014b). The meat consumption in Cameroon was 13.3 kg/capita/year in 2010 but this consumption is low according to the worldwide consumption of meat which is 41.9 kg/capita year (FAOSTAT, 2014a). That is why the government of Cameroon through the Ministry of Livestock, Fisheries and Animal industries (MINEPIA) hosts many projects which aimed to improve meat consumption from 13.3 kg/capita/year to 23 kg/capita/year in 2020 (MINEPIA, 2013). However, the problem of the poor consumption rate of meat could not be the same all over the country, especially in the three northern regions (Adamawa, North and Far-North) where the highest potential of livestock production was found (MINEPIA, 2014).

Previous studies conducted in 1980 have shown that the average of beef consumption per capita per year was 30 kg in both Garoua and Maroua, the respective capital cities of the North and the Far North regions of Cameroon (GESEP, 2002). Twenty years after, it reduced to 6.5-7.5 kg (Labonne et al., 2003). The question is: What happened twelve years after? A great deal of information is available on meat consumption in Cameroon but a little is known about the perception of consumer on meat quality.

In the Far North Region, 35.5% of households are food insecure, 5.1% in severe insecurity and 30.4% in moderate insecurity. Also, 37.7% of households have poor or limited consumption (PNSA/WFP, 2015).

The objective of this study was to determine the quantity of beef consumed per capita in the city of Maroua, a regional capital in the Far North Region of Cameroon and to evaluate the knowledge of consumer on meat quality attributes. Maroua is the capital that had an estimate of 713,653 inhabitants in 2010 (NSI, 2010). Maroua was chosen because it is the biggest city of the Far North Region of Cameroon and has the second highest cattle population in the country (MINEPIA, 2003). This city also provided an opportunity to explore beef consumption in an urban and cattle production (Ziebe et al., 2005).

MATERIALS AND METHODS

Study area

This study was conducted in the urban area of Maroua town (Figure 1).

Sample size

The number of households investigated was calculated and set taking into consideration the economic feasibility of our study but also considering the results of the pre-survey that we have done in the city of Maroua. This sample was shown to be sucient for a

reliable statistical analysis of the results obtained, considering that it obtained a confidence level of 95%. The confidence interval was used in this sample so as to obtain a mean value contained in the interval (Da Fonseca and Salay, 2008):

$$\bar{x} - t\frac{\sigma}{\sqrt{n}} \leq \mu \leq \bar{x} + t\frac{\sigma}{\sqrt{n}}$$

where n is the sample size, r is the standard deviation and t a random variable with a t student distribution of 1.96 for $n > 120$ and a confidence value of 95%. Thus, a total of 200 households were calculated for this study but 202 households were interviewed.

Sampling strategy

Sampling strategy was done using a gridded map and random selection method as described by Profitós et al. (2014) with some modifications. Briefly, the update of the topographic sheet of Maroua NC-000 33-61/250 000 published by Army Map Service (S & H) in 1960 was used. This map was them update. This process helped delimit the contours of the city and also helped to highlight the different districts with their names and their geographic coordinates and new areas.

One hundred numbered points (25 equidistant points on each side) were put along the edges of the map obtained. Two numbers at a time were then randomly selected and a line was drawn between them. A total of 20 couple points were selected. Lots of different kinds of shapes of different sizes found were numbered. Ten numbers of these shapes were randomly drawn. These shapes were considered as "neighborhoods".

In each "neighborhood", grids of 30 x 30 m were drawn and each square numbered again except those located on roads, water points or bridges. Indeed according to study conducted by Mayer (1999) and Yen et al. (2008), a building in urban zone in Africa has an average area of 100 m^2. The area defined in this study allows accurate detection (which approximates the realities of our study area), knowing that a household can have several compounds and this especially in polygamous households (Devaux et al., 2007). So in this context, a grid in this study corresponds to a household. Finally, in each "neighborhood", a defined number of grid has been randomly drawn taking into consideration the total number of households to investigate, the total number of grid in the 10 selected "neighborhoods" and the number of grids in this "neighborhood". Thus, for "neighborhood A", the number of grids selected were:

$$\text{Number of grids selected in neighborhood (A)} = \frac{\text{Total number of grids in neighborhood A x N}}{\text{Total number of grids of all the 10 neighborhoods}}$$

Where N is the sample size.

After all the calculations, 202 instead of 200 households were surveyed and their distribution is as shown in Figure 2.

Before the investigation, informed consent was verbally obtained before proceeding with each survey. The investigation was conducted in two phases and lasted four months (July-October 2014).This periods could be considered as a period of food short -age, therefore, the consumption should be low.

Beef consumption

To collect data on beef consumption, the cooker or cooks were surveyed and observed in each household. They were sometimes assisted by other family members on some issues that eluded them. During this survey, three (3) pieces of beef selected
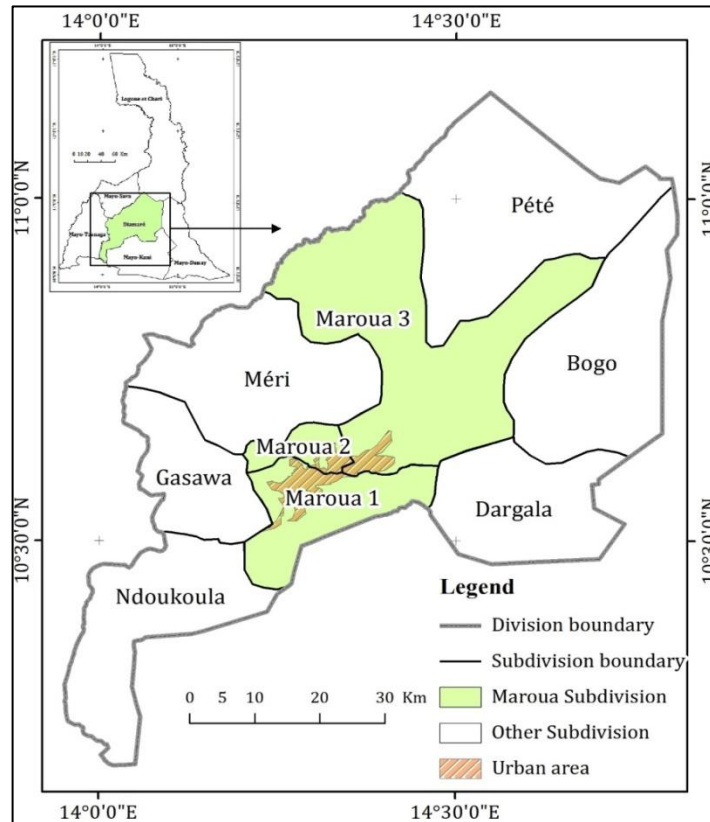
Figure 1. Study area in Diamaré (Far North Region of Cameroon).
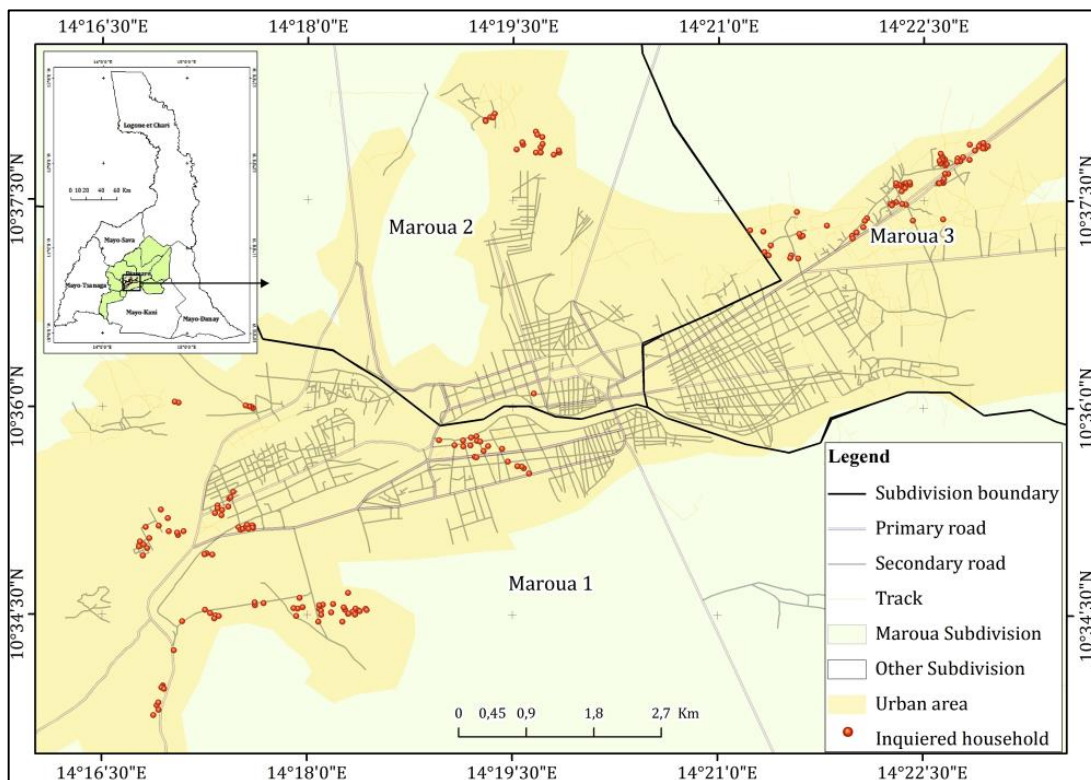

Figure 2. Distribution of households interviewed

randomly, as cut before cooking, were weighted by using a balance (ADAM®, CQT601, Max: 600 g × 0.1 g). The following formulae were used for calculation:

1. Average weight of a piece of beef in a household $M = (m_1 + m_2 + m_3)/3$;
2. Daily consumption per capita $= M \times N$;
3. Monthly consumption per capita $= M \times F$;
4. Annual consumption = monthly consumption x 12

Where F: Frequency of consumption of beef per month in the household; m_1, m_2, m_3: Weight of pieces 1, 2, 3 of beef sample; and N: number of pieces of beef consumed per day/person.

Consumer's knowledge on meat quality

To achieve the objective, open-ended questionnaires were administered in households in urban areas of Maroua. Thus, the values of variables such as religion and the monthly household income were attributed to those relating to the head of household. They were also asked questions on meat quality attributes.

Determination of the distribution of butchers' shops in Maroua

All the places where fresh beef are sold in Maroua were recorded with GPS.

Data analysis

Data from the field were entered directly on IBM® SPSS® (Statistical Package for Social Sciences) Statistics Ver. 20.0 (http://www.ibm.com/support software). This allowed the authors to calculate the descriptive statistics for the entire evaluated variables. Duncan's multiple comparison test performed with Statgraphics Ver. 5.0 (Windows, www. statgraphics.com) was used for the comparison of beef consumption taking into consideration different factors including age, religion, monthly income of the household and number of person in the household.

RESULTS

Characteristics of the interviewees and households

Table 1 shows the general characteristics of the representative sample interviewed. Most of them were more than 25 years old (68%), women (96%) and went toprimary school (28%). In general, 55.2% of households were Christian and had an average of 7 peoples.

Frequency of meat consumption in Maroua

As shown in Table 2, in the great majority of households, meat (96%) and beef (98%) were consumed. In 72% of households, beef is mainly consumed. The mean frequency for the consumption of beef in the majority of households (39%) is 2 to 3 times per week.

Beef consumption

Beef consumption by subdivision

In general, it appears as shown in the Figures 3 and 4 that the daily and monthly consumption of beef per capita varied significantly with subdivision. Thus, it appears that this consumption was the same in Maroua I and III. On the contrary, the consumption of beef per person in Maroua II subdivision is significantly different (p <0.05) from those of other.

Beef consumption by socioeconomic characteristics

In general, the average quantity of beef consumed per person is 133.25 ± 33.49 g per day and 1296.5 ± 239.41 g per month (Table 3). The daily consumption increased significantly with age (p <0.05) but the monthly consumption for those who were less than 15 years (524.99 ± 119.80 g) is statistically lower than that of other age groups (16-45 and > 45 years).

Daily consumption of beef per person was statistically higher in households with a lower monthly income (157.21 ± 11.92 g) than the others (Table 3).

Perception on meat quality

For 57.92% households, meat quality is defined by its color. In 21.86% of the households meat quality refers to two factors (color and tenderness) while 1.64% of households refer to the presence or absence of stamping.

Distribution of the butcher shops in the research area

Figure 5 shows the repartition of the butcher shops in the city of Maroua. But this map does not take into consideration the beef hawkers because they are not stable.

DISCUSSION

It was found that, meat is consumed in 96% of households and 98% consume beef. This result is justified by the availability of meat in this part of Cameroon (MINEPIA, 2014). The fact that beef is consumed in the majority of households can be explained by the distribution of beef shop and or slaps. Besides, this area is the second cattle populated zone in the country (MINEPIA, 2003) and beef is not religious taboo. The beef consumption was highly by the majority of households as well as per capita, and sometimes even higher than the total amount of red meat (7.97 kg/ capita/year) consumed in Cameroon (FAO, 2013). Similar results had been found in various countries in Africa (Gamba, 2005) and elsewhere (USA and Brazil) (Davis and Lin, 2005; Levy-Costa et al., 2005; USDA Economic Research Service, 2009). On the contrary, the observations of Krystallis and Arvanitoyannis (2006) and

Table 1. Socio-economic and demographic characteristics of the interviewees in the household.

Variables	Percentage (%)	Sample size (No. of household)
Age (years)[+]		202
< 10	0	
[11-15]	4.1	
[16-25]	26.9	
[26-45]	53.8	
>45	15.2	
Religion[++]		201
Christian	55.2	
Muslim	43.8	
Animist	1.0	
Marital status		200
Single	12.0	
Married	81.0	
Divorcee	1.5	
Widowed	5.5	
Educational level		200
No formal education	32.0	
Koranic	10.5	
Primary	28.0	
Secondary	24.5	
University	5.0	
Family income		158
< $30	15.2	
[$30-$120]	44.3	
> $120	40.5	
Average number of people in the house	6.37	202

([+]): age of the principal interviewee; (++): religion of the head of the household; Sample correspond to the number of household and each of them has an average of 7 persons.

France (2013) have respectively shown that in Greece, between 1997 and 2002 and in France in 2011, pork was the most consumed meat. This disparity would be justified by the importance that each country gives to each animal species production. This situation could be explain as already emphasized in the FAO report in 2011 that "more meat is consumed where it is produced" (FAO, 2011). According to Dettmann and Dimitri (2010) and Van Loo et al. (2010), the socio-economic, demographic and cultural characteristics were strongly influenced by the food preferences of consumers.

In majority of the households of Maroua, beef is consumed 2-3 times a week. A similar result was obtained by Jeremiah et al. (1993) in Canada. This frequency is nevertheless higher than that in Navarra in Spain (once a week) (Barrena and Sanchez, 2009). Yet it is low when compared to that in Campinas in Brazil (four times a week) (Da Fonseca and Salay, 2008). This differences could be explained firstly in eating habits, demographic structure and socio-economic and environmental factors that characterize each of the cities and countries and secondly in the methodological choices made by the authors in their respective studies.

The daily consumption of beef per capita in Maroua II is significantly lower than those of Maroua I and III. This trend was reversed when considering the monthly per capita consumption. This decrease of the consumption rate could be explained by the occurrence of the majority of butchers' shop localized in Maroua II (Figure 5), which would raise the frequency of purchase of the meat and by extension, their monthly consumption as well as the increment of monthly income of the population of Maroua

Table 2. Some variables of meat consumption.

Variable	Percentage (%)	Sample size (No. of households)
Eat meat**	95.50	202
Meat more eaten**		199
Beef	72.36	
Sheep	5.02	
Goat	20.60	
Chicken	1.01	
Pork	1.01	
Eat beef**	97.90	193
Frequency of beef consumption*		196
Every day	10.7	
Twice or three times a week	38.8	
Once a week	12.8	
Twice or three times a month	10.7	
Once a month	4.1	
Rarely	22.4	
Do not know	0.5	

*P<0.05, **P<0.01; Sample correspond to household and each of them has an average of 7 persons.
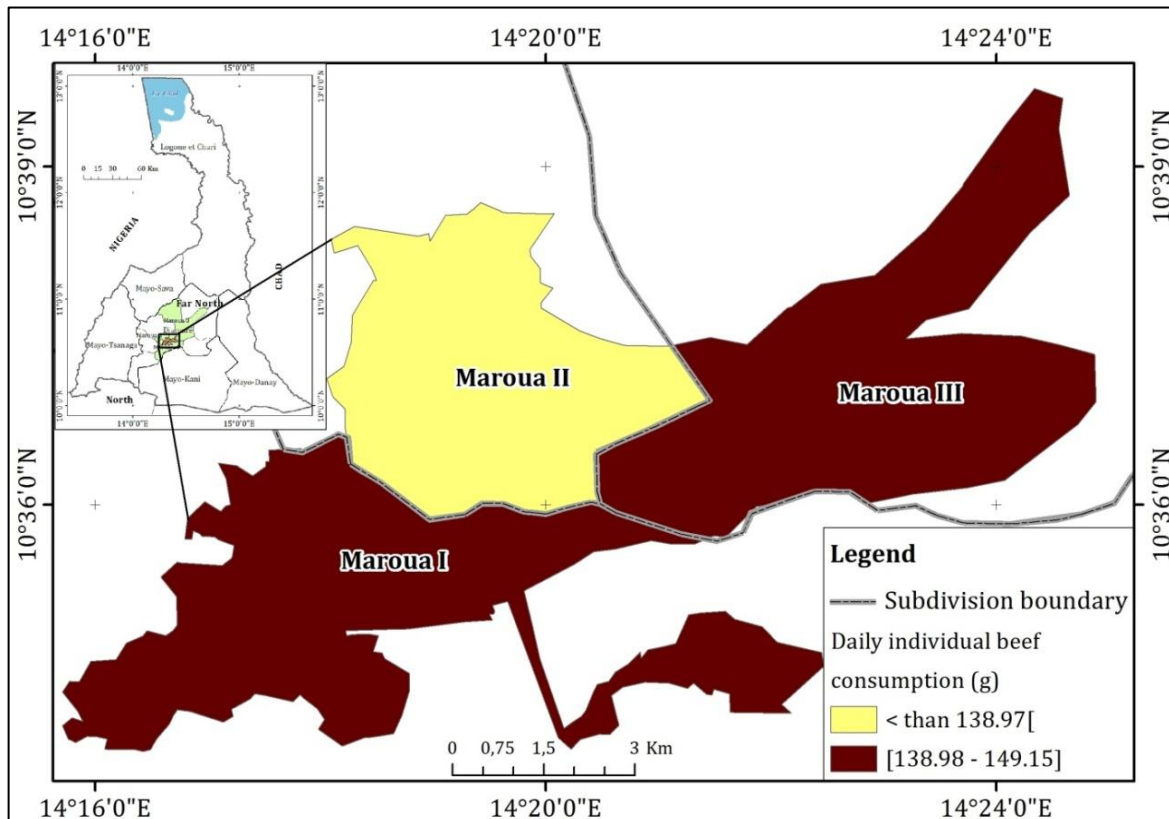
Figure 3. Daily consumption of beef (g) per person.

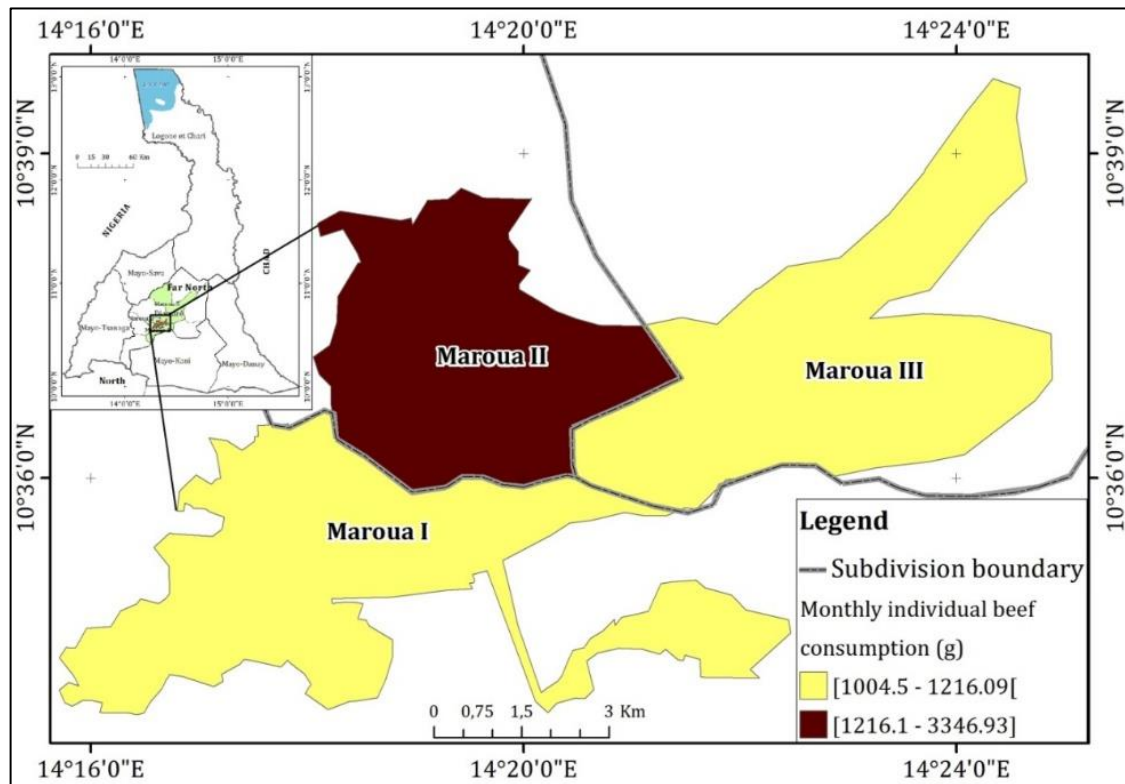**Figure 4.** Monthly consumption of beef (g) per person.

Table 3. Quantity of beef consumed per person in Maroua.

Variable	Per day (g)	Per month (g)
Quantity of beef consumed per person	133.25 ± 33.49	1296.50 ± 239.41
Age		
0-15	92.78 ± 6.22[c]	524.99 ± 119.80[b]
16-45	151.84 ± 15.63[b]	1151.10 ± 86.83[a]
> 45	179.22 ± 40.93[a]	1332.63 ± 329.72[a]
Household monthly income+		
Low	157.21 ± 11.92[a]	1306.65 ± 129.48[a]
Average	129.77 ± 19.50[b]	1477.16 ± 380.86[a]
High	130.0 ± 12.17[b]	1429.70 ± 152.05[a]
Religion		
Christian	135.39 ± 10.09[a]	1861.00 ± 731.62[a]
Muslim	136.66 ± 15.24[a]	857.87 ± 32.10[b]
Number of person in the household		
<5	94.08 ± 17.76[a]	684.13 ± 155.40[a]
5≤n<10	94.78 ± 8.08[a]	579.42 ± 152.49[a]
≥10	79.96 ± 44.50[a]	569.00 ± 265.56[a]

(+) Correspond to the monthly income of the head of the household; Low, less than $30; Average, $30-$120; High, more than $120. The values represent the average consumption of beef in g. For the same variable, values with different letters of the alphabet in the same column are significantly different ($P<0.05$).
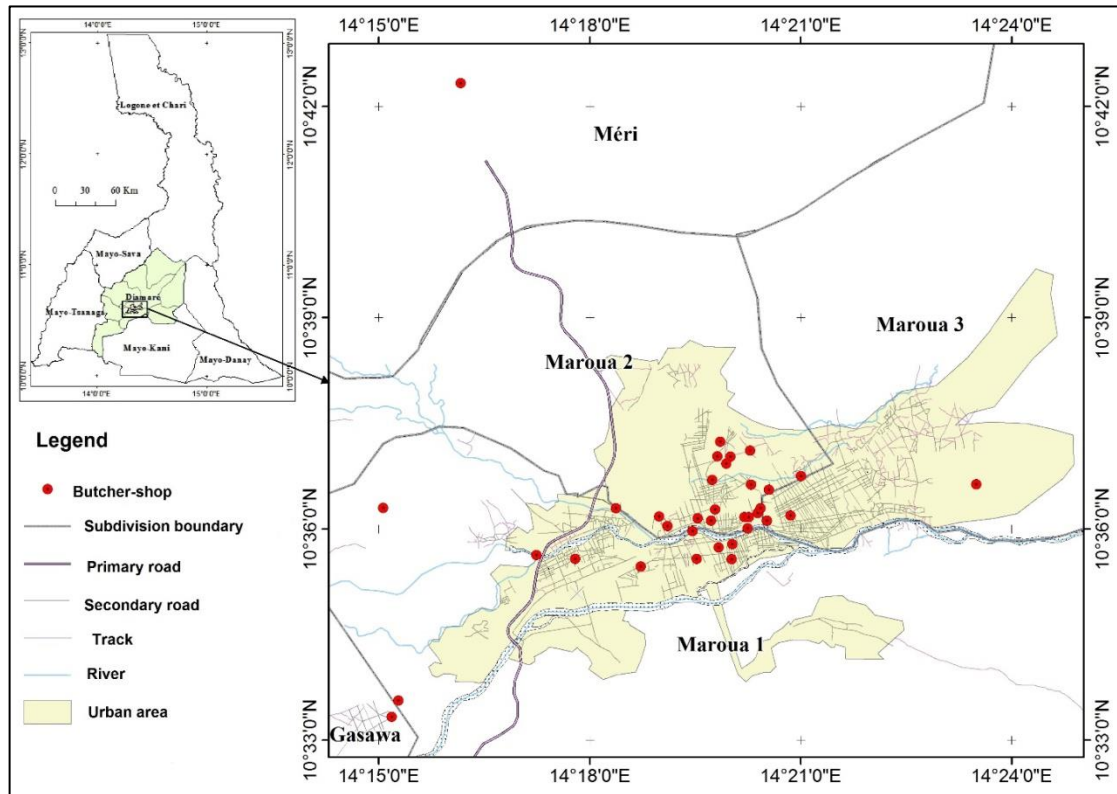
Figure 5. Distribution of butcher shops in Maroua.

II. Indeed, Maroua II is the most urbanized area of this city and it is well know that this factor also influences the meat consumption (Davis and Lin, 2005; Yen et al., 2008). This differential spatial distribution of the annual per capita consumption of beef has also been observed in the US (Davis and Lin, 2005). A person in this study area consumed 133.25 ± 33.49 g of beef per day and 1296.5 ± 239.41 g per month. This consumption is almost three times higher than what is currently observed in Cameroon in general (5.3 kg) (FAO, 2013). Similarly, it is greater than the individual consumption of beef in Africa (6.4 kg) and in subsaharian Africa (3.1 kg) in 2015 (FAOSTAT, 2014a; OCDE, 2016). This difference may be due to the fact that Maroua is the capital city of the region and has the second highest cattle population in Cameroon (MINEPIA, 2014). Beef is sold everywhere in Maroua, also explaining this result. Indeed according to Mensah et al. (2012), difficult access to food could influence its consumption by the population.

It is also clear from this study that the daily consumption of beef per capita increased significantly with the age of the person. This result is contrary to that of Yen et al. (2008) in US. This contrast can be as a result of the structural composition of the households where the preference for a food varies also with age (Barrios and Costell, 1996; Lazaridis, 2003).

The daily per capita consumption of beef is statistically

higher in households with lower monthly income as compared to those of middle and higher income households. This result corroborates the findings of Davis and Lin (2005). Indeed, since 2012, Maroua had the highest rise of the consumption in Cameroon (NSI, 2010).

Daily consumption of beef per person was similar whatever the religion. This is justified by the fact that beef is not the subject of any religious taboo. However, the fact that the monthly consumption of beef per capita is less for the Christians would probably be the consequence of having more alternatives to meat consumption (MINEPIA/AMO, 2009) which is not the case for Muslims (Sack, 2001). This adds to the results of several studies (Pettinger et al., 2004; Bonne et al., 2007) which have shown the influence of religion on the feeding behavior of populations.

For majority of the households in this study area, the color (lightness) is the first criterion for defining meat quality while 21.86% of the household attributes it to the color-tenderness. This result is also consistent with that obtained in Europe where according to consumers, color is one of the most important parameters defining the quality of fresh meat (Glitsch, 2000). Indeed, this population is based only on the sensory quality, which represents only a quarter of the criteria to be taken into account (Clinquart et al., 2000; Cartier and Moëvi, 2007). According to Cartier and Moëvi (2007) and Coibion

(2008), the quality of the food groups includes the organoleptic or sensory quality, nutritional or dietary quality, technological quality and hygienic or safety quality. This observation already underlines health risks that could run the population of the town of Maroua following the consumption of beef since the guarantee of its safety is generally dependent on the quality of information that the public receives and how it interprets and their perception of quality (Grunert, 2005; Mazzocchi et al., 2008; Barrena and Sanchez, 2010).

Conclusion

Beef is the meat mostly consumed in Maroua city. The daily and monthly consumption of beef per person in this city is very high. Beef consumption is influenced by the age, monthly income and the district position. The problem of low rate of consumption of meat in Cameroon could only found in the areas where the potential of livestock production is low. Thus, the government should focus on those zones to improve meat consumption.

Conflict of interest

The authors have no financial or personal conflicts of interest to declare.

REFERENCES

Barrena R, Sanchez M (2009). Consumption frequency and degree of abstraction: A study using the laddering technique on beef consumers. Food Qual. Prefer. 20:144-155.

Barrena R, Sanchez M (2010). Differences in consumer abstraction levels as a function of risk perception. J. Agric. Econ. 61(1):34-59.

Barrios EX, Costell E (1996). Review: Use of methods of research into consumers' opinions and attitudes in food research. Food Sci. Technol. Int. 10(6):359-371.

Bonne K, Vermeir I, Bergeaud-Blackler F, Verbeke W (2007). Determinants of halal meat consumption in France. Br. Food J. 109(5):367-386.

Cartier P, Moëvi I (2007). Le point sur la qualité des carcasses et des viandes de gros bovins. Institut de l'Élevage. Compte rendu final 17:72.

Clinquart A, Leroy B, Dottreppe O, Hornick JL, Dufrasne IL, Istasse L (2000). Les facteurs de production qui influencent la qualité de la viande des bovins Blanc Bleu belge. 19 p.

Coibion L (2008). Acquisition of the organoleptic qualities of beef: adaptation to Consumer demand. DVM Thesis, National Veterinary School of Toulouse, France.

Da Fonseca MCP, Salay E (2008). Beef, chicken and pork consumption and consumer safety and nutritional concerns in the City of Campinas, Brazil. Food Control 19(11):1051-1058.

Davis CG, Lin B (2005). Factors affecting U.S. beef consumption. Electronic outlook report from the economic research service. US Department of Agriculture, Economic Research Service, Washington, DC, LDP-M-135-02. Available at: http://www.ers.usda.gov/media/864436/ldpm13502_002.pdf.

Dettmann RL, Dimitri C (2010). Who's buying organic vegetables? Demographic characteristics of US consumers. J. Food. Prod. Mark. 16(1):79-91.

Devaux N, Fotsing JM, Chéry JP (2007). Extraction automatique d'habitations en milieu rural de PED à partir de données THRS. Cybergeo: Euro. J. Geogr. Available at: http://cybergeo.revues.org/12581.

FAO (2011). Food and Agriculture Organization of the United Nations. Food outlook: global market analysis. Available at: http://www.fao.org/docrep/014/al978e/al978e00.pdf

FAO (2013). Food and Agriculture Organization of the United Nations. Study of slaughterhouse in Central Africa (Cameroon-Congo- Gabon-Chad). Summary. 70p. Available at: http://faostat.fao.org/site/610/DesktopDefault.aspx?PageID=610#anc or.

FAOSTAT (2014a). Food and Agriculture Organization of the United Nations. Available at: http://faostat.fao.org/site/610/default.aspx#ancor.

FAOSTAT (2014b). Food and Agriculture Organization of the United Nations. Available at: http://faostat3.fao.org/.

Font-i-Furnols M, Guerrero L (2014) Consumer preference, behavior and perception about meat and meat products: An overview. Meat Sci. 98:361-371.

France Agri Mer (2013).The spinnerets of French breeding. Pp.1-87.

Gamba P (2005). Urban Domestic Consumption Patterns for Meat: Trends and Policy Implications. Tegemeo Institute of Agricultural Policy and Development, Egerton University. Working Paper 17. pp. 1-24.

GESEP (Gestion Sécurisée des Espaces Pastoraux) (2002). Study on meat consumption in Garoua. Garoua, Cameroon, Project Secure management of pastoral areas, MINEPIA/FSD.

Glitsch K (2000). Consumer requirements for fresh meat: Results of the survey. In: Quality policy and consumer behavior in the European Union. (ed.), [Becker, T.]. Kiel: Wissenschaftsverlag Vauk. pp. 113-156.

Grunert KG (2005). Food quality and safety: Consumer perception and demand. Eur. Rev. Agric. Econ. 32:369-391.

Jeremiah LE, Tong AKW, Jones SDM, Mcdonell C (1993). A survey of Canadian consumer perceptions of beef in relation to general perceptions regarding foods. J. Consum. Stud. Home Econ. 17(1):13-37.

Labonne M, Magrong P, Oustalet Y (2003). The livestock sector in Cameroon and in the Northern provinces: current situation, constraints, issues and challenges. In: African grasslands: the changing spaces, actors face to new challenges, Conference Proceedings, 27-31 May 2002, Garoua, Cameroon, Montpellier, France, CIRAD-Prasac. pp. 1-12.

Lazaridis P (2003). Household Meat Demand in Greece: A demand systems approach using microdata. Agribusiness 19(1):43-59.

Levy-Costa RB, Sichieri R, Pontes NS, Monteiro CA (2005). Disponibilidade domiciliar de alimentos no Brasil: distribuição e evolução (1974-2003). Rev. Saua Puablica 39:530-540.

Mayer H (1999). Automatic object extraction from aerial imagery-a survey focusing on buildings. Comp. Vis. Image Und. 74(2):138-149.

Mazzocchi M, Lobb A, Bruce Traill W, Cavicchi A (2008). Food scares and trust: a European study. J. Agric. Econ. 59(1):2-24.

Mensah P, Mwamakamba L, Mohamed C, Nsue-Milang D (2012). Public health and food safety in the African region. Scholarly, Peer

Reviewed. Afr. J. Food Agric. Nutr. Dev. 12(4):6317-6335.

MINEPIA (2003). Ministère de l'Elevage, des Pêches et des Industries Animales. Livestock production in Cameroon. http://www.minepia.gov.cm (accessed March, 2013).

MINEPIA (2013). Ministère de l'Elevage, des Pêches et des Industries Animales. MINEPIA Policy Document. 29p.

MINEPIA (2014). Ministère de l'Elevage, des Pêches et des Industries Animales. Annuaire des statistiques du sous-secteur Elevage, Pêche et Industrie Animales 2013.

MINEPIA/AMO (2009). Ministère de l'Elevage, des Pêches et des Industries Animales/Programme d'Appui à la Maîtrise d'Ouvrage des Administrations du Secteur Rural. Study of livestock marketing system in Cameroon. Final Report. 97p.

NSI (National Statistics Institute) (2010). Population and social affairs. Cameroon Statistical Yearbook: Part 2, 39-62. Available at: http://www.statistics-cameroon.org/downloads/annuaire2010/chap4.pdf.

OCDE (2016). Organisation de Coopération et de Développement Economiques. Consommation de viande (indicateur). Available at: http://www.oecd-ilibrary.org/agriculture-and-food/meat-consumption/indicator/french_edbce270-fr

Pettinger C, Holdsworth M, Gerber M (2004). Psycho-social influences on food choice in Southern France and Central England. Appetite 42(3):307-316.

PNSA/WFP (2015). Programme Nationale de Sécurité alimentaire/Word Food Program. Evaluation de la sécurité alimentaire dans les régions de l'Est, Adamaoua, Nord etExtrême-Nord du Cameroun. Rapport 17p.

Profitós JMH, Mouhaman A, Lee S, Garabed R, Moritz M, Piperata B, Tien J, Bisesi M, Lee J (2014). Muddying the Waters: A New Area of Concern for Drinking Water Contamination in Cameroon. Int. J. Environ. Res. Public Health 11(12):2454-12472.

Van Loo E, Vincenzina C, Nayga RM (2010). Effect of organic poultry purchase frequency on consumer attitudes toward organic poultry meat. J. Food Sci. 75(7):S384-S397.

Yen ST, Biing-Hwan L, Davis CG (2008). Consumer knowledge and meat consumption at home and away from home. Food Policy 33(6):631-639.

Ziebe R, Thys E, De Deken R (2005). Analysis of livestock production systems on the scale of a canton: The case of Boboyo in the Far north Cameroon. Rev. Elev. Méd. Vét. Pays Trop. 58:159-65.