

## **EFFECT OF TENDERIZING AGENTS ON QUALITY AND ORGANOLEPTIC CHARACTERISTICS OF TRADITIONAL STYLED GOAT RUMEN MEAT CURRY**

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**Abstract:** Traditional styled goat rumen meat curry were prepared by using 0.05% papain and 5% ginger extract and were studied for various physico-chemical and sensory characteristics. Significantly ( $p < 0.01$ ) higher pH, product yield, moisture and fat percentage were observed in ginger treated goat rumen meat curry as compared to papain treated goat rumen meat curry. Protein content of goat rumen meat curry did not differ significantly between ginger extract and papain treated traditional goat rumen meat curry. All physico-chemical qualities were better for papain treated traditional styled goat rumen meat curry as compared to ginger extract treated traditional styled goat rumen meat curry. Sensory scores for papain treated traditional styled goat rumen meat curry was rated moderately to very acceptable and ginger extract treated traditional styled goat rumen meat curry was rated moderately acceptable. Therefore, it can be concluded that, 0.05% papain appeared to be more suitable for preparation of traditional styled goat meat curry followed by 5% ginger extract.

**Keywords:** Goat, rumen meat, tripe, ginger extract, papain, traditional, meat product, quality

### **Introduction**

Food animals are slaughtered mainly for meat, the by-products that are obtained from slaughtered animals are also of good value. Rumen meat is one of the high proteinnacious by product obtainable from slaughter house. Rumen musculature otherwise called as ‘tripe’ and colloquially called as ‘*potti*’, is one of the important edible offal with substantial yield and the yield of rumen meat was reported to be ranging from 0.28 to 0.77 with mean value of 0.53 kg in goats. Development of value added products from goat rumen meat is very limited because its inherent toughness due to high collagen content, off odors, poor functional properties and shelf life. The material offers good scope for processing in the products, subject to successfully overcoming these limitations. In India most of the goat rumen meat 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 rumen meat (Anna Anandh et al., 2008). Some attempts have been made to utilize rumen meat as partial substitute for lean meat in the preparation of comminuted meat products (Anjaneyulu and Kondaiah, 1990). It is observed that in Indian household utilized the rumen meat for preparation of potti curry and potti fry. Taking a clue from this practice and in order to diversify the available product range, a study was conducted to assess the ginger extract and papain on quality and acceptability of traditional styled goat rumen meat products.

### **Materials and Methods**

**Goat rumen meat:** Fresh goat rumen meat obtained from local meat market. The fat and adhering extraneous materials on the surface of goat rumen meat were removed by knife and it was cut in to small chunks of about 2.5 cm. The time lag between the slaughter of the animal and the commencement of the experiment was about 3 h. The goat rumen 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% tri sodium phosphate solution for 30 min was used as per standard procedure (Anna Anandh et al., 2008).

**Ginger extract:** Fresh ginger was purchased from local market. The ginger was peeled, sliced, ground in a mortar with pestle and squeezed through two layer of cheese cloth to produce a crude ginger extract. The yield of crude extract was approximately 50% of the peeled ginger. For 5.0% ginger extract, 5 ml of ginger extract was dissolved in 5 ml distilled water and the mixture was sprayed on 100 gm of meat.

**Papain :** Readily available papain enzyme powder procured from a standard firm was used in this study. For 0.05% papain treatment, 0.05 gm of papain powder was dissolved in 10 ml distilled water and the mixture was sprayed on each 100 gm of meat chunks.

**Spices and condiments :** Dry spices viz. aniseed (10%), black pepper (10%), capsicum (8%) caraway seed (10%), cardamoms (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 onion, 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 and process schedule:** The formula for traditional styled goat rumen meat curry was developed after conducting a series of preliminary trials. traditional styled

goat rumen meat curry formulation consisted of pressure cooked tripe pieces 100%, spice mixture 5.0%, table salt 2.5%, turmeric 2.5%, condiments mix 6.0% (onion, ginger and garlic paste in the ratio of 2: 3: 1) and refined oil 15%. The goat rumen meat pieces were tenderized with concentration of papain 0.05% (treatment I), ginger extract 5.0% (treatment II). The required concentration of papain and ginger extract were dissolved with distilled water (10 ml) and sprayed on 100 gm of goat rumen meat product pieces. For control only 10 ml of distilled water was used. The deodorized goat rumen meat pieces were pressure cooked at 15 psi for 10 min and then used for preparation of traditional styled goat rumen meat product. The spices and condiments were shallow fried in oil to get the “golden brown stage” of spices-condiments mixture and then pre-cooked goat rumen meat pieces are added to the fried spice mixture. The cooked goat rumen meat pieces and spice mixture were further shallow fried and cooked for about 15 minutes to ensure uniform penetration of spice extract into meat pieces. The end-point of the fried goat rumen meat product was development of an attractive golden brown colour and flavor of the product. After cooling, the fried goat rumen curry were packaged in sterile polyethylene pouches, sealed and stored at room temperature. The products were evaluated the various physico-chemical parameters and sensory attributes on a 8- point hedonic scale.

#### **Physico-chemical and sensory analysis**

**pH:** The pH of traditional styled goat rumen meat curry were determined by using digital pH meter. Homogenates were prepared by blending 10 g sample with 90 ml distilled water using an Ultra Turrax tissue homogenizer for 1 min. The pH of the homogenates was recorded by immersing combined glass electrode of digital pH meter.

**Product yield:** The weight of traditional styled goat rumen meat curry were recorded before and after frying and the yield was calculated (product yield = weight of traditional styled goat rumen meat product / weight of raw products × 100) and expressed as percentage.

**Shear Force Value:** Core of 1 cm<sup>2</sup> were taken from traditional styled goat rumen meat curry after cooling at 4±2°C for overnight and sheared using Warner Bratzler shear press. The force required to shear the sample was observed and recorded (Kg/cm<sup>-3</sup>). 10 observations were recorded for each sample to get the average value.

**Proximate composition:** The moisture, protein and fat contents of traditional styled goat rumen meat curry were determined by standard methods using Hot air oven, Kjeldahl's assembly and Soxhlet ether extraction apparatus, respectively (AOAC, 1995).

**Sensory evaluation:** Sensory evaluation was conducted with semi-trained panelists. Traditional styled goat rumen meat curries were served to the panelists. The sensory attributes like appearance and colour, flavour, juiciness, tenderness and overall palatability were evaluated on 8 point descriptive scale (where in 1 is extremely undesirable and 8 is extremely desirable).

**Statistical 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.

## **Results and Discussion**

**Physico-chemical characteristics:** Physico-chemical parameters of ginger extract and papain treated fried goat rumen meat curry prepared by traditional style are presented in Table 1. Mean pH value was significantly ( $p < 0.01$ ) higher for ginger extract treated traditional styled goat rumen meat curry as compared to papain treated traditional styled goat rumen meat curry. Higher pH values of ginger extract treated traditional styled goat rumen meat curry might be due to higher pH of ginger as compared to papain. Similar results were also reported in roasted buffalo meat chunks by Naveena (2002). Mean product yield was significantly ( $p < 0.01$ ) higher for ginger extract treated traditional styled goat rumen meat curry as compared to papain treated traditional styled goat rumen meat curry. Low product yield of papain treated traditional styled goat rumen meat curry was due to higher cooking loss (Crounland and Woychick, 1987). The mean shear force value was significantly ( $p < 0.01$ ) higher for ginger extract treated traditional styled goat rumen meat curry followed by papain treated traditional styled goat rumen meat curry. Reduction in shear force value of beef meat treated with papain was also reported by Takagi *et al.* (1992). Wang *et al.* (1991) reported that SB improved the tenderness of culled beef when it was used as tenderizer. Moisture content was significantly ( $p < 0.01$ ) low in papain treated traditional styled goat rumen meat curry and higher in ginger extracted treated traditional styled goat rumen meat curry. This lower moisture content of the papain treated traditional styled goat rumen meat curry might be due to lower water holding capacity. The protein content of traditional styled goat rumen meat curry did not differ significantly between them. Higher protein content value was observed in papain treated traditional styled goat rumen meat curry as compared to ginger extract treated traditional styled goat rumen meat curry. The decrease in protein content of ginger extracted treated traditional styled goat rumen meat curry was due to relatively higher moisture content of the product (Reddy *et al.*, 1998). Significantly ( $p < 0.01$ )

increased fat content value observed in papain treated traditional styled goat rumen meat curry as compared to ginger extract treated traditional styled goat rumen meat curry. The variation might be due to absorption of fat during frying in oil (Jindal and Bawa, 1988).

**Sensory characteristics:** Sensory attributes of ginger extract and papain treated goat rumen meat curry prepared by traditional style are presented in Table 2. The sensory attributes score for appearance and colour, flavour, juiciness, tenderness and overall acceptability were higher for papain treated traditional styled goat rumen meat curry as compared to ginger extract treated traditional styled goat rumen meat curry. Between traditional styled goat rumen meat curry, the sensory attributes of flavor score higher for ginger extract treated traditional styled goat rumen meat curry and tenderness scores were significantly ( $p < 0.01$ ) higher for papain treated traditional styled goat rumen meat curry than ginger extract treated traditional styled goat rumen meat curry. However, appearance and colour, juiciness and overall acceptability scores between traditional styled goat rumen meat curry were non significant. Among traditional styled goat rumen meat curry, papain treated traditional styled goat rumen meat curry was rated moderately to very acceptable and ginger extract treated traditional styled goat rumen meat curry was rated moderately acceptable.

### **Conclusion**

All physico-chemical and sensory qualities were better for papain treated traditional styled goat rumen meat curry as compared to ginger extract treated traditional styled goat rumen meat curry. Finding of this study has shown that 0.05% papain appeared to be more suitable for preparation of traditional styled goat rumen meat curry followed by 5% ginger extract. Therefore, it can be concluded that goat rumen meat can be effectively used for preparation of traditional styled goat rumen meat product of an acceptable quality with substantial value addition to the materials.

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**Table 1: Physico-chemical characteristics of traditional styled goat rumen meat curry treated with tenderizing agents (Mean  $\pm$  S.E)**

Parameters	Control	Tenderizing agents	
		Ginger Extract	Papain
pH	6.69 $\pm$ 0.11 <sup>a</sup>	6.78 $\pm$ 0.10 <sup>b</sup>	6.29 $\pm$ 0.18 <sup>c</sup>
Product yield (%)	64.33 $\pm$ 0.12 <sup>a</sup>	58.18 $\pm$ 0.12 <sup>b</sup>	51.12 $\pm$ 0.18 <sup>c</sup>
Shear force value (Kg/cm <sup>-3</sup> )	4.28 $\pm$ 0.11 <sup>a</sup>	4.12 $\pm$ 0.14 <sup>b</sup>	3.18 $\pm$ 0.08 <sup>c</sup>
Moisture (%)	63.14 $\pm$ 0.12 <sup>a</sup>	57.12 $\pm$ 0.10 <sup>b</sup>	46.16 $\pm$ 0.12 <sup>c</sup>
Protein (%)	17.75 $\pm$ 0.33	16.30 $\pm$ 0.42	19.20 $\pm$ 0.26
Fat (%)	4.18 $\pm$ 0.14 <sup>a</sup>	2.92 $\pm$ 0.12 <sup>b</sup>	3.47 $\pm$ 0.11 <sup>c</sup>

Number of observations: = 4

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

**Table 2: Sensory attributes of traditional styled goat rumen meat curry treated with tenderizing agents (Mean  $\pm$  S.E)**

Sensory attributes*	Control	Tenderizing agents	
		Ginger Extract	Papain
Appearance and colour	6.25 $\pm$ 0.15 <sup>a</sup>	7.18 $\pm$ 0.12 <sup>b</sup>	7.42 $\pm$ 0.12 <sup>c</sup>
Flavour	6.12 $\pm$ 0.18 <sup>a</sup>	6.48 $\pm$ 0.12 <sup>b</sup>	6.86 $\pm$ 0.14 <sup>c</sup>
Juiciness	6.20 $\pm$ 0.14	6.74 $\pm$ 0.11	7.98 $\pm$ 0.12
Tenderness	6.18 $\pm$ 0.12 <sup>a</sup>	6.52 $\pm$ 0.18 <sup>b</sup>	7.21 $\pm$ 0.04 <sup>c</sup>
Overall acceptability	6.63 $\pm$ 0.18	6.72 $\pm$ 0.09	6.83 $\pm$ 0.16

Number of observations: = 20

\*Sensory attributes of traditional styled buffalo rumen meat products were evaluated on a 8 – point descriptive scale (wherein 1 = extremely undesirable; 8 = extremely desirable).

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