Nutritional Value of Lesser-known Ethnic Meat Products of the Himalayas

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(Meat is highly nutritious but, in its fresh state, it is perishable and can be an agent for the transmission of a range of infections and intoxications (Adams, 2010). The domestic livestock species of the Himalayan regions of India, Nepal, Bhutan and China (Tibet) are mostly cattle, sheep, goats, pigs, yaks, etc. which are mainly used for meat, milk and milk products (Tamang, 2010a). The Himalayan people prepare and consume a variety of traditionally processed smoked or sun dried or air dried or fermented meat products including ethnic sausages for centuries. They use their indigenous knowledge of preservation of perishable meats without using starter culture and chemicals (Rai et al., 2009). Microorganisms transform the chemical constituents of raw substrates during fermentation into acceptable food products with improved flavour, aroma and texture, enhancing nutritional value and other health benefits (Tamang, 2010b). Lesser-known traditionally processed ethnic meat products of the Himalayas are kargyong, satchu, suka ko masu, kheuri, chilu, chartayshya, jamma and arjia. Kargyong is an ethnic sausage-like product prepared from yak, beef and pork meat, and is mostly consumed by the Bhutia, Tibetans, Drupka, Lepcha, and Sherpa in the Himalayas (Rai et al., 2009). Three varieties of kargyong are prepared and consumed: yak kargyong (prepared from yak meat), lang kargyong (prepared from beef), and faak kargyong (prepared from pork). Satchu is an air dried or smoked meat product, mostly prepared from yak and beef meat. Two varieties of satchu are usually prepared i.e. lang satchu and yak satchu. Suka ko masu is a air dried or smoked chevon or bufflo meat product. Ethnic people of Western Himalayas prepare and consume mostly three types of meat products made up of goat meat and its scraps such as chartayshya, arjia and jamma. Chartayshya is a traditional chevon (chevon means meat of goat) meat product of the Kumaun Himalayas, consumed by Bhutia of Dharchula and Munsiyari in the district of Pithoregarh of Uttarakhand. This product is preferred by the people of Darma, Chawdas and Byans valley of Dharchula. It is prepared mainly during the religious festival called 'Kolatch' (worshiping ancestral spirit).

Drying or smoking or fermentation of perishable meat is a remarkable step in the traditional meat processing as bipreservation in the Himalayas. Bacteria- Lactobacillus sake, Lb. curvatus, Lb. divergens, Lb. carnis, Lb. sanfransisco, Lb. plantarum, Lb. casei, Lb. brevis, Enterococcus faecium, E. cecorum, Leuconostoc mesenteroides, Pediococcus pentosaceus, Bacillus subtilis, B. mycoides, B. lentus, B.

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thuringiensis, and B. licheniformis, Micrococcus and Staphylococcus; yeasts-Debaryomyces hansenii, D. polymorphus D. pseudopolymorphus, P. burtonii, P. anomala, Candida famata and the mould Rhizopus were isolated from these lesser-known ethnic meat products of the Himalayas (Rai et al., 2010). Many of the LAB isolates demonstrated some antimicrobial activity, enzymatic activities and a few showed a remarkable degree of hydrophobicity (Rai et al., 2010). The present paper is aimed to analyse the nutritional value of lesser-known ethnic meat products of the Himalayas.

Samples were collected aseptically in pre-sterile poly-bags and were, sealed and labelled for further analyses. The pH of the sample was determined directly using a digital pH meter (Type 361, Systronics) calibrated with standard buffer solutions (Merck). Titratable acidity of sample was calculated by titrating the filtrates of a well blended 10 g sample in 90 ml carbon-dioxide free distilled water with 0.1 N sodium hydroxide to end point of phenolphthalein (0.1 % w/v in 95 % ethanol) (AOAC, 1990). Moisture content was determined by weight loss of accurately weighed 1 g of sample (in triplicate) after heating at 135 °C for 2 h. Ash content was measured by heating the sample at 550 °C until the difference between two successive weighing was £ 1mg (AOAC, 1990). Protein content was determined by multiplying total nitrogen, estimated by standard Kjeldahl method, by 6.25 (AOAC, 1990; Feiner, 2006). Fat content was determined by ether extraction using glass soxhlet (AOAC, 1990). Carbohydrate content was estimated by difference: 100 - (% protein + % fat + % ash) (Standal, 1963). Energy value of a sample was estimated as the method described by Indrayan et al. (2005). The statistical data were analysed by determining the standard deviation (SD) as described by Snedecor and Cochran (1989).

The nutritional value of kargyong, satchu, suka ko masu, kheuri, chilu, chartayshya, jamma and arjia were analyzed (Table 1). The pH of all these products was in between 5.3 and 6.9. The pH increases and may be high as 7 in some thin, mould ripened sausages which taste quite different to the smoked ‘tangy’ sausages (Lücke, 1985). Anifantaki et al. (2002) reported the pH values of frankfurters ranged from 6.3-6.6 and in some cases the value was 5.7. Due to the production of lactic acid, the final pH of cooked meat products reached pH values of 5.0-5.3 (Gardner, 1983). Sun-and smoke-drying of most of the products, such as yak kargyong, faak kargyong, lang satchu, yak satchu, suka ko masu and chartayshya as a result of dehydration, have < 41 % of the moisture content. This data corresponds with the work reported by Garcia-Fontan et al. (2007) on Spanish traditional pork sausage androlla. Due to the low moisture content and slightly acidic nature of some of the meat products like kargyong, satchu, suka ko masu, chartayshya etc., can be kept for longer period and are safe for consumption. Titrable acidity was ranging from 0.3-2.6 %. In all samples analysed, food value ranged from 400.0-634.5 kcal/100g dry matter. The protein content was ranging in between 6.0-58.0 % indicating increasing protein intake in the local diet.

Drying or smoking or fermentation of perishable meat is a remarkable step in the traditional meat processing as biopreservation of highly spoilage raw meats in the Himalayas. Preparation of sausages is different from that of the European method in regards to use of natural casing, meat mixture and particularly the sausages of yak-product which is unique to the Himalayas. Lesser-known ethnic meat products are preserved for several months without refrigeration and can be consumed at anytime. Due to high calorie value, the Himalayan ethnic meat products are good source of animal protein and other nutritional intake for the people living in high mountainous regions.
REFERENCES


Table 1. Nutritional value of lesser-known ethnic meat products of the Himalayas

<table>
<thead>
<tr>
<th>Meat product</th>
<th>Moisture (%)</th>
<th>% DM</th>
<th>Kcal/100 g DM</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ash</td>
<td>Fat</td>
</tr>
<tr>
<td>Lang kargyong (n= 17)</td>
<td>59.8 ± 0.8</td>
<td>3.8 ± 0.6</td>
<td>10.3 ± 1.1</td>
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<tr>
<td>Yak kargyong (n= 7)</td>
<td>21.9 ± 0.7</td>
<td>2.8 ± 0.4</td>
<td>49.1 ± 0.7</td>
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<tr>
<td>Faak kargyong (n= 8)</td>
<td>41.0 ± 1.0</td>
<td>2.8 ± 0.3</td>
<td>27.1 ± 0.8</td>
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<tr>
<td>Lang satchu (n= 9)</td>
<td>22.8 ± 0.7</td>
<td>5.4 ± 0.6</td>
<td>5.9 ± 0.6</td>
</tr>
<tr>
<td>Yak satchu (n= 6)</td>
<td>23.7 ± 1.5</td>
<td>7.3 ± 0.4</td>
<td>4.7 ± 0.5</td>
</tr>
<tr>
<td>Suka ko masu (n= 6)</td>
<td>23.2 ± 0.3</td>
<td>1.8 ± 0.4</td>
<td>2.0 ± 0.1</td>
</tr>
<tr>
<td>Chartayshya (n= 6)</td>
<td>17.4 ± 0.2</td>
<td>7.8 ± 1.2</td>
<td>17.0 ± 0.2</td>
</tr>
<tr>
<td>Jamma (n= 6)</td>
<td>65.1 ± 0.6</td>
<td>5.2 ± 0.5</td>
<td>4.2 ± 0.5</td>
</tr>
<tr>
<td>Arjia (n= 4)</td>
<td>60.2 ± 0.2</td>
<td>3.5 ± 0.4</td>
<td>5.5 ± 0.4</td>
</tr>
</tbody>
</table>

n, total number of samples (n) is given in parenthesis.
DM, dry matter.
Data represents the means (± SD) of triplicate of each sample.
PpH of all samples (5.3-6.9); acidity (0.3-2.6 %).