Consumption Pattern of Meat and Value Added Meat Products in Durg District of Chhattisgarh India

Chandan Kumar Sahu[1], Subhash Kumar Verma[1*], Keshab Das[1], Anil Patyal[2] and Ankita Thakre[3]

[1]*Department of Livestock Products Technology, College of Veterinary Science and Animal Husbandry, Dau Shri Vasudev Chandrakar Kamdhenu Vishwavidyalaya, Anjora, Durg, Chhattisgarh, INDIA*
[2]*Department of Veterinary Public health and Epidemiology, College of Veterinary Science and Animal Husbandry, Dau Shri Vasudev Chandrakar Kamdhenu Vishwavidyalaya, Anjora, Durg, Chhattisgarh, INDIA*
[3]*Department of Veterinary Physiology and Biochemistry, College of Veterinary Science and Animal Husbandry, Dau Shri Vasudev Chandrakar Kamdhenu Vishwavidyalaya, Anjora, Durg, Chhattisgarh, INDIA*

*Corresponding author: SK Verma; E-mail; subhash90verma@gmail.com

ABSTRACT

The present study was conducted in Durg district of Chhattisgarh to assess the consumption, processing pattern and hygienic outlook of consumers through contact survey studies. The objectives were achieved through a designed questionnaire (28 questions) on various categories of preference and processing patterns viz. likeness of type of meat, cooking and processing methods, hygienic practices etc. The district was divided in three zones and 200 respondents from each zone were selected purposively to constitute a total sample size of 600 respondents for the study and two indices based on questions were constructed. Analysis of data revealed that in general, consumers had shown higher preference to poultry meat than sheep/goat meat, pork or other meat irrespective of zone of sampling. It could be depicted from the study that most of the consumers preferred fresh meat over packed meats. It was found there was significant variation (p<0.05) of responses based on zone of sampling between three zones. The findings indicate majority of respondents were unaware of Food Safety and Standard Act of India (FSSAI) in meat production and Indian Government policies for meat products and transport. 96.1% respondents were unaware of slaughter of animal by humane slaughter method. The microbial load from fresh meat differed significantly amongst zones. It can be concluded from the study that for the success of meat processing sector, consumers need to be aware, educated about processing pattern and value addition in meat products.

HIGHLIGHTS

⊙ Consumption, processing pattern and awareness of hygienic outlook of the consumers through contact survey studies.
⊙ Consumers need to be aware, educated about hygienic processing pattern of meat products.

Keywords: Contact survey, questionnaire, humane slaughter, meat products

India is recognized as a country of diversified population with distinct cultures and traditions. Food habits of vast Indian society differ according to their religion, culture, tradition, socio-economic profile, geographical area and so on. The meat consumption pattern has dramatically changed owing to nutritional transition, advancement of lifestyle and increasing purchasing power of people in India (Mehta *et al*., 2015).

Chhattisgarh is rich in livestock wealth. In 2019, State had

99.83 lakh cattle, 11.74 lakh buffaloes, 40.04 lakh goats, 1.80 lakh sheep, 5.26 lakh pigs, and 187.12 lakh poultry birds. In Durg district there are 10877 Exotic cattle and 296816 Indigenous (Desi) cattle, 51122 buffaloes, 61499

goats, 7472 sheep and 1594 pigs available. (Livestock Census, 2019).

Foods of animal origin in relation to protein content are at the top of the food chain (Chemnitz and Becheva, 2014) and among that meat occupy the principal position. Meat is one of the most widely used important food commodity of animal origin. It contains quality protein, palatability enhancing fat, energy providing carbohydrates, vitamins as well as essential fatty acids and micronutrients which make it a source of balanced diet for most of the people (Sharma *et al.*, 2018). The traditions and culture influences meat consumption to a great extent in India (Devi *et al.*, 2014). The bio-availability of meat proteins is high with (Net protein utilization value around 0.75 as against 0.5-0.6 for plant proteins) balanced amino acid profile having higher digestibility (Sharma, 2003). Increase in meat production and also its demand is expected to take place in near future mainly in developing countries like India.

Survey work may use a variety of data collection methods with the most common being questionnaires and interviews. Questionnaires may be self-administered or administered by a professional, may be administered individually or in a group and typically include a series of items reflecting the research aims. Questionnaires may include demographic questions in addition to valid and reliable research instruments (Costanzo *et al.*, 2012; DuBenske *et al.,* 2014; Ponto *et al.*, 2010).

MATERIALS AND METHODS

A Trilingual (English, Hindi & Chhattisgarhi) questionnaire/interview schedule covering various meat and meat products related to their consumption, processing pattern, awareness of consumers was designed. A total sample size of more than 600 respondents were taken for the survey by dividing Durg district into three zones, namely; Zone I, zone II, and zone III by using a random sampling method (Yamane, 1967). Three different parameters namely consumption pattern of meat, processing awareness of consumers and hygienic practices adopted were considered and all the questions were distributed under these three heads for computation and analysis of responses by 600 respondents in all the three zones of Durg district. Further, grading of the awareness about meat consumption and hygiene was done by allotting scores on the basis of number of positive

responses obtained per respondent. Data were analyzed statistically using "SPSS (25)" software package as per standard methods. Qualitative data were analyzed by Chi-Square test. The statistical significance was estimated at 5% level ($p < 0.05$).

RESULTS AND DISCUSSION

Effect of zone of sampling on consumption and processing pattern of meat and value added meat products

The analyzed data on effect of zone of sampling on meat consumption and processing pattern has been depicted in Table 1. It was found that the most preferred meat in all the three zones i.e. Zone I, II and III was poultry meat, with the value 88.0%, 78.0%, 68.5% respectively. However, a significant ($p < 0.05$) variation was observed in between all three Zones. These findings are in agreement with Talukder *et al.* (2020), Waghamare *et al.* (2021) who reported that most of consumers prefer chicken meat.

Results indicated that majority of the respondents, irrespective of zone of sampling, consume fresh meat (97.0%, 98.0%, 99.0% respectively) than packed meat. A non-significant ($p > 0.05$) variation was observed in between all three zones. The findings were in accordance to the earlier observations of Chandirasekaran *et al.* (2021) they reported most respondents attribute the reason for consumption of meat to buy fresh meat.

Query on poultry, which carcass part you prefer, Whole carcass part in poultry was preferred by most of respondents. Result shows non-significant variation ($p > 0.05$) between Zone I, II and III (88.5%, 83.5%, 86.5% respectively). The present finding corroborates with earlier description of Waghamare *et al.* (2021) who found majority of consumers preferred all body parts of the poultry carcass (56.19%).

During the survey majority of people responded that they usually consume meat once in a week (69.5%, 54.5%, 70.0% respectively). Result shows significant ($p < 0.05$) variation between all three zones. Similar findings have been reported by Waghamare *et al.* (2021) found that 70.62% respondents usually preferred to eat non-vegetarian food once or twice in a week.

Table 1: Effect of zone of sampling on consumption and processing pattern of meat and value added meat products

Question No.	Options	Zones			P-value
		Zone I	Zone II	Zone III	
Consumption and processing pattern					
1	Which species animal meat do you prefer to consume?				
	Goat/Sheep	9 (4.5%)	16 (8.0%)	19 (9.5%)	0.001
	Poultry	176 (88.0%)	156 (78.0%)	137 (68.5%)	
	Pork	5 (2.5%)	9 (4.5%)	17(8.5%)	
	Other	10 (5.0%)	19 (9.5%)	27 (13.5%)	
2	What do you prefer: Packed/Fresh meat				
	Packed	6 (3.0%)	4 (2.0%)	2 (1.0%)	0.360
	Fresh meat	194 (97.0%)	196 (98.0%)	198 (99.0%)	
3	In Poultry, which Carcass part you prefer?				
	Whole	177 (88.5%)	167 (83.5%)	173 (86.5%)	
	Chest	7 (3.5%)	5 (2.5%)	4 (2.0%)	0.054
	Wings	5 (2.5%)	7 (3.5%)	14 (7.0%)	
	Other	11 (5.5%)	21 (10.5%)	9 (4.5%)	
4	How often do you consume meat?				
	Everyday	2 (1.0%)	2 (1.0%)	3 (1.5%)	0.016
	1-3 times in a week	18 (9.0%)	28 (14.0%)	16 (8.0%)	
	Once in a week	139 (69.5%)	108 (54.0%)	140 (70.0%)	
	Once in a month	25 (12.5%)	33 (16.5%)	29 (14.5%)	
	On special occasion	16 (8.0%)	29 (14.5%)	12 (6.0%)	
5	Which processed meat product you prefer?				
	Chicken curry	160 (80.0%)	154 (77.0%)	153 (76.5%)	0.029
	Fast food	28 (14.0%)	35 (17.5%)	22 (11.0%)	
	Other	12 (6.0%)	11 (5.5%)	25 (12.5%)	
6	Which traditional meat you prefer?				
	Purawa	6 (66.7%)	10 (71.4%)	11 (11.1%)	0.970
	Tarava	3 (33.3%)	4 (28.6%)	5 (31.3%)	
	Other	0	0	0	
7	Which meat processing do you prefer: Hot Processing/Cold Processing				
	Hot Processing	193 (96.5%)	191 (95.5%)	189 (94.5%)	0.628
	Cold Processing	7 (3.5%)	9 (4.5%)	11 (5.5%)	
8	Will you prefer the branded outlets (KFC, McDonalds) over traditional meat Market?				
	KFC	10 (52.6%)	9 (47.4%)	7 (53.8%)	0.610
	McDonalds	9 (47.4%)	4 (30.8%)	6 (42.6%)	

Value in the parenthesis indicates percentage of the respondents (n=600); ($p<0.05$- The mean difference is significant at 5% level).

Regarding the preference about the value-added meat product respondents from Zone I, II and Zone III opted for chicken curry (80.0%, 77.0%, 76.5% respectively). Result shows significant ($p<0.05$) variation between all three zones. This is in agreement with the earlier finding of Kiran *et al.* (2018), These findings were in contrast to

Talukder *et al.* (2020) as they reported that consumers chose seek kabab (chicken and chevon) as their first preference of value-added meat product.

Purawa/puraga (clean digestive tract of poultry cooked over the coal) 66.7%, 71.4%, 11.1% was the most preferred

traditional meat product irrespective of zone of sampling. Result shows a non-significant (p>0.05) variation between zone I, II and III.

People from zone I, zone II and zone III (96.5%, 95.5%, 94.5% respectively) reported a non-significant (p>0.05) variation for hot processing method for meat processing. This is indicative of higher acceptability of fresh meat foods from all zones. The findings were in accordance to the earlier observations of Waghamare *et al.* (2021) who found that the majority of consumers (90.21%) preferred hot processing.

Branded outlets were not more preferred in all the three zones (zone I, zone II and zone III) than traditional meat market. Result shows a non-significant (p>0.05) variation between the three zones.

Effect of zone of sampling on awareness regarding consumption of meat and value added meat products

The analyzed data on effect of zone of sampling on awareness has been depicted in Table 2. It was observed that respondents from all the three zones preferred poultry meat because it is tastier (79.0%, 72.5%, 84.5% respectively)

Table 2: Effect of zone of sampling on awareness regarding consumption of meat and value added meat products

Question No.	Options	Zones			P-value
		Zone I	Zone II	Zone III	
		Awareness			
9	Why do you prefer Goat/Sheep/Poultry/Pork meat?				
	Tastier	158 (79.0%)	145 (72.5%)	169 (84.5%)	
	Nutritious	24 (12.0%)	18 (9.0%)	8 (4.0%)	
	Healthier	7 (3.5%)	20 (10.0%)	15 (7.5%)	0.012
	Cheaper	6 (3.0%)	9 (4.5%)	5 (4.5%)	
	Easy access	5 (2.5%)	8 (4.0%)	3 (1.5%)	
10	Do you think Goat/Sheep Meat/Poultry/Pork you consume is hygienically processed: Y/N				
	Yes	196 (98.0%)	191 (95.5%)	185 (92.5%)	0.033
	No	4 (2.0%)	9 (4.5%)	15 (7.5%)	
11	Have you heard of processed meat products: Y/N				
	Yes	19 (9.5%)	11 (5.5%)	7 (3.5%)	0.040
	No	181 (90.5%)	189 (94.5%)	193 (96.5%)	
12	If yes, Which product you have heard:				
	1	14 (73.7%)	7 (63.6%)	3 (42.9%)	0.342
	2	5 (26.3%)	4 (36.4%)	4 (57.1%)	
13	Do you have any knowledge about age group of poultry affecting taste of Meat: Y/N				
	Yes	44 (22.0%)	26 (13.0%)	53 (26.5%)	0.003
	No	156 (78.0%)	174 (87.0%)	147 (73.5%)	
14	Are you aware of Food Safety and Standards Act (FSSAI) in meat Production: Y/N				
	Yes	21 (10.5%)	10 (5.0%)	13 (6.5%)	0.093
	No	179 (89.5%)	190 (95.0%)	187 (93.5%)	
15	Do you think the shop/retail outlet from where you purchase meat is FSSAI registered or HACCPI certified: Y/N				
	Yes	11 (5.5%)	5 (2.5%)	7 (3.5%)	0.282
	No	189 (94.5%)	195 (97.5%)	193 (96.5%)	
16	Do you think meat cooked at home destroy all the microbes from meat: Y/N				
	Yes	196 (98.0%)	187 (93.5%)	191 (95.5%)	0.086
	No	4 (2.0%)	13 (6.5%)	9 (4.5%)	
17	Are you aware of slaughter of animal by humane slaughter: Y/N				
	Yes	13 (6.5%)	6 (3.0%)	4 (2.0%)	0.048
	No	187 (93.5%)	194 (97.0%)	196 (98.0%)	

18	Are you aware about Indian Government policies for meat products and Transport: Y/N				
	Yes	21 (10.5%)	11 (5.5%)	17 (8.5%)	0.185
	No	179 (89.5%)	189 (94.5%)	183 (91.5%)	
19	Are you aware improper disposal of slaughter house waste is a potential source of pollution: Y/N				
	Yes	171 (85.5%)	179 (89.5%)	156 (78.0%)	0.006
	No	29 (14.5%)	21 (10.5%)	44 (22.0%)	
20	What is your consideration to purchase raw meat?				
	Freshness	182 (91.0%)	176 (88.0%)	179 (89.5%)	
	Cost	6 (3.0%)	14 (7.0%)	9 (4.5%)	0.442
	Healthy/Low fat	8 (4.0%)	4 (2.0%)	5 (2.5%)	
	Social issue	4 (2.0%)	6 (3.0%)	7 (3.5%)	

Value in the parenthesis indicates percentage of the respondents (n=600); (P<0.05- The mean difference is significant at 5% level).

than others. Result shows significant (p<0.05) variation between all the three zones. The findings were supported by earlier observations of Chandirasekaran *et al.* (2021) who found that most of the consumers preferred **"taste"** as their first criteria for purchase of meat products.

Respondents from zone I, II, and III reported that goat/sheep meat/poultry/pork they consume was hygienically processed (98.0%, 95.5%, 92.5% respectively). Result shows significant (p<0.05) variation between all the three zones. This finding was in line with earlier findings of Waghamare *et al.* (2021). They reported nearly 42.78% consumers showed concern about cleanliness and hygienic condition of the meat retail shop where from they buy non-vegetarian products. Most of the consumers (82.38%) showed their willingness to purchase with home delivery of minimally handled hygienic meat and for this they (86.17%) are ready to pay a slightly higher price. This indicates consumers concern about safety of food, but unaware of the food laws, quality guidelines, food safety standards.

Query regarding, have you heard of processed meat products, respondents showed a significant (p<0.05) relation between zone I, II and III (90.5%, 94.5%, 96.5% respectively). Processed chicken meat products, mainly consumed by respondent of all three zones, directly correlated with most preferred value added meat was chicken curry. The present observation was supported by earlier finding of Cosgrove *et al.* (2005) who reported red meat, white meat and processed meat consumption in Irish adults with dietary quality and mean intake of red meat, white meat and processed meat were 51, 33 and 26 g/d respectively.

The query regarding knowledge about the age of poultry affecting the taste of meat respondents showed a significant (p<0.05) variation between zone I, II and III (78.0%, 87.0%, 73.5% respectively). The finding agrees with Singh *et al.* (2019) who reported majority of consumers expressed inability to judge broiler or spent hen meat by tasting it.

A non-significant (p<0.05) variation of respondents from the entire three zones were not aware of the Food Safety and Standards Act (FSSAI) in meat industry. These were supported by earlier observations of Singh *et al.* (2019) who found that people from the entire four zones were not aware of the Food Safety and Standards Act (FSSAI) in meat industry.

People from all the three zones stated that the shop/retail outlet from where they purchase meat is not FSSAI registered or HACCP certified and showed a non-significant (p<0.05) variation. This corroborates with the finding of Suresh (2016) who found that the purchase of meat from registered meat shop was quite low (22%).

The query regarding whether proper cooking kills all the pathogens in meat, it was observed that participants from all the three zones reported that they think proper cooking at home kills all the pathogens. Result shows a non-significant (p>0.05) variation between all three zones. The findings were in accordance to the earlier findings of Kiran *et al.* (2018). They reported traditional cooking practices in India destroys majority of meat borne pathogens.

The query regarding awareness of slaughter of animal by humane slaughter the respondents from zone I, II and III showed a significant (p>0.05) variation. 93.5%,

97.0%, 98.0% respondents were not aware about humane slaughter. These were similar to the earlier finding of Waghamare *et al.* (2021) who reported about 68.59% consumer's preferred chicken carcass slaughtered by any ritual method.

Also, respondents reported that they were not aware of the government policies for meat production and export in India, irrespective of zone of sampling. Result shows a non-significant (p>0.05) variation between all three zones. These were supported by earlier observations of Singh *et al.* (2019) who found that irrespective of the zones, the people were not aware of the government policies for meat production and export in India.

The awareness of Participants from zone I, II and III (85.0 %, 89.5%, 78.0% respectively) about the potent environmental hazards by disposal of untreated slaughter house by-products was found to have significant (p<0.05) variation. The finding is in agreement with Singh *et al.* (2019) who reported that, the awareness of Participants from zone I and II about the potent environmental hazards by disposal of untreated slaughter house by-products was significantly higher (p <0.01) than that of zone III and IV.

When hygiene factor was compared in different zones, it was observed that the major criterion for purchase of raw meat in all the three zones was freshness (91.0%, 88.0%, 89.5% respectively). Result shows a non-significant (p>0.05) variation between all three zones. This was in line with earlier report of Raju and Suryanarayana (2005) who reported rural people were well aware of the importance of meat freshness during purchase of raw meat and Kiran *et al.* (2018) found that majority of respondents (71.5%) used colour as indication of meat quality.

Effect of zone of sampling on hygienic consideration of meat and value added meat products

The analyzed data on effect of zone of sampling on hygienic considerations has been depicted in Table 3. Rspondents from all three zones reported that they preferably purchase meat from butcher shop (91.5%, 87.0%, 86.5% respectively). Result shows a non-significant (p>0.05) variation between all three zones (Table 3). These were similar to the earlier findings of Kiran *et al.* (2018) who reported that close to 50 percent respondents purchased meat directly from butcher shop. Waghamare *et al.* (2021)

reported that most of the consumers (70.62%) usually buy meat from the meat shop near to their residence and in contrast to present finding Tekle and Anja (2017) reported that out of the total respondents, most of the respondents (86%) replied that the meat they consumed was purchased from hotel, restaurant, butchery and abattoir whereas some of the respondents obtained meat for consumption direct from market and fattened in individual house animals slaughtered, 10% and 4% respectively.

Poultry meat (80.0%, 75.5%, 72.0% respectively) was given the highest rank when respondents were asked about which meat do they think was healthier. Result shows a non-significant (p<0.05) variation between all three zones.

Respondents from zone I, II and III reported that there was a change in their mindset for meat consumption (85.5%, 90.5%, 91.0% respectively). Result shows a non-significant (p>0.05) variation between all three zones.

A non-significant (p>0.05) variation of preference for chicken curry meat was observed amongst respondents from zone I (90.0%), zone II (88.5%) and zone III (91.5%). These were supported by earlier observations of Kiran *et al.* (2018) who found that the Gravy type product was most preferred type in home.

A significant (p<0.05) variation of people between all three zones also reported that they had encountered unhygienic meat served to them (2.5%, 3.5%, 8.5% respectively). These corroborate the earlier findings of Kiran *et al.* (2018) who reported that 92.7 percent of respondents have not seen any type of food poisoning attributed to consumption of meat and meat products.

Respondents from zone I, II and III also had a non-significant (p>0.05) variation of preference for meat from the road side vendors (90.0%, 85.5% and 87.5%, respectively). This was in line with earlier report of Chandirasekaran *et al.* (2021) who reported most respondents prefer to buy fresh meat from roadside meat shops indicating that the consumers are not willing to pay extra for better quality products. It could be correlated to their answer for the query no. 27 wherein they reported that they were satisfied with the hygienic conditions adopted by them (96.5%,95.5% and 94.5%%, respectively).

The impact of avian flu/swine flu on meat consumption pattern was observed amongst respondents in zone I (88.0%), zone II (90.5%) and zone III (85.5%). Result

Table 3: Effect of zone of sampling on hygienic consideration of meat and value added meat products

Question No.	Options	Zones			P-value
		Zone I	Zone II	Zone III	
	Hygiene				
21	From where do you procure meat?				
	Butcher shop	182 (91.0%)	174 (87.0%)	173 (86.5%)	
	Super market	0	0	0	
	Home slaughter	18 (9.0%)	26 (13.0%)	27 (13.5%)	0.312
	Other	0	0	0	
22	Which meat do you feel batter for health?				
	Goat/Sheep meat	18 (9.0%)	26 (13.0%)	17 (8.5%)	
	Poultry meat	160 (80.0%)	151 (75.5%)	144 (72.0%)	
	Pork	8 (4.0%)	11 (5.5%)	21 (10.5%)	0.075
	Other	14 (7.0%)	12 (6.0%)	18 (9.0%)	
23	If yes, has it changed your mindset to consume meat again: Y/N				
	Yes	171 (85.5%)	181 (90.5%)	182 (91.0%)	0.151
	No	29 (14.5%)	19 (9.5%)	18 (9.0%)	
24	How do you consume meat?				
	Boiled	7 (3.5%)	11 (5.5%)	5 (2.5%)	
	Fried	11 (5.5%)	7 (3.5%)	7 (3.5%)	
	Curry	180 (90.0%)	177 (88.5%)	183 (91.5%)	0.504
	Oven cooked	0	0	0	
	Grilled	2 (1.0%)	5 (2.5%)	5 (2.5%)	
	Other	0	0	0	
25	Have you ever experiential consuming unhealthy meat: Y/N				
	Yes	5 (2.5%)	7 (3.5%)	17 (8.5%)	0.011
	No	195 (97.5%)	193 (96.5%)	183 (91.5%)	
26	Do you prefer to consume processed raw meat products from road side Vendors: Y/N				
	Yes	176 (88.0%)	181 (90.5%)	171 (85.5%)	0.306
	No	19 (9.5%)	29 (14.5%)	25 (12.5%)	
27	Are you satisfied with the hygienic conditions maintained in such outlets: Y/N				
	Yes	193 (96.5%)	191 (95.5%)	189 (94.5%)	0.628
	No	7 (3.5%)	9 (4.5%)	11 (5.5%)	
28	Did any of diseases like Avian flu/Swine flu etc. affect your consumption pattern if so how whether increase or decrease: Y/N				
	Yes	176 (88.0%)	181 (90.5%)	171 (85.5%)	0.306
	No	24 (12.0%)	19 (9.5%)	29 (14.5%)	

Value in the parenthesis indicates percentage of the respondents (n=600); (P<0.05- The mean difference is significant at 5% level).

shows a non-significant (p>0.05) variation between all three zones. Present finding agreed with Ali *et al.* (2017) observed that a significant proportion of respondents showed reduction in the consumption of chicken and eggs due to the fear of bird flu outbreak.

CONCLUSION

It was found that poultry meat was most preferred one as compared to sheep/goat meat, pork and other meat. The effect of zone of sampling revealed that people from all three zones preferred hot processing of meat. The most preferred carcass cut of poultry in all the age groups was whole carcass. The maximum respondents were in the opinion that they consume meat once in a week. The most preferred value added meat products was chicken curry. Majority of people prefer hot served meat than cold processed meat. All zones preferred poultry meat because it is tastier. The entire three groups stated that they were not aware of the Food Safety and Standards Act

(FSSAI) in meat production and governmental policies being followed in the country for the same. Irrespective of the zones, the people were not aware of the government policies for meat production and export in India. The respondents from all zones preferred purchase of meat from butcher shop and consideration for purchase of raw meat was freshness and very few people experienced health issue due to consumption of meat.

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