

**EFFECT OF PROCESSED MEAT PACKAGING ON CONSUMER PERCEPTION OF
FOOD SAFETY VALUE IN KHARTOUM STATE, SUDAN**Ayat Abdelgader Fakhr Eldin¹, Nahid T. Fawi*², Ahmed D. A. Biraima³, Adil M. A. Salman⁴, Hamad Iman M.⁵¹Department of Food Safety and Veterinary Public Health, College of Veterinary Medicine, University of Bahri.²Associate Professor, Faculty of Animal Production, University of Khartoum.³Assistant Professor, Department of Meat Production, Faculty of Animal Production, University of Khartoum.⁴Professor, Director of One Health Center, University of Bahri.⁵Associate Professor, Department of Physiology, College of Medicine, University of Bahri.

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Associate Professor, Faculty
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A consumer survey (n=150) was carried out to assess the consumer's perception purchase behavior, awareness, and consumption of processed meat products as a tool of protection and safety during the year 2021 in Khartoum State, Sudan. The effect of socio-demographic characteristics on packaging and labeling of meat product was also examined. The study was based on primary data collection using a scientifically structured questionnaire. The data were analyzed using Statistical Package for Social Science (SPSS) to obtain a frequency of distributions and Chi-square tests. The ranking index was also calculated. The results showed that sausages were the most purchased (74.1%) followed by burgers (59.4%), meatballs (39.2%), and then pastrami (3.5%). Almost two thirds (66.43%) of the consumers preferred purchasing meat products of specific companies. Of this category, 46.36% of the consumers said YES because they trust product food safety, while almost half (54.55%) of those who said NO was because they believe that all companies are the same. Product information and data were highly ranked (0.31) by participants followed by manufacturer information (0.29) packaging durability (0.19) easy to open and close (0.15) and then the colors used (0.11). Production date and validity most frequently received a top ranking (0.37), followed by product content (0.27), ways to use the product (0.18), and then packaging weight (0.18). The result showed that education level increased ($P < 0.05$) as the awareness of consumers on purchases decision and reflection on the company's strategies for applying food safety regulations increased. Intermediate respondents had the lowest (50%) effect ($P < 0.05$) of packaging and labeling on the consumer purchases decision and reflection on the company's strategies for applying food safety regulations. It could be conclude that consumers showed good awareness of meat product packaging and labeling, including quality and safety knowledge perception associated with meat products.

KEYWORDS: Processed Meat; Packaging; Purchases; Consumer Perception; Food Safety.**INTRODUCTION**

Packaging serves a variety of purposes, including describing the product and its features, interacting with customers, and protecting the product (Silayoi and Speece, 2007). Moreover, the product's packaging provides information on the various substances, how to use the product, and some safety measures to take in case the product has any negative side effects. At the point of sale, where it forms an integral component of the selling process, packaging appears to be one of the key variables in purchasing decisions (Silayoi and Speece, 2004). According to Saeed, *et al.* (2013), consumers buy more products after reading their labels, therefore it is obvious that labeling influences consumer purchasing decisions.

Packaging includes the names and the brand names, brand logos, pictures of the product, different kinds of labels such as ingredients, manufacturing, and expiry date, warnings, price, using the method of the product, company name, company place, etc. and the main function of the packaging is to easily and safely distribute the products (Mahera Mazhar *et al.*, 2015).

Fast-moving consumer goods (FMCGs) are products that sell quickly at relatively low costs. These goods are also called consumer packaged goods. FMCGs have a short shelf life because of high consumer demand (e.g., soft drinks and confections) or because they are perishable (e.g., meat, dairy products, and baked goods). These

goods are purchased frequently, consumed rapidly, priced low, and sold in large quantities. They also have a high turnover when they're on the shelf at the store (Kenton, 2021).

One of the most significant and straightforward ways to provide information to the consumer is through a food label, which is the information shown on a food product (FAO, 2022). One of the main aims of a labeling policy is to prevent food sellers from deliberately misleading consumers through false representations on a package (Reilly, 2018). The objective of this study was to determine the consumer's perception, purchase behavior, awareness, and consumption of processed meat products as a tool of protection and safety in Khartoum State, Sudan. The effect of socio-demographic characteristics on meat product packaging and labeling was also targeted.

MATERIAL AND METHODS

This study was performed in Khartoum North; Sudan. The research was based on primary data collection using a cross-sectional questionnaire that was designed to meet the objectives of the study. Personal interviews were performed with consumers under research to collect the primary data. Cross-sectional sample of 150 consumers comprised the sample of the study were selected from various parts of Khartoum North, Sudan. Inclusion criteria included that the respondents should be family households who purchased and consumed the meat and/or processed meat products.

Collected data were analyzed using Statistical Package for Social Sciences (SPSS, version 21). Chi-square tests (χ^2) were used to assess the statistical differences, with $P < 0.05$ as significance level. Descriptive statistics were also done. An index described by Kosgey (2004) was used to calculate rankings for the product labelling and packaging standards and types of information on packaging that the consumer reads. The formula used for calculating the ranking index for the product labelling and packaging standards is as follow:

Ranking index (I) = \sum of (5for rank1 responses + 4for rank2 responses + 3for rank3 responses + 2 for rank 4 responses + 1 for rank 5 responses) for a particular standard divided by sum of (5 for total responses for rank 1+ 4 for total responses for rank 2 + 3 for total responses for rank 3 + 2 for total responses for rank 4 + 1 for total responses for rank 5) for all standards.

The formula used for calculating the ranking index for the types of information on packaging that the consumer reads is as follow:

Ranking index (I) = \sum of (4for rank1 responses + 3for rank2 responses + 2 for rank 3 responses + 1 for rank 4 responses) for a particular type of information divided by sum of (4 for total responses for rank 1 + 3 for total

responses for rank 2 + 2 for total responses for rank 3 + 1 for total responses for rank 4) for all types of information.

RESULTS AND DISCUSSION

The demographic profile of respondents is presented in Table 1. The most common age group (46.15%) of the respondents was between 20 and 35 years, followed by 36 to 45 years (31.47%), 46 to 55 years (20.28%), and then more than 55 years (2.1%). University graduates (58.04%) were observed as the main education level followed by post-graduates (33.57%), secondary (6.99%), and lastly intermediate (1.40%). More than one third (36.36%) of the respondents were unemployed, followed by government employees (33.57%) and then privately employed (30.07%). The most frequently purchased meat product by respondents was sausage (74.1%) followed by burger (59.4%), meat balls (39.2%), and lastly pastrami (3.5%) (Figure 1). As expected, sausage was the most purchased meat product in Sudan. This agrees with Elhag *et al.* (2014) who stated that sausage is becoming the most popular meat product in Sudan. More than one half of the respondents (58.74%) purchased meat products from supermarkets, followed by hyper supermarkets (37.76%), while very few (3.50%) respondents directly purchased from companies. In support of this, Maruyama and Trung (2007) and Zulqarnain *et al.* (2015) reported that supermarkets and hyper supermarkets are the main suppliers of meat products to shoppers. In addition, Machín *et al.* (2020) reported that supermarkets have become the most important provider of food products worldwide. The household structure may affect the consumption patterns of meat and meat products (Young and Hamdok 1994; Ezedinma *et al.*, 2006). In this study, the entire family of respondents consumes more meat products (52.45%) followed by children (28.67%) and adults (18.18%).

Table 1: Demographic Profile of respondents.

Item	%
Age of respondents'	
20-35	46.15
36-45	31.47
46-55	20.28
>55	2.10
Educational level	
Intermediate	1.40
Secondary	6.99
University graduates	58.04
Post graduate	33.57
Job occupation	
Unemployed	36.36
Private	30.07
Governmental section	33.57
Purchases point	
Hyper supermarket	37.76
Supermarket	58.74
Direct from company	3.50
Most family sector consuming meat	
Children	28.67
Adults	18.18
All the Family	52.45

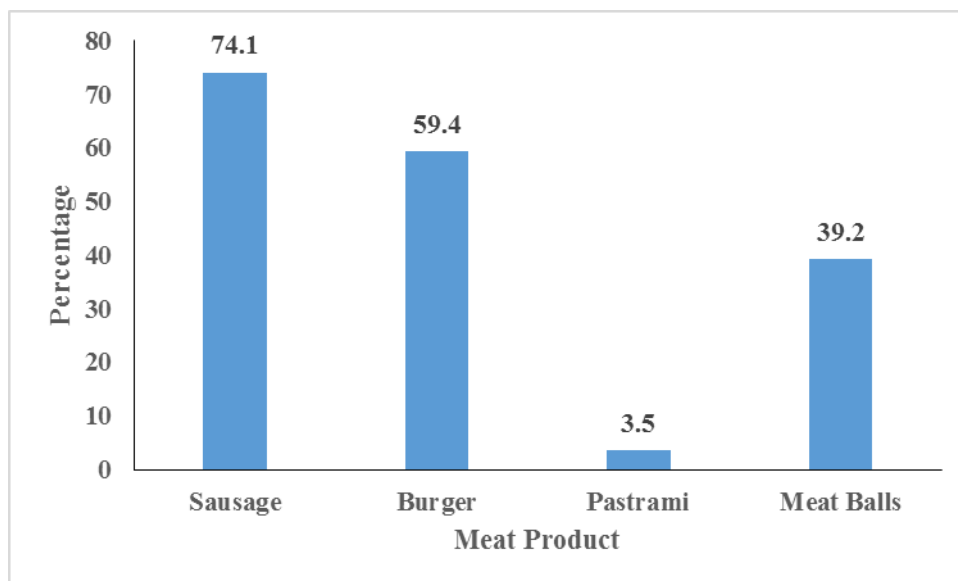


Figure 1: Frequency (%) of purchase of processed meat products.

The purchasing meat products profile of consumers is shown in Table 2. More than half of the consumers (58.04%) purchased meat products between three to five times a month. On average, 23.78% of the consumers purchased meat products between one to two times a month, while about 18.18% of the respondents purchased meat products more than five times a month. In terms of purchased quantity of meat products, results showed that slightly less than half of the respondents (48.25%) purchased 3-5 Kg of meat products a month, followed by 33.57% purchased 1-2 Kg/month and lastly 18.18% who purchased >5 Kg/month. These findings are in agreement with Udomkun *et al.* (2018) who stated that consumption

and purchasing frequencies of meat products are influenced by price and nutrition, of meat products that are the important factors that influence.

Almost two thirds (66.43%) of the consumers preferred purchasing meat products of specific companies. Of this category, 46.36% of the consumers said YES because they trust product food safety, while almost half (54.55%) of those who said NO was because they believe that all companies are the same.

Almost two thirds (66.43%) of the consumers would prefer to purchase meat products from specific

companies, whereas one third (33.57%) of the consumers were not interested in the particular companies when they purchased meat products. These observations could be due to that most of the respondents in this study trust

product food safety. This finding also is in line with Niyonzima *et al.* (2017) and Owusu-Sekyere *et al.* (2014) who reported that safety and hygiene are important quality attributes in purchasing meat products.

Table 2: Consumer purchasing profile meat product.

Item	%
Purchase of frequencies of processed meat products	
1-2 times a month	23.78
3-5 times a month	58.04
>5 times a month	18.18
Amount of Purchases / Month	
1-2 Kg	33.57
3-5 Kg	48.25
>5 Kg	18.18
Consumer preference for a specific company	
Yes	66.43
No	33.57
If the answer Yes	
Consumer trust Products Food safety	46.36
Consumer trust referee opinion	30.38
Other	23.26
If the answer no	
Consumer purchases what is available at store	37.76
All companies are the same for the consumer	54.55
Other	7.69

Meat product packaging and labeling are presented in Table 3. Slightly less than half (48.3%) of the consumers considered the product label when they purchase, whereas 7.2 % of consumers showed no interest in the

product label. This finding coincided with that mentioned by Saeed, *et al.* (2013) who reported that labeling influences consumer purchasing decisions, and consumers buy more products after reading their labels.

Table 3: Meat product packaging and labeling.

Item	%
Effect of packaging and labeling on consumer purchases decision	
Agree	7.2
disagree	48.3
No opinion from me	44.5
Effect of packaging and labeling on product quality	
Agree	86.1
Disagree	0
No opinion from me	13.9
Packaging and labeling reflect company's strategies on applying food safety regulations	
Agree	79.02
disagree	7.69
no opinion from me	13.29
Consumer takes consideration about packaging and labeling information	
Interested	95.8
No interested	4.2

The majority of the respondents (86.1%) believed that packaging and labeling affect product quality, whereas 13.9 % of respondents had no opinion on the effect of packaging and labeling on meat product quality. A high proportion of consumers (79.02 %) agreed that the packaging and labeling reflect the company's strategies for applying food safety regulations. Similar observations were found by Lee (2010) who reported

that packaging materials are more related to the quality and safety of meat products. Most of the consumers (95.8%) said that they take consideration about packaging and labeling information. Similar findings were reported by Wills *et al.* (2009) and Grujić *et al.* (2013).

Table 4 shows the awareness of consumers of meat product packaging standards. Most of the respondents (81.09 %) somewhat believed that Sudanese companies care about food packaging regulation standards, whereas a very low proportion (4.31%) of consumers were not. On average, 42% of the consumers trust foreign companies over local companies, while about 58% of respondents somewhat trust foreign companies over local companies. Most of consumers (90.9%) were found aware of information on food safety standards. Wang *et*

al. (2009) stated that the Chinese consumers require safety guarantees and information with integrity to confirm their trust. Most consumers (86%) believed that Sudanese companies should pay attention to packaging standards. This is because packaging appears to be one of the key variables in purchasing decisions (Silayoi and Speece, 2004). Most of the perception of respondents about standards of purchasing and labeling in Sudanese companies was between good and intermediate.

Table 4: Consumer awareness of packaging standards.

Item	%
Consumer thinks that Sudanese companies care about food regulation standards	
Yes	14.6
No	4.31
To some extent	81.09
Consumer trusts foreign companies over local companies	
Yes	42
No	0
To some extent	58
Consumer care about being aware of information on food safety standards	
Yes	90.9
No	9.1
Do you think that Sudanese companies should pay attention on packaging standards	
Yes	86
No	14
Consumer perspective about standards of purchasing and labeling in Sudanese company	
Excellent	6.99
Good	32.87
Intermediate	55.94
Weak	4.2

The ranking of product labeling and packaging standards, according to the consumer's perception was shown in Figure 2. Product information and data were highly ranked (0.31) by participants, followed by manufacturer information (0.29) and packaging durability (0.19) and easy to open and close (0.15) and then the colors used (0.11). Similarly, the report of Wills *et al.* (2009) confirmed that labels on food packaging have been a major instrument for providing consumers with information and data, which could help consumers make an informed decision. In addition, Grujić *et al.* (2013) stated that the basic information which effect on consumers' preference and food purchasing is information and data on the products' labels. Bahrainizad and Rajabi (2018) found that the appropriate material, shape, and labeling of packaging have a significant positive influence on consumers' perception of the usability of product packaging, while the color of packaging does not have an influence on consumers' perception of a product's usability. In this study, the color of labeling and packaging received the lowest ranking index.

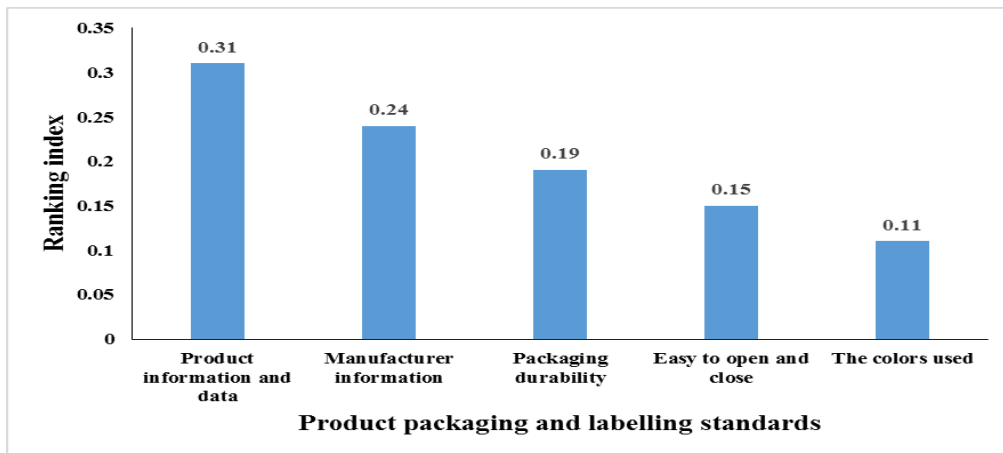


Figure 2: Ranking of product labelling and packaging standards as described by respondents.

The ranking of types of information on packaging that the consumer reads is presented in Figure 3. Consumers read labels in order to obtain information about ingredients and nutrition (Wills *et al.*, 2009), while the validity of the product is the main factor explaining

consumer attitudes and purchase decisions (Bredahl *et al.*, 1998). In the present study, product date and validity was most frequently (0.37) received a top ranking, followed by product content (0.27) and then ways to use the product (0.18) and packaging weight (0.18).

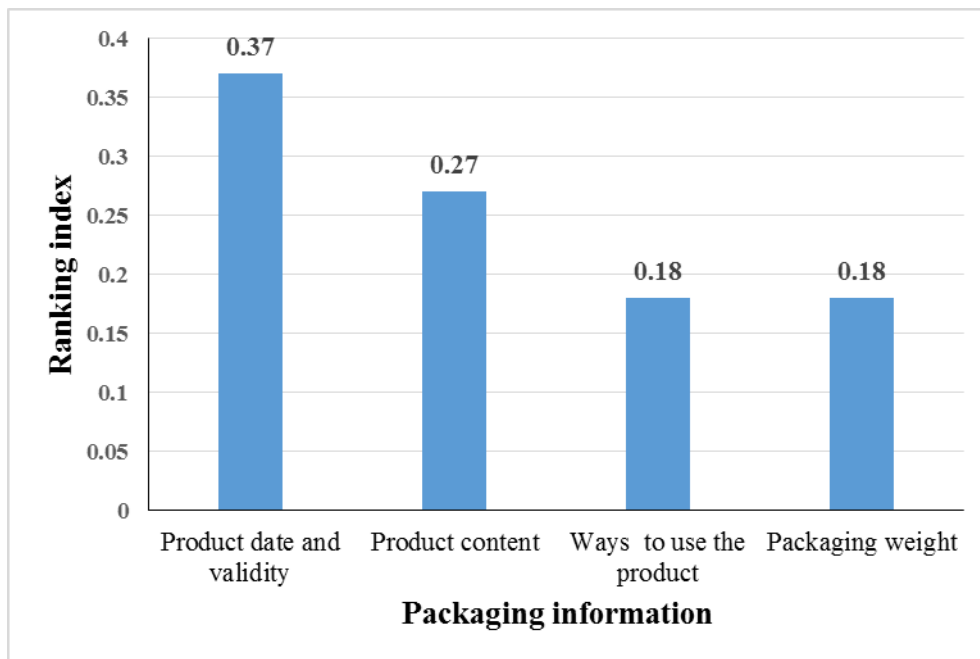


Figure 3: Ranking of types of information on packaging that the consumer reads as described by respondents.

Specific companies or brands and packaging and labeling of processed meat products play a vital role in food choices as consumers decide what they know about the health claims or the nutritional features and thus affect consumer satisfaction and purchases decision (Lusk and Briggeman, 2009; Ling *et al.*, 2021). In this study, respondents showed packaging and labeling of processed meat had a positive influence on purchasing decisions (Table 5). However, specific companies and packaging and labeling of processed meat products were not influenced by age group ($P > 0.05$; Table 5). Regardless of the age group effect, it was also observed that a positive attitude toward consumers' trust in the safety of processed meat products of specific companies (Table 5).

Table 5: Frequency (%) of consumer preference for a specific company and products packaging and labeling on consumer purchases decision as affected by age group.

Item	Age (years)				X ² P-value
	20-35	36-45	46-55	> 55	
Why consumer prefer specific company					0.405
Consumer trust products food safety	45.7	40.5	46.4	0.0	
Consumer trust referee opinion	32.9	31.0	17.9	66.7	
Other	21.4	28.6	35.7	33.3	
Effect of packaging and labeling on consumer purchases decision					0.120
Agree	84.30	92.90	78.60	66.70	
Disagree	8.60	4.80	3.60	33.30	
No opinion from me	7.10	2.40	17.90	0.00	

The preference of consumers for a specific company was influenced significantly by their educational level ($P < 0.05$; Table 6). All intermediate participants (100%) trust in the safety of processed meat products of specific companies followed by university graduate (50.6%) and postgraduate (37%) participants and then secondary participants (9.1%). Some studies about consumers showed knowledge about food safety tends to increase with level of education (Rimal *et al.*, 2001, Unusan, 2007). The observed percentage of the intermediate participants is difficult to explain. This study showed that packaging and labeling of processed meat had significant

effects on consumer purchases decision and reflection of the company's strategies for applying food safety regulations (Table 6). The results revealed that education level increased as the awareness of consumers on purchases decision and reflection of the company's strategies for applying food safety regulations increased. It is notable that intermediate respondents had scored the lowest (50%) effect ($P < 0.05$) of packaging and labeling on the consumer purchases decision and reflection on the company's strategies for applying food safety regulations (Table 6).

Table 6: Frequency (%) of consumer preference for a specific company and products packaging and labeling on consumer purchases decision as affected by educational level.

Item	Educational level				X ² P-value
	Intermediate	Secondary	University graduate	Postgraduate	
Why consumer prefer specific company					< 0.05
Consumer trust products food safety	100 ^a	9.10 ^c	50.6 ^b	37 ^b	
Consumer trust referee opinion	0 ^c	63.6 ^a	25.3 ^b	30.4 ^b	
Other	0 ^b	27.3 ^a	24.1 ^a	32.6 ^a	
Effect of packaging and labeling on consumer purchases decision					< 0.05
Agree	50 ^b	90.9 ^a	86.7 ^a	84.8 ^a	
Disagree	0 ^b	0 ^b	6 ^a	8.7 ^a	
No opinion from me	50 ^a	9.1 ^b	7.2 ^b	6.5 ^b	
Packaging and labeling reflect company's strategies on applying food safety regulations					< 0.05
Agree	50 ^b	63.6 ^a	71.1 ^a	89.1 ^a	
Disagree	0 ^b	27.3 ^a	14.5 ^a	2.2 ^b	
No opinion from me	50 ^a	9.1 ^b	14.5 ^b	8.7 ^b	
Effect of packaging and labeling on consumer purchases decision					< 0.05
Agree	84.3 ^a	92.9 ^a	78.6 ^a	66.7 ^b	
Disagree	8.6 ^b	4.8 ^b	3.6 ^b	33.3 ^a	
No opinion from me	7.1 ^b	2.4 ^c	17.9 ^a	0 ^c	

^{ABC}Frequencies within a row with different superscript are significant different ($P < 0.05$)

The level of education was influenced by packaging and labeling on consumer purchase decisions and reflection of the company's strategies for applying food safety regulations (Table 6). Similar findings were reported by

Wang *et al.* (2009) and Udomkun *et al.* (2018). The effect of a family sector on the rate and amount of purchases are shown in Table 7.

Table 7: Frequency (%) of rate and amount of purchases as affected by family sector.

Item	Family sector			X ² P-value
	Children	Adult	All the family	
Rate of purchase per month				0.80
1-2/month	24.4	26.9	19.7	
3-5/month	61	57.7	57.9	
>5/month	14.6	15.4	22.4	
Amount of purchases per month				0.212
1-2 kg	34.1	50	27.6	
3-5 kg	43.9	30.8	55.3	
>5 kg	22	19.2	17.1	

The household structure may affect the demand for meat products (Ezedinma *et al.*, 2006). However, it was observed that neither the purchase rate nor the amount of purchase was affected by the family sector ($P > 0.05$).

CONCLUSION

The study concluded that consumers showed good awareness of meat product packaging and labeling, including quality and safety knowledge perception associated with meat products. And that the education level increased as the awareness of consumers on purchases decision and reflection on the company's strategies for applying food safety regulations increased. The most important packaging information are product information and data as well as production date and validity.

REFERENCES

- Bahrainizad, M. and Rajabi, A., Consumers' perception of usability of product packaging and impulse buying: Considering consumers' mood and time pressure as moderating variables. *Journal of Islamic Marketing*, 2018; 9(2): 262-282.
- Bredahl, L., Grunert, K.G. and Frewer, L.J., Consumer attitudes and decision-making with regard to genetically engineered food products—a review of the literature and a presentation of models for future research. *Journal of consumer Policy*, 1998; 21(3): 251-277.
- Elhag, N.B., Babiker, E.R.B. and Mahdi, A.A., Microbial profile of sausages in Khartoum State. *J. Agri. Food Appl. Sci*, 2014; 2: 206-219.
- Ezedinma, C.I., Kormawa, P.M. and Chianu, J., Urban household demand for meat and meat products in Nigeria: *an almost ideal demand system analysis*, 2006; (No. 815-2016-52611).
- FAO Food labelling. FAO Organizational Chart. Food Labelling. FAO, Food and Agriculture Organization of the United Nations, 2022.
- Grujić, S., Grujić, R., Petrović, Đ. and Gajić, J., The importance of consumers' knowledge about food quality, labeling and safety in food choice. *Journal of Food Research*, 2013; 2(5): 57-65.
- Kenton Will Fast-Moving Consumer Goods (FMCG) Industry: Definition, Types, and Profitability. *Investopedia*. <https://www.investopedia.com>, 2021.
- Kosgey, I.S., Breeding objectives and breeding strategies for small ruminant in the tropics, (unpublished PhD thesis, Wageningen University), 2004.
- Lee, K.T., Quality and safety aspects of meat products as affected by various physical manipulations of packaging materials. *Meat science*, 2010; 86(1): 138-150.
- Ling, X., Shahzad, M.F., Abrar, Z.U. and Khattak, J.K., Determinants of the intention to purchase branded meat: mediation of Brand Trust. *SAGE Open*, 2021; 11(3): 21582440211032669.
- Lusk, J.L. and Briggeman, B.C., Food values. *American journal of Agricultural Economics*, 2009; 91(1): 184-196.
- Machín, L., Curutchet, M.R., Gugliucci, V., Vitola, A., Otterbring, T., de Alcantara, M. and Ares, G., The habitual nature of food purchases at the supermarket: Implications for policy making. *Appetite*, 2020; 155: 104844.
- Maruyama, M. and Trung, L.V., Supermarkets in Vietnam: Opportunities and obstacles. *Asian Economic Journal*, 2007; 21(1): 19-46.
- Mazhar, M., Daud, S., Arz Bhutto, S. and Mubeen, M., Impact of product packaging on consumers buying behavior: evidence from Karachi. *Journal of Marketing and Consumer Research*, 2015; 16: 35-42.
- Niyonzima, E., Ongol, M.P., Brostaux, Y., Koulagenko, N.K., Daube, G., Kimonyo, A. and Sindic, M., Consumption patterns, bacteriological quality and risk factors for Salmonella contamination in meat-based meals consumed outside the home in Kigali, Rwanda. *Food Control*, 2017; 73: 546-554.
- Owusu-Sekyere, E., Owusu, V. and Jordaan, H., Consumer preferences and willingness to pay for beef food safety assurance labels in the Kumasi Metropolis and Sunyani Municipality of Ghana. *Food Control*, 2014; 46: 152-159.
- Reilly, A., Overview of food fraud in the fisheries sector. FAO, *Fisheries and Aquaculture Circular*, 2018; (C1165): I-21.
- Rimal, A., Fletcher, S.M., McWatters, K.H., Misra, S.K. and Deodhar, S. Perception of food safety and

- changes in food consumption habits: a consumer analysis. *International Journal of Consumer Studies*, 2001; 25(1): 43-52.
19. Saeed, R., Lodhi, R.N., Rauf, A., Rana, M.I., Mahmood, Z., and Ahmed, N. Impact of Labelling on Customer Buying Behavior in Sahiwal, Pakistan. *World Applied Sciences Journal*, 2013; 24(9). ISSN: 1250-1254.
 20. Silayoi, P. and Speece, M., Packaging and purchase decisions: An exploratory study on the impact of involvement level and time pressure. *British food journal*, 2004.
 21. Silayoi, P. and Speece, M., The importance of packaging attributes: a conjoint analysis approach. *European journal of marketing*, 2007; 41: 11/12, ISSN: 1495- 1517.
 22. Udomkun, P., Ilukor, J., Mockshell, J., Mujawamariya, G., Okafor, C., Bullock, R., Nabahungu, N.L. and Vanlauwe, B., What are the key factors influencing consumers' preference and willingness to pay for meat products in Eastern DRC? *Food Science & Nutrition*, 2018; 6(8): 2321-2336.
 23. Unusan, N., Consumer food safety knowledge and practices in the home in Turkey. *Food control*, 2007; 18(1): 45-51.
 24. Wang, F., Zhang, J., Mu, W., Fu, Z. and Zhang, X., Consumers' perception toward quality and safety of fishery products, Beijing, China. *Food control*, 2009; 20(10): 918-922.
 25. Wills, J.M., Schmidt, D.B., Pillo-Blocka, F. and Cairns, G., Exploring global consumer attitudes toward nutrition information on food labels. *Nutrition reviews*, 2009; 67(suppl_1): S102-S106.
 26. Young, T. and Hamdok, A.A., Effects of household size and composition on consumption in rural households in Matabeleland South, Zimbabwe. *Agricultural Economics*, 1994; 11(2-3): 335-343.
 27. Zulqarnain, H., Zafar, A.U. and Shahzad, M., Factors that affect the choice of Consumers in selecting Retail Store, for Grocery Shopping. *International Journal of Multidisciplinary and Current Research*, 2015; 3(1): 1167-1172.