6. SUMMARY

Dudh churpi, a popular masticatory product, is traditionally produced from milk of Yak, dzno (a crossbreed of male yak and cow) and cow in Bhutan, Sikkim and Darjeeling, respectively.

The samples from Bhutan had least moisture, fat, water-dispersible protein, titratable acidity, pH and energy value than the samples from other two places. The values of these parameters are maximum in the samples of Darjeeling.

The samples from Darjeeling containing higher lactic acid, free fatty acid, 2-thiobarbituric acid, tyrosine and reflectance were less acceptable by the judges with respect to all the sensory attributes, and criticized those as rancid and brittle. Significantly poor sensory scores of dudh churpi prepared in Darjeeling might apparently be due to less heat treatment of green curd, and less cooking of prechurpi which resulted in hydrolysis of fat, protein and lactose. On the other hand, the samples from Bhutan rated highest with respect to all the sensory attributes and graded as the best quality product.

The samples from Bhutan containing high elasticity, firmness, smoothness, gumminess and chewiness but less crumbliness rated most desirable with respect to overall textural quality. The same also exhibited greater hardness, cohesiveness, springiness, gumminess and chewiness on instrumental analysis than those from Sikkim and Darjeeling .

Lactic acid, free fatty acid, 2-thiobarbituric acid, tyrosine and total 5-hydroxymethylfurfural combinedly reflected 68% variation in the total scores, and all the intrinsic parameters taken together explained 81% variation in colour and appearance scores.

Total solids, total fat, total protein, total sugar, titratable acidity and water-dispersible protein jointly explained 48% variation in hardness. Water-dispersible protein alone explained 41% variation in hardness which indicates the possibility of using a single, relatively simple parameter as an index of

the instrumental texture profile.

All the Instron parameters taken together explained 47% variation of the overall sensory texture scores of dudh churpi, whereas the single parameter hardness predicted 55% sensory chewiness. The observed significant interrelationship between the sensory texture perception and instrumental mesurement can revolutionize the quality control programme leading to greater reliability blended with simplicity.

Successfully established psychophysical models could be of considerable importance for process modification of existing products. These necessitate predicting how the food system will react under certain conditions. This would be particularly relevant to traditional milk products, such as dudh churpi, which hitherto manufactured by traditional processes on small scales may be proposed to be produced on large scale by introducing this technological innovations.

Prechurpi was prepared in the laboratory by standardizing cow milk to 1.0% fat and 8.7% solids-not-fat, heating to 70°C, coagulating the milk within 60 s with hot (70°C) 2.0% citric acid solution, removing whey without any holding by filtering through a muslin cloth, cooking green curd in a boiling water bath for 20 min, wrapping hot cooked mass in a muslin cloth and pressing it at 9 kg/cm^2 for 12 h.

Best quality dudh churpi was prepared when pieces of prechurpi were smoked for 30 min, dried in an oven at 35°C to a moisture level of 30%, cooked for 15 min in milk of 1.0% fat, 8.7% solids-not-fat and 2.0% sugar concentrated to 29.25% total solids and dried in an oven at 35°C for 15-20 days.

The shelf-life of dudh churpi at ambient condition of storage was enhanced with the incorporation of 0.1% potassium sorbate in the milk used for cooking prechurpi and packed in glass/plastic containers or plastic pouches. However, the shelf-life was maximum in glass containers and minimum in pouches.

Adsorption isotherms of dudh churpi were typical type II sigmoidal isotherms according to BDDT classification. Nine equations, namely Bradely, Henderson, Iglesias and Chirife, Khun, Mizrahi, GAB, modified Mizrahi, Oswin and Caurie were fitted to the dudh churpi isotherm data. Caurie's equation was found to be suitable to predict equilibrium moisture content of dudh churpi. Monolayer value, density of sorbed water, number of monolayers and percent bound water decreased with the increase in temperature, and surface area of adsorbent reduced from 239.686 at 15°C to 214.016 m^2/g at 45°C.

Out of 254 respondents, 116 preferred laboratory-made dudh churpi and 105 preferred the best quality market samples of Bhutan indicating the equal acceptability of both the products.

Cost of production of dudh churpi was worked to be Rs 116.82 per kg. Calculated data on the cost of production of dudh churpi showed that conversion of 108 l cow milk into dudh churpi per day will help one to earn a net profit of Rs 96,584 per annum with capital investment of Rs 46,300 and operating cost of Rs 3,03,085 per annum.