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Effect of sesame seed paste on the quality of mini chevon patties

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ABSTRACT

A study was undertaken to find the effect of sesame seed paste (SSP) as fat replacer in mini chevon patties. Standardized recipe of chevon patties containing goat meat (70%) and chevon fat (7%) was considered as control. Sesame seed paste (SSP)was incorporated at 1.4%, 2.8%, and 4.2% levels in the formulation by replacing chevon fat at 20, 40 and 60% levels, respectively. Three batches each of control and sesame seed paste added chevon patties were prepared in the experiment and were subjected to physicochemical, proximate and sensory analysis. No significant (P>0.05) difference was noticed in pH of patties and batter in control and treatments. The control patties had significantly (P<0.05) higher emulsion stability(%), moisture(%), and fat (%) than the other treatments. The patties prepared with 2.8% and 4.2% SSP showed significantly higher cooking yield(%), protein and ash contents than control and treatments. The patties prepared with 2.8% SSP had significantly (P<0.05) higher sensory scores compared to patties containing 4.2% SSP. The level of 2.8% SSP also showed significantly (P<0.05) higher fiber content, better fatty acid and amino acid profile than the control. Thus sesame seed paste appeared to be a better fat replacer without affecting quality of chevon patties.

Keywords: *Chevon patties, Sesame seed paste, proximate composition, fatty acid profile, amino acid profile*

INTRODUCTION

Chevonis recognized as a high-quality protein source that is low in fat, saturated fatty acids, and cholesterol. It contains more beneficial unsaturated fatty acids, such as linoleic and oleic acid, than other red meat(Banskaleiva*et al.*, 2000; Mahgoub*et al.*, 2002). In recent years, there has been a shift in meat products consumption, with people exercising more control over their fat intake and by reducing the quantity of animal fat in their diet.High fat consumption is linked to an increased risk of obesity and certain types of cancer, while saturated fat consumption is linked to high blood cholesterol, coronary heart disease, and an increased risk of chronic diseases(Prince *et al.*, 2013; Popkin*et al.*, 2012).

Fat in processed meat products is significant in determining the product's taste profile and flavour.Fat is essential in the development of stable meat emulsions in finely comminuted meat products (Ney, 1988; Hughes *et al.*,1997).Fat reduction in comminuted meat products leads to rubbery dry textured products with high shear force due to changes in hardness (Barbut and Mittal, 1992; Keeton, 1994).Although consumers prefer foods that are low in fat or calories, they still want them to taste good. As a result, making further processed meat products through reformulation with nonmeat and fat replacer ingredients provides a tremendous chance to lower fat and ameliorate the problems associated with fat reduction.

Incorporation of vegetable oilseeds in meat products may benefit consumer health because they are cholesterol-free and have a higher ratio of saturated to unsaturated fatty acids and (Choi *et al*., 2010; Pietrasik and Janz, 2010; Sanjeewa*et al*., 2010) dietary fibre, which is generally lacking in meat.As a result, including dietary fibres into processed meats has been considered a viable technique for increasing the nutritional content of processed meats(Verma*et al*, 2010). Tahine, or sesame paste, is made from husked sesame seeds. This product has a high nutritional value since it contains unsaturated fatty acids omega 6 and omega 9 (oleic up to 38.84% and linoleic up to 46.26%), which promote the synthesis of good cholesterol or HDL in the liver (Sansawat*et al*., 2015).Because of the high quantity of polyunsaturated fatty acids in its oil, it is known to lower cholesterol levels. Consuming sesame seed oil raises plasma gamma tocopherol levels and boosts vitamin E activity, both of which are believed to prevent cancer and heart disease (Cooney *et al*., 2001). Hence, the current study was designed to optimize the incorporation level of sesame seed paste (*Sesamumindicum*) as a fat replacer in mini chevon patties.

MATERIALS AND METHODS

Collection of raw material

The hind saddle region from loin to leg portion and the visceral fat of goat were bought from local market and transported to laboratory (Department of Livestock Products Technology, Rajiv Gandhi Institute of Veterinary Education and Research) in clean polyethylene bags kept inice box. On arrival at the lab, the meat samples were deboned and cut into small chunks. The tendons, ligaments and cartilages were carefully trimmed from the meat portion. Then the meat were washed in portable tap water and after draining the excess water, meat chunks were packed in LDPE bags (500g each) and finally stored in the freezer (-18±1^{0}C) till further use. The visceral fat harvested during evisceration were packed separately in LDPE bags and stored in freezer (-18^{0}C) for further use. Frozen meat and required quantity of fat were thawed under refrigeration (4±1^{0}C). Meat and fat were minced twice separately using meat mincer (MADO junior model, Germany) using 8mm and 4mm plates. The minced meat and fat were used for making the chevon patties mix.

Preparation of dry spice mix&green condiments paste

The whole spice ingredients were purchased from local market and were cleaned and dried in hot air oven for 18 hours at 60^{0}C. They were ground separately and sieved through a fine mesh. Finely powdered spice ingredients were stored in air tight plastic bottles for subsequent use. The dry spice mix was prepared by mixing the ingredients in the following proportion. Onion, ginger and garlic were peeled and washed thoroughly with running tap water. They were cut into small pieces, weighed in required proportions in the ratio of 2:1:1, mixed and ground in a home mixer grinder (Sumeet, Mumbai) to obtain a fine paste. The onion garlic paste was stored in the freezer (-18^0 C) for further use.

Preparation of sesame seed paste

Sesame seeds (white) procured from the local market were cleaned of extraneous matter and dried in the hot air oven at 60^{0}C for an hour. It was roasted in stainless steel pan over a controlled gas flame to reduce the smell of the raw seeds.Roasted sesame seeds were made into paste by using mixer – grinder (Sumeet,Mumbai) with addition of minimum required quantity of water.

Preparation of batter

The minced meat with curing ingredients and ice flakes were added to the food processor. Proteins were extracted by chopping using food processor for 3 minutes at high speed. Goat fat/sesame seed paste were added (as per requirement) to the mixture and the chopping continued at high speed for 3 more minutes. Finally the binder (maida), dry spice mix and green condiments were added and the process continued for another 30 seconds to prepare the final batter. From the prepared batter, raw patties with an average weight of 25grams were molded using petri plates (40mm internal diameter x 12mm height). The patties were cooked in pre heated electrical grilling oven at 180^{0}C for 30 minutes till the internal core temperature reaches 80^{0}C. After 15 minutes of cooking patties were turned to change the side for uniform cooking.

Incorporation of sesame seed paste

Sesame seed paste was incorporated into chevon patties by replacing the goat fat at 20%, 40% and 60% levels to determine the optimum level of fat replacement in chevon meat patties as shown in Table 1.

ANALYSIS OF SESAME SEED PASTE INCORPORATED BATTER AND CHEVON MEAT PATTIES

Estimation of pH

pH of the batter and cooked patties was determined by following the procedure of (AOAC 1995). Blending 10 gram of sample with 50 ml of distilled water for 1 minute using pestle and mortar and then transferred into small beakers. The pH was determined by immersing the electrode of digital pH meter into aliquot of the sample. The pH meter was calibrated every time before the measurement by using standard buffer of pH 4 and 7.

Estimation of emulsion stability and cooking yield

The stability of emulsions was determined by using the method of Verma*et al*. (2019). Taking the emulsion samples (25 g) from each treatment group in LDPE pouches and heated at 80^{0}C for 20 min in a thermostatically controlled water bath by turning the sample for every 10 min. After draining out the exudates, the cooked mass was cooled, weighed and the yield of cooked emulsion mass was recorded as emulsion stability percentage.The weight of chevon patties were recorded before and after cooking. The cooking yield was calculated as under and expressed as percentage (Murphy *et al*., 1975).

Cooking yield % = Weight of cooked chevon patties /weight of raw chevon patties x 100

Proximate composition

Proximate composition including moisture (%), crude protein (%), ether extract (%), and ash contents of the meat patties were estimated by the following methods of (AOAC 1995).

Sensory analysis

Sensory evaluation (Keeton, 1983) was conducted to select the best level of fat replacement and to compare the quality of control and treatment samples. For sensory analysis, patties were heated to 60^{0}C, cut into cubes and were served to the panelists for sensory evaluation. It was carried out using semi-trained panelists comprising of post graduate students and faculty of RIVER. The panelists were explained about the nature of experiment without disclosing the identity of the samples. They were requested to record their preference on 8 point hedonic scale (8 = extremely desirable, 1 = extremely undesirable) for attributes viz, appearance, flavor, texture, juiciness and overall acceptability. Plain water was provided to each panelist to rinse the mouth between testing of samples.

Table 1: Ingredients used in the mini chevon patties incorporating sesame seed paste

S.No	Ingredients	Control (0%)	Treatments Levels of replacement of chevon fat with SSP		
			T_1 (20%)	T_2 (40%)	T_3 (60%)
1	Goat Meat	70	70	70	70
2	Goat fat	7	5.6	4.2	2.8
3	Sesame paste	0	1.4	2.8	4.2
4	Ice flakes	12	12	12	12
5	Common salt	1.5	1.5	1.5	1.5
6	Dry Spices mix	1.9	1.9	1.9	1.9
7	Maida	3	3	3	3
8	TSPP	0.3	0.3	0.3	0.3
9	Condiments (Onion, Garlic and Ginger 2:1:1)	4	4	4	4
10	Sugar	0.3	0.3	0.3	0.3
	Total	100	100	100	100

In all the treatments Sodium Nitrite was added at the rate of 150mg per 1000 g of batter

Based on the results of the above parameters, the control and the best selected products were subjected to crude fibre, fatty acid and amino acid analysis.

Analysisof crude fibre

The crude fibre content of chevon patties sample was determined as per AOAC (1995).

Analysis of fatty acid profile (Gas chromatography)

The method of O'Fallon *et al.* (2007) was followed for the estimation of fatty acid with slight modification.

Analysis of amino acid profile (Ultra-Performance Liquid Chromatography)

UPLC method was applied to investigate the amino acid profile of mini chevon patties incorporated with sesame seed pasteand it was carried out by following the modified method of Zhu *et al.* (2012).

STATISTICAL ANALYSIS

The data generated from this study were subjected to statistical analysis by standard procedures like analysis of variance (ANOVA) using SPSS software 17. The physicochemical, sensory quality parameters and proximate composition of mini chevon patties with sesame seed paste incorporation at different levels were analyzed by one way ANOVA. Significant difference were tested using the Least Significance Difference Test (LSD) Snedecor and Cochran, (1994).

RESULTS AND DISCUSSION

Physico chemical properties of batter & cooked patties

Physicochemical properties of SSP incorporated chevon patties emulsion and the control sample are presented in Table 2.No significant differences were observed in pH of batter and cooked patties among the control and the treatments. Indumathi *et al.* (2020) reported that pH of spent hen broiler breeder chicken sausages containing sesame seed paste as fat replacer were 6.23 – 6.29, which were almost similar to the pH values recorded for treated groups in the present study. However, these values were lower than values reported by Castillo *et al.* (2018) in hamburger meat, Sanjivikumar(2011) recorded pH of sesame paste incorporated turkey meat nuggets as 6.32 - 6.34.

No significant differences were noticed in emulsion stability between the treatments 1 and 2, but there was significant ($P<0.05$) difference between treatment 2 and treatment 3 and the control. Control sample had significantly ($P<0.05$) higher emulsion stability than all the treatments. Similar findings were reported by Anita *et al.* (2020) in low fat chicken patties with different fat replacers where control had significantly ($P<0.05$) higher emulsion stability (%) than treatments.

The mean percent cooking yield of mini chevon patties was significantly ($P<0.05$) affected by addition of sesame seed paste at the highest level (4.2%) which was found to be 86% compared to 83% for control. Findings of present study are in agreement with the observations recorded by Choi *et al.* (2010) in low fat meat products, Sanjivikumar (2011) in sesame paste added turkey nuggets and Indumathi*et al.* (2020) in sesame paste added chicken sausages. This increase in cooking yield might be due to moisture retention by ground sesame seed paste (Zhuang *et al.*, 2016).

Proximate composition of mini chevon patties

Proximate composition of SSP incorporated chevon patties along with control are presented in Table 2.
Moisture percentage (67.44+0.12, 67.55±0.15, 67.51+0.06 and 66.39+0.06) decreased significantly ($P>0.05$) in T3 containing 4.2% sesame seed paste in the formulation. Similar to our observation Eman et al. (2004) reported that addition of defatted sesame flour (DSF) in chicken sausages resulted in decrease of moisture contents. Castillo et al. (2018) also recorded decrease in moisture (%) from 64.61 in control to 62.04 in sesame paste added hamburger meat. Recently, Indumathi et al. (2020) also reported steady decrease in moisture content from 67.75% in control to 63.34 % in sesame paste added chicken sausages. Protein percentage increased significantly ($P<0.05$) in 2.8% (21.86±0.08) and 4.2% (22.58+0.20) SSP incorporated samples compared to control (21.27+0.15). Sesame seed paste incorporation in the formulation of chevon patties resulted in higher protein content in the treatments. This might be due to high protein content of sesame seed. Similar trend was reported by Sanjivikumar (2011) in turkey meat nuggets containing different levels of SSP, where protein contents were found to be 16.13% and 18.41%, 19.87% in control and products containing 5% and 7.5% of SSP, respectively. Indumathi et al. (2020) also reported that control chicken sausages

sample had lower protein (%) compared to sample containing 10% SSP.

Addition of sesame seed resulted significant (P<0.05) decrease in the fat percent in treated patties than in control. Chevon patties containing sesame seed paste (T3) had significantly (P<0.05) lower fat content than that of treatment 1 and control. This might be due to decrease in the chevon fat levels in treated patties as wellas due to dilution resulted from the addition of sesame seed paste. These findings are similar to the observations recorded by Castillo et al. (2018) in sesame seed paste fortified low fat hamburger and SanjiviKumar (2011) in turkey meat nuggets containing SSP as fat replacer. Similarly, Eman et al. (2004) also reported that addition of defatted sesame flour (DSF) in chicken sausages up to 18% resulted in decreased fat content in the final product.

Chevon patties containing sesame seed paste (T3) had significantly (P<0.05) higher percent total ash (3.33+0.01) than rest of the treatments and control. This might be attributed to the high total ash content of sesame seed (Elleuch et al., 2007). Similar to the present findings, Sanjivikumar (2011) reported that ash content of turkey meat nuggets containing different levels of SSP as fat replacer was higher than control. Castillo et al. (2018) also found that ash content of hamburger meat formulated with SSP resulted in increase in ash contents in treated products. Indumathi et al. (2020) also reported higher ash content in chicken sausages prepared with ground sesame paste as fat replacer compared to control samples which did not contain any SSP.

Sensory evaluation of mini chevon patties

Sensory evaluation of SSP added chevon patties is indicated in Table 2. The results revealed significant (P<0.05) difference in the organoleptic scores among the control and the treated products (T3) with respect to flavor, texture and overall acceptability. Better scores for flavor, texture, appearance, juiciness and acceptability were noticed in control than all other treatments which might be due to only chevon fat content in the control sample. Although flavor, texture and overall acceptability scores decreased significantly (P>0.05) in T3 compared to the control, appearance and juiciness scores were not affected. Scores for all the sensory attributes in treatment 2 were comparable with scores for control sample. All the scores for T2 and control were in the range of 6.56-7.38 on 8 point hedonic scale which indicated that SSP addition did not affect the sensory quality of the products to a great extent. Based on the results, chevon patties incorporated with sesame seed paste at 2.8% level (T2) and control were selected.

Though the cooking yield (%) and protein content of 4.2% SSP (treatment 3) incorporated chevon patties were significantly (P<0.05) higher than 1.4% and 2.8% SSP added patties, based on the sensory scores the patties with 2.8% SSP incorporation was selected for further analysis as it recorded significantly (P<0.05) higher scores than 1.4% and 4.2% levels in respect of flavor, texture and overall acceptability.

The samples belonging to control and the selected treatment groups were subjected to estimation of crude fiber

Table 2: Effect of SSP incorporation by replacing chevon fat on the physico chemical properties,proximate composition and sensory quality of mini chevon meat patties

Parameters	Control	Treatment (SSP)		
		(T1) 20%	(T2) 40%	(T3) 60%
pH of batter	6.02±0.01	6.03±0.02	6.02±0.03	6.02±0.03
pH of patties	6.21± 0.06	6.22±0.06	6.22± 0.03	6.23±0.05
Emulsion stability (%)	91.27±0.09^{c}	88.17±0.07^{a}	88.47±0.19^{ab}	88.89±0.29^{b}
Cooking yield (%)	83.82±0.08^{c}	79.89±0.90^{a}	81.76±0.57^{b}	86.18±0.23^{d}
Proximate composition of mini chevon patties				
Moisture (%)	67.44±0.12^{a}	67.55±0.15^{a}	67.51±0.06^{a}	66.39±0.06^{b}
Protein (%)	21.28±0.16^{a}	21.28±0.07^{a}	21.86±0.08^{b}	22.58±0.20^{c}
Ether extract (%)	7.51± 0.17^{c}	6.58±0.07^{b}	6.38±0.04^{ab}	6.08±0.19^{a}
Total ash(%)	2.89± 0.03^{a}	3.04± 0.02^{b}	3.21±0.05^{c}	3.33±0.02^{d}
Sensory quality of mini chevon patties				
Appearance	7.38±0.11	7.15±0.14	7.16±0.15	7.10±0.12
Flavour	7.13± 0.14^{b}	7.08±0.13^{ab}	6.90±0.12^{ab}	6.73±0.13^{a}
Juiciness	6.93± 0.13	6.80±0.13	6.56± 0.16	6.73±0.11
Texture	7.15± 0.13^{b}	6.83± 0.16^{ab}	6.85± 0.11^{ab}	6.73± 0.11^{a}
Overall acceptability	7.10± 0.12^{b}	7.00±0.13^{ab}	6.95±0.11^{ab}	6.73±0.13^{a}

Means with different superscripts in the same row differ significantly (P<0.05); SSP – Sesame Seed Paste content, fatty acid profile and amino acid profile to find the effect of incorporation of selected level of SSP, if any.

Crude fibre(%) of mini chevon patties

The crude fibre (%) of control and treatment (with 2.8% SSP) chevon patties were 0.62 and 1.62 %, respectively. The selected mini chevon patties containing 2.8% SSP (T2) had significantly (P<0.05) higher percent of crude fiber than the control. This might be due to the high fiber (16%) contents of sesame seed (Elleuch*et al.*, 2007). Presence of crude fiber in the control patties might be due to added non- meat ingredients like binders and seasonings. These findings were in agreement with the results reported by Castillo *et al*. (2018) in sesame paste added hamburger, Sanjivikumar (2011) in turkey nuggets and Indumathi*et al.* (2020) in sesame seed paste incorporated spent broiler breeder hen chicken sausages.

Fatty acid profile of mini chevon patties

Effects of SSP on fatty acid composition for selected level of mini chevon patties is indicated in Table 3. Sesame seed paste as goat fat replacer in the chevon patties had significantly (P<0.05) changed the fatty acid profile of patties. Addition of sesame seed paste improved the lipid profile by reducing the saturated fatty acids and increasing the polyunsaturated fatty acids and ratio of PUFA/SFA. Borchani*et al.* (2010) reported that the sesame paste contained high polyunsaturated to saturated fatty acid ratios. Treatment patties had significantly (P<0.05) higher percent of total poly unsaturated fatty acids (PUFA) and higher ratio of PUFA/SFA when compared to the control. This might be due to presence of high amount of unsaturated and lower amount of saturated fatty acids in sesame seed paste. These findings were in agreement with the results reported by Castillo *et al*. (2018) in sesame added hamburger and Indumathi *et al*. (2020) in sesame seed added chicken sausages. Sesame seed paste addition decreased the saturated fatty acids like myristic acid, palmitic acid, stearic acid in treatment compared to the control. Similarly, Rajkumar and Verma(2018) reported lower stearic (C18:0) and higher oleic (C18:1) acid contents due to replacement of goat fat with vegetable oil in chevon nuggets. Backes*et al.* (2017) found significant reductions in myristic, palmitic, stearic and arachidonic fatty acids in salami containing canola oil compared to control. Linoleic acid and linolenic acid percent in treated chevon patties in the present study increased due to incorporation of sesame seed paste. Similarly, Lee *et al*. (2015) reported reduction in saturated to unsaturated fatty acid ratio in emulsion type pork sausages containing vegetable oil as pork fat replacer.

Amino acid profile of mini chevon patties

Effect of SSP on amino acid profile of mini chevon patties is indicated in Table 4. No significant differences were noticed between the contents of essential amino acids namely histidine, methionine, leucine, lysine, phenyl alanine and valine. These were in agreement with the findings of Morris (2002). In general, lysine, methionine and tryptophan are the three essential amino acids that are most important in evaluating the nutritive quality of a protein (Neilands*et al*., 1949). A deficiency of these amino acids is frequently encountered in natural food materials. Chevon pattiestested in the present study were found to be very good sources of lysine and methionine and the other

Table 3: Effect of incorporation of 2.8% SSP by replacing chevon fat on the fatty acid composition (%) of mini chevon patties

Parameter	Control	Treatment
Myristic acid (C14)	2.249±0.11^{b}	1.522±0.16^{a}
Palmitic acid (C16)	26.104±0.23^{b}	25.110±0.28^{a}
Stearic acid (C18)	18.852±0.04^{b}	17.100±0.10^{a}
Oleic acid (C18:1)	37.276±0.06^{b}	36.379±0.11^{a}
Palmitoleic acid (C16:1)	3.295±0.14^{b}	2.654±0.08^{a}
Linoleic acid (C18:2)	8.916±0.06^{a}	11.418±0.11^{b}
Linolenic acid (C18:3)	3.308±0.09^{a}	5.642±0.09^{b}
Arachidonic acid (C20:4)	0.000±0.00	0.172±0.03^{a}
SFA	47.205±0.38^{b}	43.732±0.54^{a}
MUFA	40.571±0.20^{b}	39.036±0.19^{a}
PUFA	12.224±0.15^{a}	17.232±0.23^{b}
Omega 3 PUFA	3.308±0.09^{a}	5.645±0.09^{b}
Omega 6 PUFA	8.916±0.06^{a}	11.418±0.11^{b}
PUFA/SFA	0.258±0.39^{a}	0.394±0.42^{b}

Means bearing different superscript in a row differ significantly (p<0.05)

Table 4: Effect of incorporation of 2.8% SSP by replacing chevon fat on amino acid composition (g%) of mini chevon patties

Parameter	Control	Treatment
Essential amino acid		
Histidine	16.00±0.91[b]	15.97±0.86 [a]
Leucine	8.62±0.37	8.69±0.24
Lysine	10.25±0.53	10.26±0.36
Methionine	2.76±0.83	2.75±0.72
Phenyl alanine	3.60±0.99	3.59±0.72
Threonine	2.03±0.26[a]	1.98±0.31[b]
Valine	3.20±0.19	3.21±0.18
Tyrosine	4.52±0.27 [a]	5.10±0.12[b]
Non essential amino acid		
Glycine	1.22±0.32	1.42±0.17
Proline	5.15±0.40 [a]	6.01±0.51[b]
Glutamic acid	24.22±0.34	24.55±0.29
Aspartic acid	4.41±0.62	4.45±0.73
Alanine	2.31±0.20	2.36±0.31

Means bearing different superscripts between rows differ significantly (P<0.05)

essential amino acids. Therefore, the above product may be considered tocontain protein of higher nutritive quality. Among the non essential amino acids glutamic acid had the highest concentration followed by proline, aspartic acid, alanine and glycine. A significant difference (P<0.05) was noticed in proline content. There were slight increase in values of non-essential amino acids namely glycine, proline, aspartic acid, glutamic acid and alanine. Eman*et al.* (2004) reported that addition of defattened sesame flour (DSF) to chicken sausage formulation led to increase the contents of these amino acids in the samples due to their relatively high content in DSF.

CONCLUSION

The patties prepared with 2.8% SSP had significantly higher sensory scores compared to patties containing 4.2% SSP. Hence 2.8% SSP with 40% fat replacement was selected for further analysis. The selected level of treatment patties with (2.8%) sesame seed paste showed significantly higher fiber content, better fatty acids profile, PUFA/SFA ratio and amino acid content than the control patties. Thus concluding that incorporation of sesame seed paste at 2.8% level in the chevon patties, will be a better alternative in replacing the chevon fat with healthy fibre content, fatty acid and amino acid profile without affecting its quality and sensory attributes.

REFERENCES

Anita Chappalwar, Pathak V, MeenaGoswami, Verma AK, Rajkumar V (2020) Quality evaluation of low fat chicken patties incorporated with different fat replacers.I. J. of Livestock Research,10(1):14-21.

AOAC (Association of Official Analytical Chemist) (1995). Official Methods of Analysis. 16th Ed, Virginia, USA.

Backes AM, Cavalheiro CP, Stefanello FS, Lüdtke FL, Terra NN and Fries LLM (2017) Chemical composition, microbiological properties, and fatty acid profile of Italian-type salami with pork backfat substituted by emulsified canola oil. Ciência Rural, 47(8).

Banskaleiva V, Sahlu T and Goetsh AL (2000) Fatty acid composition of goat muscle fat depots: Review. Small ruminant research, 37:225-68.

Barbut S and Mittal GS (1992) Use of carrageenans and xanthan gum in reduced fat breakfast sausages. Lebensmittel - Wissenschaft and Technologie, 25:509.

Borchani C, Besbes S, Blecker CH, and Attia H (2010) Chemical characteristics and oxidative stability of sesame seed, sesame paste, and olive oils. J. Agricultural. Science Technology, 12: 585-596.

Castillo Piedad MM, Julio Erica PT, Rodriguez Perez (2018) Evaluation of the effect of the sesame paste (Sesamumindicum) as partial fat substitute in hamburger meat. International J. of Engineering and Technology. 10(1):231-237.

Choi YS, Choi JH, Kim HY, Lee MA, Kim HW, Lee JW, Chung HJ and Kim CJ (2010) Optimization of replacing pork back fat with grape seed oil and rice bran fibre for reduced fat meat emulsion systems. Meat Science, 84(1):212-218.

Cooney RV, Custer LJ, Okinaka L and Franke AA (2001) Effects of dietary sesame seeds on plasma tocopherol levels. Nutrition Cancer, 39: 66-71.

Elleuch M, Besbes S, Roiseux O, Blecker C and Attia H (2007) Quality Characteristics of Sesame Seeds and Byproducts. Food Chem, 103: 641-650.

Eman, Wafaa H and Mohamed GF (2004) Utilization of defatted sesame flour in formulation of chicken sausages and its effect on storage stability and microbial load. Alex. J. Food Science and Technology, 1(2):31-38.

Hughes E, Cofrades S, Crockford D and Troy DJ (1995). Irish J. Agricultural and Food Research, 34(2):211.

Indumathi J, Shashikumar M, VijayaBhaskar Reddy, JagadeeshBabu and Gnana Prakash M (2020) Influence of incorporation of ground sesame seed as fat replacer on the functionality of spent broiler breeder hen chicken sausages. J. of Pharmacognosy and Phytochemistry, 9(5):676-682.

Keeton J (1983) Effects of fat, NaCl and phosphate levels on the chemical and sensory properties of pork patties. J. Food Science, 48: 878-881,885.

Keeton JT (1994) Low fat meat products - Technological problems with processing. Meat Science, 36:261.

Lee HJ, Hee JE, Hwa LS, Hee KJ, Joon LJ and Choi Yang-II (2015) Effect of replacing pork fat with vegetable oils on quality properties of emulsion type pork sausages. Korean J. Food Science, 35(1): 130-136.

Mahgoub O, Khan AJ, AL-Sabahi JN, Annamalai K and AI – sakry NM (2002) Fatty acid composition of muscle and fat tissue of Omani Jebel Akhdar goats of different sexes and weights. Meat science, 61:381-387.

Morris JB (2002) Food industrial nutraceutical and pharmaceutical uses of sesame genetic resources, chapter, ASHS Press, Editors: J. Janick, A. Whipkey:153-156.

Murphy W, Criner PE and Grey BC (1975). Comparison of methods for calculating retension

Neilands JB, Sirny RJ, Sohljell I, Strong FM and Elvehjem CA (1949) The nutritive value of canned foods. II Amino acid content of fish and meat products. J. of Nutrition, 39: 187-202.

Ney KH (1988) Sensogamme, einemethodischeerweiterung der aromagramme. Gordian, 88:19. Cited from Akoh, 1998.

O'Fallon JV, Busboom JR, Nelson ML and Gaskins CT (2007) A direct method for fatty acid methyl ester synthesis: Application to wet meat tissues, oils and feedstuffs. J. of Animal Science, 85(6):1511-1521.

Pietrasik Z and Janz JAM (2010) Utilization of pea flour, starch rice and fibre rich fraction in low fat bologna. Food Research International, 43(2):602-608.

Popkin BM, Adair LS and Ng SW (2012) Global nutrition transition and the pandemic of obesity in developing countries. Nutrition reviews, 70:3-21.

Prince A, Diaz P, Banon S and Garrido MD (2013) Natural extracts versus sodium ascorbate to extend the shelf life of meat-based ready to eat meals. I. Food science and Technology, 19:427-438.

Rajkumar V and Verma AK (2018) effect of replacement of goat fat with vegetable oil on the quality of chevon nuggets. Indian J. of Small Ruminants, 24(2):321-328.

Sanjeewa WGT, Wanasundara JPD, Shand PJ (2010) Physical Textural and sensory properties of low fat bologna with added chickpea flour. Presented at: Institute of food technol annual meeting, from 28 june-1 july, new Orleans, L.A, Poster:134-12.

Sanjivikumar (2011) Effect of incorporation of sesame seed (Sesamumindicum) paste on the quality of turkey meat nuggets. M.V.SC Thesis submitted to Rajiv Gandhi College of Veterinary and Animal Sciences, Puducherry.

Sasawat T, Lee HC, Singh P, Hall N and Iksoon K (2015) Quality and sensory characteristics of low-fat hamburger patty prepared with a wheat-based protein (WP). Meat Science . volume 101, 118-119.

Snedecor GW and Cochran WG (1994) Statistical methods. The Iowa state University Press, Iowa.

Verma AK, Sharma BD and Banerjee R (2010) Effect of sodium chloride replacement and apple pulp inclusion on the physicochemical textural and sensory properties of low fat chicken nuggets. LWT- Food science technology, 43:715-719.

Verma AK; Rajkumar V and Kumar S (2019). Effect of amaranth and quinoa seed flour on rheological and physicochemical properties of goat meat nuggets.Journal of Food Science and Technology, 56: 5027-5035.

Zhu Y, Peng Z, Wang M, Wang R, Rui L (2012) Optimization of extraction procedure for formaldehyde assay in smoked meat products. J. of food composition and analysis.

Zhuang X, Han M, Kang ZL, Wang K, Bai Y, Xu XL and Zhou GH (2016) Effects of the sugarcane dietary fiber and pre-emulsified sesame oil on low-fat meat batter physicochemical property, texture, and microstructure. Meat Science, 113:107-115.