Appraisal of value added goat meat spread application method

Raziuddin. M[*1], R. Narendra Babu[2], R. Ramani[3]

Department of Livestock Products Technology (Meat Science),
Madras Veterinary College, Chennai-600007,
Tamil Nadu Veterinary and Animal Sciences, University,
Tamil Nadu, INDIA

[1*]Assistant Professor, Department of Livestock Products Technology, College of Veterinary and Animal Sciences, MAFSU, Udgir-413517 (MS). India. E-Mail ID: dr_razi@rediffmail.com and Mobile No. 7588062558 (Corresponding Author)

[2]Professor & Head, Department of Livestock Products Technology (Meat Science), Madras Veterinary College, TANUVAS, Chennai-600007. (TN) India. E-Mail ID: narendrababu.r@tanuvas.ac.in

[3]Assistant Professor, Department of Livestock Products Technology (Meat Science), Madras Veterinary College, TANUVAS, Chennai -600 007. (TN) India.E-Mail ID: blessmer@gmail.com

Abstract

In this experiment different spreading techniques are used to enhance the quality of products as a healthier alternative to modifying individuals' food choices. Effects of different spreading techniques viz. T1- application of goat meat spread on bread slice and T2- Application of first butter and then goat meat spread on sensory quality along with quantity of meat spread required for one serve. Highly significant (P≤0.01) increase in sensory quality in respect to all the sensory attributes except spreadability and adhesive ability after spreading of butter and then goat meat spread. However, not only it enhances the test of products but also little quantity of goat meat spread was required to serve on bread slice. On the basis of result it could be concluded that using of first butter and then goat meat spread on bread slice enhanced the sensory quality.

***Keywords*: Spread, Butter, Sensory quality and physic-chemical quality**

Introduction

It is commonly known that goat meat has a very high nutritional value. Although meat is a poor source of calcium, it is a great source of iron, phosphorus, and several B-complex vitamins (thiamine, riboflavin, niacin, pyridoxine, and cobalamine). The amino acids found in goat meat are similar to those needed for human tissue growth and maintenance. After cooking, the flesh from a spent goat is hard, fibrous, and dark brown. It also loses texture, flavour and juiciness of meat. Due to its higher myoglobin concentration, spent meat has a dark red colour. As an animal age, its flesh becomes tougher, which not only thickens the muscle fibres but also raises the collagen's tensile strength to levels that are nearly equal to those of collagen from older animals with non-reducible intermolecular cross-links. By reducing the muscle fibres and collagen fibres to tiny particles through mincing and chopping, it is possible to effectively utilise used goat meat and prepare it for a variety of products with additional value.

The snack sector, which often includes bakery goods, ready-to-eat mixes, chips, pretzels, crackers, cookies, bars, namkeen, and other minimally processed ready-to-eat foods, can satisfy temporary hunger. Most market snacks are made of cereal, are high in calories, and lack essential amino acids including tryptophan, threonine, and lysine (Jean *et al.,* 1996). Spreads can enhance the flavour and/or texture of food. In the Indian convenient snack market, there are numerous such products as cheese spread, mayonnaise, jam, and jelly. However, spreadable meat product is not very common yet among Indian consumers. Spreads are used to enhance the flavour and/or texture of food. On the Indian market for handy snacks, there are numerous such products like cheese spread, mayonnaise, jam, and jelly.

The butter should have a smooth consistency to make it simple to spread and me\ in the mouth. butter contains 80 % fat and 16 – 18 % moisture, basically depending on whether it is salted or not. Butter also naturally contains the Vitamins A and D. The colour of butter varies with the content of carotenoids, which make up from 11 to 50 % of the total vitamin A activity of milk. As the carotenoid content of milk normally fluctuates between winter and summer, butter produced in the winter period has a brighter colour. Butter should also be dense and taste fresh. The

water content should be dispersed in fine droplets so that the butter looks dry. Ideally a good spread is soft enough that there is little resistance to applied deformation but strong enough that it maintains its shape and doesn't run-off the surface it has been spread onto Present study was conducted to identify the best technique of application of value added goat meat spread on bread which present in good qualities spread.

Material and methods

The study was conducted in the Department of Livestock Products Technology (Meat Science), Madras Veterinary College, TANUVAS, Chennai-600007 (TN) in the year 2021-22. Spent goat meat samples required for the study were procured from local market at Vepery, Chennai-07. After being chilled for 24 hours at 4±1°C, the meat was deboned. The meat was twice minced in a meat mincer through a 4.5 mm sieve after being freed of all visible fat, fascia, and connective tissue. Minced meat was conditioned for nearly 24 hours after being packaged in a colourless low density polyethylene (LDPE) bag at 4±1°C in a refrigerator and then maintained at -18±1°C. The meat was thawed for 12 hours at 4±1°C prior to product production.. The condiment paste of onion, garlic and ginger in the ratio of 3:2:1 was used. Spice ingredients, procured from the local market were dried at 50 ± 1°C for 4 hr. in a hot air oven. The ingredients were finely crushed, sieved, then added in predetermined ratios as specified by Table 1 suggested by (Raziuddin *et al.* 2021).

Processing of meat spread

The present study was carried out to study the different spreading techniques of goat meat spread on bread. The items in (Table-2) were cooked using the braising technique according to Raziuddin *et al.,* (2020). The developed value added goat meat spread were used to spread on bread by different techniques T1- application of goat meat spread and T2-first application of butter (AMUL salted butter) and then meat spread was analyzed on the basis of sensory evaluation and amount of spread required to serve.

Process protocol of value added goat meat spread:

Salt, spices and other ingredients were mixed into the cooked goat meat. Mixing the ingredients completely and cooked by braising (85 $\pm$ 2°C for12 min). Cooling and adding honey in final product and grinding for 3-4 min. to get fine paste like consistency. Product was stored at ambient temperature till evaluation.

Products Analysis:

A. Physico-chemical analysis

1. Determination of Cooking Yield

The Verma *et al.* (2012) described methodology was used to calculate product yield. Equation and weights before and after heating were used to determine the product yield.

$$\text{Cooking yield \%} = \frac{\text{Weight of product after cooking}}{\text{Weight of product before cooking}} \times 100$$

2. pH

A pre-calibrated digital pH metre was used to determine the pH of the product slurry. (Cyberscan pH 510, Merck). According to the method described by Trout *et al.,* (1992)the slurry was made by homogenising 5g of sample with 45 ml of distilled water in a lab blender for one minute.

3. Spreadability

The gel's spreadability was determined using the following method (Bachhav and Patravale, 2009): A circle of 1 cm diameter was premarked on which 0.5 g gel was deposited and a glass plate over which a second glass plate was placed. A weight of 500 g was allowed to rest on the upper glass plate for 5 min. The spreading of the gel caused an increase in the diameter.

B. Textural profile analysis

Texture profile analysis was carried out using a Stable Microsystems Texturometer (Stable System Ltd., England, UK) model TX_HD plus texture analyser attached to a software texture expert system. The texture profile was analysed as per the procedure outlined by Bourne (1978). Triplicate samples in each trial were compressed twice to form a two work force compression curve. A cylindrical probe of 25 mm (P/25) diameter was used and the load cell capacity was 500 kg with a load range of 0-500 kg at cross head and char speed of 50 mm/min. Distance between probe

and base is calculated according to the height of the product such that the probe compresses half of the product. The pre-test, test and post-test speed were 1 mm/sec, 5 mm/sec respectively.

C. Sensory Evaluation

The sensory evaluation of the spread was conducted using a nine-point descriptive scale (Keeton, 1983) wit'-ominor modifications, with 9 indicating excellent and 1 indicating extremely poor. Total 15 judges were used as a sensory panellist consisted of Professors and Postgraduate students of the Livestock Products Technology Division (Meat Science) of Madras Veterinary College. Fresh goat meat spread along with bread was served to the panellists. The panellists assessed the samples based on their overall appearance, flavour, spreadability, texture, aftertaste, adhesive ability, and acceptability.

D. Proximate Analysis

The moisture, crude fat, crude protein, and total ash of the value added goat meat spread were determined using the Association of Official Analytical Chemists' standard techniques (AOAC, 2012).

E. Determination of calcium

Samples were analysed for the estimation of calcium content using (The Agilent Technologies 720 series). Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES)

1. Digestion of samples

The samples were digested by wet digestion method for the analysis of calcium by following the procedure of Jankeaw *et al*. (2015). One gram of sample was taken in 25 ml glass screw cap test tube. 5 ml of 69 % concentration of nitric acid (Sigma aldrich) was added to the samples and kept in water bath at 80 ˚C for 15 minutes. After that the test tubes were cooled to room temperature for 10 minutes and kept in hot air oven at 135 ˚C for 3 minutes. After cooling them to room temperature 1 ml of 30 % hydrogen peroxide solution was added to the contents and filtered through Whatman No. 1 followed by Whatman No. 42 filter paper separately. The extracted solution was quantitatively transferred into a 50 ml volumetric flask and the volume was made upto the mark (*i.e* 50 ml) with millipore water and immediately used for calcium analysis.

2. Quantitative determination

Calcium content of goat meat spread was determined at 396.847 Wavelength (nm) and recorded directly from the analysis scale of ICP and was calculated by the following equation according to ASTM, (2002).

Calcium content (mg/100 gm) = R x D/W

Where:

R= Reading of elemental concentration from the digital scale of ICP system

D = Dilution of prepared sample

W = Weight of the sample

F. Statistical Analysis

All the experiments were replicated six times (n-6), and the data generated was analyzed by statistical methods viz. Independent sample T test, mean ± S.D using SPSS software package developed as per the procedure of Snedecor and Cochran, 1995.

Result and discussion

A. Physico-chemical and nutritional quality of value added goat meat spread

It was depicted from Table 3. the pH, Cooking yield, Spreadability, Water activity and Hardness of developed value added spent hen meat spread were 5.87, 85.66, 3.15, 0.960 and , 24.17 whereas the nutritional quality of value added goat meat spread for Moisture, Protein, Fat, Ash and Calcium were 66.33, 20.99, 3.87, 3.38 and 29.00

B. Sensory quality of value added goat meat spread with different techniques

Sensory attributes in respect to appearance, flavour, texture, after taste and overall acceptability score was increased highly significant ($P<0.01$) after first butter and then value added goat meat spread on bread as compared to only goat meat spread. It might be due to the colour and taste of butter along with goat meat spread observed in plate 2. All the judges scored well and like to the first butter and then value added goat meat spread on bread in respect to appearance, flavour, texture, after taste and overall acceptability score. Further, the score for spreadability and adhesive ability was decreased highly significant ($P<0.01$)) after first butter and then value added goat meat spread on bread as compared to only goat meat spread. It might be due to the spread of butter on bread which reduces the spreadability and adhesive ability of value added goat meat spread.

C. Quantity of meat spread required for one serve

Developed goat meat spread required 9.65 gm per slice of bread (T1) and 5.12 gm butter and 6.74 gm goat meat spread on bread (T2). The data mention in Table 5. depicted more goat meat spread required to spread per slice of bread as compared to other treatment. This could be due to the only spread of goat meat spread as compared to butter and spread. Not only smallest amount of spread required in T2 treatment but also it enhance the test of spread due to the use of butter.

Conclusion: On the basis of observation it could be concluded that use of butter before spread of developed goat meat spread on bread enhanced the value of product.

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Conflicts of interest

The authors state that the publishing of this paper does not include any conflicts of interest.

Ethics approval

Not Applicable

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Table 1: Composition of spice mix for goat meat spread

Sr. No.	Ingredients	% in the mix
1.	Coriander powder (Dhania)	25.0
2.	Cumin seeds (Zeera)	12.0
3.	Dried ginger (Sont)	10.0
4.	Aniseed (Soanf)	10.0
5.	Black pepper (Kali mirch)	10.0
6.	Caraway seed (Ajowan)	05.0
7.	Turmeric (Haldi)	05.0
8.	Capsicum (Mirch powder)	08.0
9.	Cardamom (Badi elaichi)	05.0
10.	Cinnamon (Dal chini)	05.0
11.	Cloves (Laung)	03.0
12.	Nutmeg (Jaiphal)	01.0
13.	Mace (Jaipatri)	01.0

Table 2: Formulation for the processing of value added goat meat spread

Ingredients	Percentage
Spent goat meat	48.3
Salt	2.23
Spice mix	1.47
Skimmed milk powder	1.86
Condiments	5.95
Corn starch	2.97
Paprika	1.0
Honey	3.0
Butter	3.0
Water	30.22

Table 3: Mean values of Physico-chemical and nutritional quality of value added goat meat spread

Physico-chemical quality				
pH	**Cooking yield (%)**	**Spreadability (cm)**	**Water activity**	**Hardness (g)**
5.87	85.66	3.15	0.960	24.17
Nutritional quality				
Moisture (%)	**Protein (%)**	**Fat (%)**	**Ash (%)**	**Calcium (mg/100 g)**
66.33	20.99	3.87	3.38	29.00

Table 4: Mean ± SD values of Sensory quality of goat meat spread with different methods of application

Treatment	Sensory Quality						
	Appearance	Flavour	Spreadability	Texture	After Taste	Adhesive Ability	Overall Acceptability
T1	7.60 ± 0.59b	7.10 ± 0.788b	8.20 ± 0.83a	7.05 ± 0.75b	7.10 ± 0.55b	8.15 ± 0.74a	7.25 ± 0.71b
T2	8.25 ± 0.71a	8.40 ± 0.753a	6.70 ± 0.86b	8.10 ± 0.71a	8.35 ± 0.67a	6.85 ± 0.74b	8.35 ± 0.58a
't' Value	-3.115**	-5.331**	5.586**	-4.493**	-6.432**	5.517**	-5.311**

(n=6)

T1: Application of meat spread
T2: First application of butter and then meat spread
Means bearing different superscripts within columns (a and b differ significantly $P \leq 0.05$; NS- $P \geq 0.05$; *- $P \leq 0.05$; **- $P \leq 0.01$

Table 5: Mean quantity of meat spread required for one serve

Different methods	Quantity Required (gm/Slice)	
	Butter	Meat Spread
T1	Nil	9.65
T2	5.12	6.74

T1: Application of meat spread
T2: First application of butter and then meat spread

Plate 1: Application of goat meat spread on bread

Plate 1: First application of butter and then goat meat spread