

Quality and acceptability of tripe pickles from goat and buffalo rumen meat

M. ANNA ANANDH

Rumen meat otherwise known as tripe is one of the important edible animal by product and the material offers good scope for processing in the products. Traditional styled pickles were prepared from goat and buffalo tripe and were studied for various physico-chemical, microbial and sensory qualities. Significantly ($P < 0.05$) higher titrable acidity (% acetic acid), TBA value and fat percentage were observed in goat tripe pickles as compared to buffalo tripe pickles. pH, product yield, moisture and protein contents were significantly ($P < 0.05$) higher in buffalo tripe pickles as compared to goat tripe pickles. Total plate, coliform and yeast and mould counts of goat tripe pickles were higher as compared to buffalo tripe pickles and values did not differ significantly between them and were within the standards specified for cooked meat products. All sensory scores were significantly ($P < 0.05$) higher for goat tripe pickles as compared to buffalo tripe pickles. Therefore, it can be concluded that traditional styled tripe pickles prepared from goat and buffalo tripe had better physico-chemical, microbial qualities and sensory scores were rated moderately to highly acceptable.

Key Words : Goat, Buffalo, Rumen, Tripe, Pickles, Quality, Acceptability

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INTRODUCTION

Food animals are slaughtered mainly for meat, the by products that are emanated from slaughtered animals are also of good value. Rumen musculature otherwise called as 'tripe' and colloquially called as 'Butt' or 'Potti', is one of the important edible offal with substantial yield and it accounts for 2.8 and 1.3 per cent of slaughter weight of goat and buffalo, respectively. Development of value added products from tripe is very limited because its inherent toughness due to high collagen content, off odors, poor functional properties and shelf-life. In India most of the tripe is underutilized or thrown as waste because of socio-cultural factors and lack of technology. To overcome this disposal problem and to find means of better

utilization, very few attempts have been made to develop value added products exclusively from tripe (Anna Anandh *et al.*, 2008).

Pickling of meat is an alternative method to develop a low cost shelf stable meat product in the market (Gadekar *et al.*, 2010). Pickling help to improving desirable characteristics like taste flavour and texture along with preservative effect. Pickling also helps in improving desirable characteristics like taste, flavour and texture along with preservative effect. Therefore, in order to diversify the available product range, the cost effective recipe for goat and buffalo tripe pickles were standardized and their quality characteristics were evaluated.

METHODOLOGY

Goat and buffalo tripe:

Fresh goat and buffalo tripe obtained from local meat market. The fat and adhering extraneous materials on

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the surface of tripe were removed by knife and it was cut in to small chunks of about 2.5 cm. The tripe meat has typical off – odour reminiscent of ingesta. Hence, the materials has to be suitably treated to reduce, eliminate such off - odour prior to its used for preparation in to products by immersion in 5 per cent trisodium phosphate solution for 30 min was used as per standard procedure (Anna Anandh *et al.*, 2008).

Spices and condiments mix :

Dry spices *viz.*, aniseed (10%), black peper (10%), capsicum (8%) caraway seed (10%), cardamams (5%), cinnamum (4%), cloves (1%), coriander (20%), cumin seed (22%) and turmeric (10%) were cleaned to remove the extraneous materials and dried in oven at 50° C for 4 h. The ingredients were ground in a grinder and sieved through a fine mesh. For preparation of condiments mix, fresh garlic and ginger were procured from the local market and were peeled of the external covering. The required quantities were cut in to small bits and mixed in a laboratory blender to a fine paste.

Product formulation:

The formula for tripe pickles was developed after conducting a series of preliminary trials. The fried tripe product formulation consisted of deodorized tripe pieces 100.0 per cent, spice mixture-2.0 per cent, red chilli powder-4.0 per cent, garlic paste-5.0 per cent, ginger paste-5.0 per cent, Jeera-1.0 per cent, mustard seeds-1.0 per cent, asafetida-1.0 per cent, fenugreek seeds-1.0 per cent, salt-2.5 per cent, turmeric-2.5 per cent, Vinegar-10.0 per cent and gingili oil 50 per cent.

Process schedule for preparation of tripe pickles:

The deodorized tripe pieces were mixed with turmeric powder and marinated for 1 hr at 5 ± 2 °C for uniform dispersion. Then the tripe pieces were pressure cooked at 15 psi for 10 min and then used for preparation of pickles. The pressure cooked tripe pieces were deep fried in heated gingili oil till golden brown colour appeared and were kept separately. The mustard seeds, fenugreek seeds, condiments, red chilli powder and spice mix were shallow fried in the remaining gingili to get the “golden brown stage”. Salt and fried tripe pieces was added to it and allowed to boil for two min. Then, vinegar was added to make a broth and heated with high constant stirring till boiling started. The pickles were allowed to cool to room

temperature. After cooling the tripe pickles were packed in the polyethylene terephthalate (PET) 100 g bottles and stored at 32 ± 2 °C. The products were evaluated the various physico-chemical parameters, microbial profile and sensory attributes on a 9 - point hedonic scale after 7 days maturation period.

Physico-chemical characteristics analysis:

The pH of tripe pickles were determined by using digital pH meter (Century Instruments Ltd., India). The weight of pickles products were recorded before and after pickling and the yield was calculated (product yield = weight of pickles / weight of raw products \times 100) and expressed as percentage. Procedure of APHA (1984) was used for estimation of titrable acidity (% acetic acid). The procedure of Witte *et al.* (1970) was followed to estimate thiobarbituric acid value (TBA). The moisture, protein and fat contents of tripe pickles were determined by standard methods using hot air oven, kjeldahl’s assembly and soxhlet ether extraction apparatus, respectively (AOAC, 1995).

Microbial profile:

Total plate, coliform, yeast and mold of freshly prepared tripe pickle samples were determined by the methods described by APHA (1984). Readymade media (Hi-media Laboratory Pvt. Ltd., Mumbai, India) used for enumeration of microbes. Preparation of samples and serial dilutions were done near the flame in a horizontal laminar flow apparatus which was pre sterilized by ultraviolet irradiation by observing all possible aseptic precautions. 10 fold dilutions of each sample were prepared aseptically by blending 10 g of sample with 10 ml of 0.1 per cent sterile peptone water with a pre sterilised blender. Plating medium was prepared by dissolving 23.5 g of plate count agar in 1 lit of distilled water and pH was adjusted to 7.0 ± 0.2 . Media was autoclaved at 15 lb pressure for 15 min before plating. The plates were incubated at 30 ± 1 °C for 48 h for total plate count. Coliform count was detected using 41.5g of Violet Red Bile Agar and plates were incubated at 37 ± 1 ° C for 48 h. 60.5 g of potato Dextrose Agar was used for enumeration of yeast and mold count and the plates were incubated at 25 ± 1 °C for 5 days. The plates were incubated at 37 ± 1 °C for 48 hr. Following incubation, plates showing 30-300 colonies were counted. The average number of colonies for each species was expressed as

\log_{10} cfu / g sample.

Sensory evaluation:

Sensory evaluation was conducted with semi-trained panelists. Goat and buffalo tripe pickles were served to the panelists. The sensory attributes like appearance and colour, flavour, juiciness, tenderness, saltiness, sourness and overall palatability were evaluated on 9 - point descriptive scale (where in 1 - is extremely undesirable and 9 - is extremely desirable).

Data analysis:

The experiment was repeated four times. The data generated from each experiment were analyzed statistically by following standard procedures (Snedecor and Cochran, 1989) for comparing the means and to determine the effect of treatment.

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Physico-chemical characteristics of goat and buffalo tripe pickles:

Physico-chemical parameters of goat and buffalo tripe pickles prepared by traditional style are presented in Table 1. Overall mean for pH value was 4.15 ± 0.12 . The mean pH values were 3.46 ± 0.12 and 4.84 ± 0.12 for goat and buffalo tripe pickles, Mean pH value was

significantly ($p < 0.05$) higher for buffalo tripe pickle as compared to goat tripe pickles. Higher pH values of fried buffalo tripe pickles might be due to higher pH of fresh buffalo tripe as compared to goat tripe. The pH reduction in pickles could be attributed to the addition of acetic acid and its absorption into the meat muscle through capillary forces by pressure gradient exerted by internal deformation of the meat (Gault, 1985). Overall mean for pickled product yield was 89.15 ± 0.14 . The mean pickled product yield values were 80.16 ± 0.11 and 98.10 ± 0.15 for goat and buffalo tripe pickles. Mean pickled product yield was significantly ($P < 0.01$) higher for buffalo tripe pickles as compared to goat tripe pickles. Low product yield of goat tripe was due to higher cooking loss in goat tripe. This might be due to very low water holding capacity and comparatively poor functional and binding properties of fresh goat tripe as compared to buffalo tripe (Anna Anandh *et al.*, 2008). Overall mean for titrable acidity value was 0.74 ± 0.12 . The mean titrable acidity (% acetic acid) values were 0.84 ± 0.10 and 0.62 ± 0.12 for goat and buffalo tripe pickles. The mean titrable acidity value was significantly ($p < 0.05$) higher for goat tripe pickle as compared to buffalo tripe pickle. This difference was due to critical absorption of acetic acid into the meat muscle. Similar observation was also made by Sahu *et al.* (2012). Overall mean for TBA value was 0.44 ± 0.13 . TBA values for goat and buffalo pickles were 0.55 ± 0.16 and 0.32 ± 0.18 mg malonaldehyde / kg meat. There was a significant ($p < 0.05$) higher TBA values was observed in goat tripe pickles as compared to buffalo tripe pickles

Table 1 : Physico-chemical characteristics of goat and buffalo tripe pickles (Mean \pm S.E)

Parameters	Goat tripe pickles	Buffalo tripe pickles	Overall mean
pH	3.46 ± 0.12^a	4.84 ± 0.10^b	4.15 ± 0.12
Product yield (%)	80.16 ± 0.1^a	98.10 ± 0.15^b	89.15 ± 0.14
Titrable acidity (% acetic acid)	0.84 ± 0.10^a	0.62 ± 0.12^b	0.74 ± 0.12
TBA value (mg malonaldehyde / kg)	0.55 ± 0.16^a	0.32 ± 0.18^b	0.44 ± 0.13
Moisture (%)	57.22 ± 0.10^a	68.12 ± 0.14^b	62.68 ± 0.12
Protein (%)	17.81 ± 0.24^a	18.14 ± 0.16^b	17.90 ± 0.20
Fat (%)	14.68 ± 0.12^a	11.15 ± 0.11^b	12.90 ± 0.11

Number of observations: = 4

Means bearing different superscripts row- wise differ significantly ($P < 0.05$).

Table 2 : Microbial profile (\log_{10} cfu/g) of goat and buffalo tripe pickles (Mean \pm S.E)

Microbial profile (\log_{10} cfu/g)	Goat tripe pickles	Buffalo tripe pickles	Overall mean
Total plate count	2.58 ± 0.14^a	2.24 ± 0.10^b	2.38 ± 0.12
Coliform count	1.28 ± 0.12	1.24 ± 0.18	1.26 ± 0.15
Yeast and mould count	1.72 ± 0.10^a	1.92 ± 0.12^b	1.82 ± 0.12

Number of observations: = 4

Means bearing same superscripts row- wise do not differ significantly ($P < 0.01$).

Table 3 : Sensory attributes goat and buffalo tripe pickles (Mean ± S.E)

Parameters*	Goat tripe pickles	Buffalo tripe pickles	Overall mean
Appearance and colour	8.52±0.12 ^a	7.42±0.18 ^b	7.98±0.16
Flavour	8.90±0.12 ^a	7.92±0.14 ^b	8.42±0.14
Juciness	7.60±0.10	7.20±0.12	7.40±0.12
Tenderness	8.78±0.18 ^a	7.10±0.14 ^b	7.94±0.16
Saltiness	7.50±0.15	7.42±0.12	7.46±0.14
Sourness	7.90±0.13	7.58±0.12	7.74±0.13
Overall acceptability	8.20±0.14 ^a	7.44±0.14 ^b	7.82±0.14

Number of observations: = 20

*Sensory attributes of fried tripe products were evaluated on a 9 – point descriptive scale (wherein 1 = extremely undesirable; 9 = extremely desirable).

Means bearing different superscripts row- wise differ significantly (P<0.01).

but the values remained well within the threshold limit of limit of 1-2 mg malonaldehyde / kg of meat product (Watts, 1962). A positive correlation between microbial load and TBA value was reported. Increase of microbial load in meat samples caused increased oxidative charges (Jay, 1996).

Overall mean for moisture, protein and fat value were 62.68±0.12, 17.90±0.20 and 12.90±0.11, respectively. The mean moisture, protein and fat content values were 57.22±0.10 and 68.12±0.14, 17.81±0.24 and 18.14±0.16 and 14.68±0.12 and 11.15±0.11 for goat and buffalo tripe pickles, respectively. Moisture content was significantly (p<0.05) lower in goat tripe pickles as compared to buffalo tripe pickles. This lower moisture content of the goat tripe pickles might be due to lower water holding capacity of goat tripe as compared to buffalo tripe meat (Anna Anandh *et al.*, 2008) and also may be due to the more evaporation of water during cooking. Higher protein content value was observed in buffalo tripe pickles as compared to goat tripe pickles. The protein content of goat and buffalo tripe products also differed significantly between them. The variation may be due to protein content of goat and buffalo tripe (Anna Anandh *et al.*, 2008). Significantly (p<0.01) increased fat content value observed in goat tripe pickles as compared to buffalo tripe pickle. The variation might be due to due to drastic reduction of moisture content (Wani and Majeed, 2014) and addition of oil during pickle processing and absorption of fat during frying in oil (Jindal and Bawa, 1988).

Microbial profile of goat and buffalo tripe pickles:

Microbial profiles of goat and buffalo tripe products prepared by traditional style are presented in Table 2. Overall mean for total plate count, coliform count and yeast and mould count were 2.38 ± 0.12, 1.26 ± 0.15 and

1.82 ± 0.12, respectively. The mean total plate count, coliform count and yeast and mould count were 2.58±0.14 and 2.24±0.10, 1.28±0.12 and 1.24±0.18 and 1.72±0.10 and 1.92±0.12 for goat and buffalo tripe pickles, respectively. Higher microbial counts were observed in goat tripe pickles as compared to buffalo tripe pickles. However, there was no significant difference between goat and buffalo tripe pickles and the microbial counts were within the standard stipulated for cooked meat products (Jay, 1996).

Sensory characteristics of goat and buffalo tripe pickles:

Sensory attributes of goat and buffalo tripe pickles prepared by traditional style are presented in Table 3. The sensory attributes score for appearance and colour, flavour, tenderness and overall acceptability were significantly (p<0.05) higher for goat tripe pickles as compared to buffalo tripe pickles. However, juciness, saltiness and sourness scores between goat and buffalo tripe pickles were non-significant and the scores slightly higher in goat tripe pickles. Among tripe pickles, a goat tripe pickle was rated to very acceptable and buffalo tripe product was rated moderately to very acceptable.

Conclusion :

Based on the results of physico-chemical parameters, microbial profile and sensory attributes, it can be concluded that goat and buffalo tripe can be successfully used for value addition into preparation traditional styled tripe pickles with acceptable physico - chemical, microbial and sensory characteristics.

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