6. SUMMARY

Churpi, a popular chewing gum, is traditionally produced from yak, joo and cow milk in Bhutan, Sikkim and Darjeeling, respectively.

The churpi prepared and marketed in Bhutan had least moisture, fat, water-dispersible protein (WDP), titratable acidity, pH and energy value than the churpi of two other places. On the other hand, the values of these parameters are maximum in the churpi of Darjeeling.

The churpi prepared in Darjeeling containing higher lactic acid, free fatty acid (FFA), 2-thiobarbituric acid (TBA), tyrosine and reflectance was less acceptable by the judges with respect to all the sensory attributes, and criticized as having rancid flavour and weak body. Significantly poor sensory scores of churpi prepared in Darjeeling might apparently be due to less heat treatment of green curd which resulted in higher fat, protein and lactose hydrolysis. On the other hand, the churpi prepared in Bhutan was rated highest with respect to all the sensory attributes, and graded as the best quality market samples.

The churpi prepared in Bhutan containing high elastcity, firmness, smoothness, gumminess and chewiness but less crumbliness was rated most desirable with respect to overall textural quality. The churpi prepared in Bhutan also exhibited greater hardness, cohesiveness, springiness, gumminess and chewiness on instrumental analysis than the churpi prepared in Sikkim and Darjeeling.

Lactic acid, free HMF, tyrosine and p-dimethylaminobenzaldehyde combinedly reflected 86% variation in total scores of market churpi, which is a better prediction than the effect of any single intrinsic parameters.

Instron parameters were greatly influenced by the chemical composition of churpi. WDP alone explained 54% variation in

hardness, 78% variation in cohesiveness, 80% variation in gumminess and 74% variation in chewiness. All the instron parameters taken together explained 72% variation of the overall sensory texture scores of churpi.

The present study has shown that to get a good quality churpi from cow milk it is necessary to standardize milk to 1.0% fat and 8.7% solids-not-fat, heating milk to 70°C, coagulating milk within 60 s with hot (70°C) 2.0% citric acid solution, removing coagulum immediately from whey without any holding by filtering through a muslin cloth, cooking of green curd in a boiling water bath for 20 min, wrapping hot cooked mass in muslin cloth, pressing it at 9 $kg.cm^{-2}$ for 12 h and drying over wooden fire for 40-50 days at 30$\pm$ 5°C.

Out of 200 respondents, 98 preferred the laboratory-made churpi over market churpi. Of them, 46% indicated better flavour as the reason for their preference.

Flavour, body and texture, gumminess and chewiness and total sensory scores increased significantly ($P<0.001$) at every 7 days intervals from initiation to end of drying.

Moisture content decreased from initial 46% to 13% at maturity. Titratable acidity increased from 0.19% to 0.28% on 28th day and no further increase was observed. Increase in lactic acid was moderate after 7 days. The FFA increased from initial 0.22% to 0.86% at maturity. Free and total 5-hydroxymethylfurfural showed a steady increase till the end of drying. The increase in FFA and TBA during manufacturing churpi could be due to hydrolysis of fat and formation of saturated and unsaturated aldehydes. Minimum degradation of protein which is evident from low tyrosine content (0.15 mg/g) resulted in characteristic hard body of churpi.

The flavour score was influenced by 99% with all the intrinsic parameters taken together.

Calculated data on cost of production of churpi showed that conversion of 100 l cow milk per day into churpi will earn a net profit of Rs 6,637 per month with a total capital investment of Rs 36,300 and the operating cost of Rs 17,226 per month.