The fruit beverages are highly nutritional and possess therapeutic value. Whey and some herbs like lemongrass \textit{(Cymbopogon flexuosus} (Steud.)Wats.) are nutritional, medicinal and impart flavour to the product in which they are added. The scientists at the Faculty of Agricultural Engineering and College of Dairy Technology, Raipur, India attempted to develop a soft drink from paneer whey and mango pulp with the addition of lemongrass distillate.

In the preparation of this beverage the volumes of mango pulp (12%), sugar (8%), water (48%) and paneer whey (32%) were kept constant while the volume of lemongrass distillate was varied from 0-2.5% (v/v). The prepared beverages were evaluated for their physico-chemical properties and organoleptic qualities. The organoleptic scores of the beverages improved as the concentration of lemongrass distillate increased from 0 to 1.5%. Further, increase of lemongrass distillate concentration did not improve the organoleptic scores. Fresh beverage having the properties of 15.2°B TSS, 4.35 pH, 23.29% total sugars, 4.53% reducing sugars and 0.19% acidity. 1.5% Lemongrass distillate obtained the average sensory score of 8.58, which was highest among the all other beverages prepared with different concentration of lemongrass distillate. The economic analysis of prepared beverages revealed that with 15% profit margin, the cost for 250 ml of beverages containing 1.5% lemongrass distillate was Rs. 5.75 [Sahu C, Choudhary PL and Patel S, Techno-Economic Feasibility of Ready-To-Serve Whey Based Mango-Herbal (Lemongrass) Beverage, \textit{Indian J Dairy Sci}, 2005, \textit{58}(4), 258-263].

Shank of poultry or spent hens are rich source of organic and inorganic matter but they are thrown away for having no suitable use. It consists of 96% fat and bone collagen (33-35% of bone). Whey is also a rich source of minerals, vitamins and proteins. Therefore, both the by-products need value addition. The scientists at Division of Livestock Products Technology, Indian Veterinary Research Institute, Izatnagar, India explored the possibilities of making shank-whey soup at lower cost.

During the experiment shanks were collected after slaughtering broiler spent hens (50 week old) and whey was obtained from dairy plant. Shanks were properly descaled and chopped manually into small pieces (app.2cm length), added separately to a whey and water at 20% (w/w) levels and mixed properly followed by addition of spice mix, condiments, thickeners (soluble starch), common salt and mono sodium glutamate to the contents in the cooker at 0.2, 1.75, 2.0, 1.0 and 0.1% (w/w) levels, respectively. The mixtures were cooked at 15 psi (121°C) pressure for 30 minutes and allowed to cool followed by filtration of the contents through a clean, fine muslin cloth.

The results revealed that shank-whey soup contains higher content of protein, ash and total solids as well as titratable acidity. Use of whey significantly improved the appearance and colour and consistency with overall palatability as compared to that of shank-water soup [Chidanandaiah and Sanyal MK, Quality of whey and water based soup prepared from spent hen shank, \textit{Indian J Poult Sci}, 2006, \textit{41}(1), 102-104].
**Goatsí milk ó A natural source of lactose-derived oligosaccharides**

Human milk oligosaccharides are thought to be beneficial for the infant with regard to their prebiotic and anti-infective properties. However, so far no milk from farm animals has been considered to be a good natural source of lactose-derived oligosaccharides for human nutrition. A study conducted by researchers at Spain and Germany, the characterization and quantitation of neutral and sialylated lactose-derived oligosaccharides in mature caprine milk was performed and compared to ovine, bovine and human milk. The aim of the study was twofold: first, to find a natural source of lactose-derived oligosaccharides among the main farm mammals for the development of functional foods, for clinical and infant nutrition. To this end, the oligosaccharide composition of fresh mature milk from Spanish goats, cows and sheep were determined and compared to those found in human milk. Second, to select a feasible process (which can be easily implemented at an industrial scale) for the isolation of the oligosaccharide fraction.

The quantification was carried out using high-pH anion-exchange chromatography with pulsed amperometric detection, and the characterization was performed by fast atom bombardment mass spectrometry. A large amount and variety of acidic and neutral oligosaccharides were found in goats’ milk when compared with cow and sheep milk. In addition, 15 new oligosaccharide structures were identified in caprine milk. In order to isolate the goats’ milk oligosaccharide fraction, a two-stage tangential ultrafiltration–nanofiltration process was selected. Tubular ceramic membranes with molecular mass cut-offs of 50 and 1 kDa, respectively, were employed. A virtually lactose and salts-free product containing more than 80% of the original oligosaccharide content was obtained. Thus, goats’ milk is an attractive natural source of oligosaccharides for applications in human nutrition due to both its composition and concentration. A product enriched in these oligosaccharides was obtained following the two-stage tangential filtration process selected [Martinez-Ferez Antonio, Rudloff Silvia, Guadix Antonio, Henkel Cordula A, Pohlentz Gottfried, Boza Julio J, Guadix Emilia M and Kunz Clemens, Goats’ milk as a natural source of lactose-derived oligosaccharides: Isolation by membrane technology, *Int Dairy J*, 2006, 16(2), 173-181].

**Bacteriocins from Boza ó**

*A cereal-based fermented beverage*

*Boza* is a low-pH and low-alcohol beverage produced from cereals such as rice, maize, or wheat and is a popular beverage in countries of the Balkan Peninsula. Cooked cereal is strained to remove most of the solids; sugar is added to taste and the product is then inoculated with a starter culture, either yoghurt or sourdough. The sludge is fermented at 30°C for 24 hours, cooled; and kept refrigerated for 3 to 5 days. Lactic-acid bacteria, and presumably yeast, produce a number of vitamins and increase the nutritional value of the product. Antimicrobial compounds, including bacteriocins, produced by lactic-acid bacteria increase the shelf-life of the product.

Researchers at Department of Microbiology, Stellenbosch University, Stellenbosch, South Africa conducted studies to isolate more bacteriocin-producing lactic-acid bacteria from *boza* and to compare the spectrum of antimicrobial activity, characteristics and mode of action of these bacteriocins with those previously described for strains isolated from the same niche. From a total population of $9 \times 10^6$ colony-forming units/ml, four isolates (JW3BZ, JW6BZ, JW11BZ and JW15BZ) produced bacteriocins active against a broad spectrum of Gram positive bacteria.
Bacteriocin JW15BZ inhibited the growth of *Klebsiella pneumoniae*. The producer strains were identified as *Lactobacillus plantarum* (strains JW3BZ and JW6BZ) and *L. fermentum* (strains JW11BZ and JW15BZ). The spectrum of antimicrobial activity, characteristics and mode of action of these bacteriocins were compared with bacteriocins previously described for lactic-acid bacteria isolated from *boza*. It is concluded that *boza* is a rich source of bacteriocin-producing lactic-acid bacteria with antimicrobial activity against a number of food spoilage and pathogenic bacteria. From an antimicrobial point of view, *boza* is a healthy beverage that needs to be introduced to the broader society, especially disease-plagued communities [von Mollendorff JW, Todorov SD and Dicks LMT, Comparison of Bacteriocins Produced by Lactic-Acid Bacteria Isolated from *Boza*, a Cereal-Based Fermented Beverage from the Balkan Peninsula, *Curr Microbiol*, 2006, **53**(3), 209-216].

**Beverage**

*Vitis vinifera* Linn. fruits (Hindi — *Angur, Dakh*) show a high concentration and a great variety of phenolic compounds; and grape juice is a rich source of flavonoids and other phenolics in the human diet. Positive health benefits of the consumption of grape juice, such as improvement of the endothelial function, increase of the serum antioxidant capacity, protection of LDLs against oxidation, decrease of native plasma protein oxidation, and reduction of platelet aggregation, have also been reported. The fermented fruit grape products — wine (alcoholic) and vinegar (alcoholic and acetic fermentations) — are also rich in polyphenols. Evidence of a negative association between coronary heart disease (CHD) mortality and wine consumption has suggested possible protective effects of wine. Although much less studied, wine vinegar also exhibits potential health benefits, such as the anti-hypertensive effects observed in rats.

Antioxidant activities of certain grape-derived beverages, such as red and white wines, have been extensively assessed, but there is not much information regarding antioxidant properties of grape juice on wine vinegar. The oxygen radical absorbance capacity assay (ORAC), based on the chemical damage caused to the fluorescent (fluorescein, FL) substrate by the peroxyl radicals produced *in situ*, has been quite widely used to assess the free radical antioxidant activity of pure compounds, fruit and vegetable extracts, wines, and biological fluids. Thus, a study was conducted by researchers at Instituto de Fermentaciones Industriales (CSIC), Madrid, Spain to determine the range of variability of the oxygen radical scavenging activity of commercial grape juices and vinegars by the ORAC-FL method.

Antioxidant activity of commercial red (*η* = 5) and white (*η* = 5) grape juices and wine vinegars (*η* = 5) were determined by the ORAC assay using FL as fluorescent probe. The ORAC-FL values varied from 14.6 to 25.0 µmol of trolox equivalents/ml for red grape juices, from 3.5 to 11.1 µmol of trolox equivalents/ml for white grape juices, and from 4.5 to 11.5 µmol of trolox equivalents/ml for wine vinegars. Differences in the antioxidant activities among grape juice, wine and vinegar were attributed to their different phenolic contents and compositions and to other non-phenolic antioxidants present in the samples. These data confirm grape juice and wine vinegar as good dietary sources of antioxidants. Thus, ORAC-FL methodology can be successfully applied to complex beverages (grape juice) and seasoning ingredients (vinegar) rich in polyphenols. The data could be used as an “additional quality parameter” for promoting the consumption of these grape products as sources of polyphenols and of other health-promoting substances [Dávalos Alberto, Bartolomé Begoña and Gómez-Cordovés Carmen, Antioxidant properties of commercial grape juices and vinegars, *Food Chem*, 2005, **93**(2), 325-330].

**Antioxidant properties of commercial grape juices and vinegars**
Role of pectin in orange juice stabilization

In orange juice, loss of cloud leads to a decrease in consumer acceptability. The cloud particles impart the characteristic flavour, colour and mouthfeel to orange juice. Although the chemical composition of these particles is known, the details of their stabilization are not well understood. Pectin, a major component of orange juice cloud, is thought to play an important role in juice destabilization: in the presence of the active enzyme pectin methylesterase (PME), pectin forms calcium pectate complexes and causes the precipitation of cloud particles. A better understanding of the colloidal behaviour of cloud particles when treated with PME and pectinase may assist in understanding how to prevent cloud loss during storage.

The effects of these pectin-modifying enzymes on the size of orange juice cloud particles were studied by researchers at Department of Food Science and Technology, University of Georgia, Athens, GA, USA and Department of Food Science, University of Guelph, Guelph, Ont. The particle size of juice cloud did not change with addition of pectinase. On the other hand, at the natural pH (3.8) of the juice, the addition of PME caused aggregation of the cloud particles within a few minutes, and the amount of enzyme added affected the kinetics of the aggregation. A higher amount of enzyme was necessary to cause the same effects at pH 6.0, while at low pH (2.5) cloud particles showed faster aggregation and a higher particle size, possibly because of a decreased surface charge at this pH. The results obtained by dynamic light scattering provided evidence of a direct effect of the PME on cloud and question our current understanding of the mechanism of cloud loss. This research employed a novel approach to the study of juice clarification, focusing on the effect of pectin degrading enzymes on the stability of cloud particles. Further work in this area will result in a new model for cloud particles and in a better understanding of the mechanism of stabilization of orange juice cloud [Croak Sarah and Corredig Milena, The role of pectin in orange juice stabilization: Effect of pectin methylesterase and pectinase activity on the size of cloud particles, *Food Hydrocolloids*, 2006, 20(7), 961-965].

Stabilizing behaviour of soybean soluble polysaccharide and pectin in acidified milk beverages

Acidified milk drinks comprise a large range of products, from those usually prepared from fermented milk with stabilizers and sugar to those prepared by direct acidification with fruit juices and/or acids. The pH of these products ranges from 3.4 to 4.6, and because of the instability of caseins in this pH range, a stabilizer needs to be added to prevent protein aggregation and achieve optimal mouth feel. Stabilizers are important to control properties such as texture, viscosity or mouth feel; correct ingredient formulation and appropriate processing ultimately affect consumer's acceptability.

Soybean soluble polysaccharide (SSPS) extracted from soybean cotyledons is often used to stabilize acidic beverages. SSPS is an acidic polysaccharide containing 18% galacturonic acid. The stabilizing mechanism of SSPS in acidified milk has been previously investigated after digestion of the sugar chains with purified pectinase or hemicellulase.

The mechanisms of stabilization of SSPS and high methoxyl pectin (HMP)
in acidified milk drinks were studied by researchers from Japan and Canada focusing on the differences in behaviour between the two polysaccharides. The changes in casein micelles size during acidification with glucono-δ-lactone or by direct acidification were measured using light scattering. When HMP was added to skim milk before acidification, pectin adsorbed on the surface of the casein micelles via electrostatic interactions and prevented casein aggregation. Results suggested that adsorption of pectin occurred from the beginning of acidification and somewhat affected the rearrangement of casein micelles in the pH range between 5.8 and 5.0. On the other hand, SSPS, at concentrations up to 2% (w/w), did not interact with caseins at pH>4.6. At pH<4.2 SSPS showed better stabilizing properties than HMP. In addition, between pH 4.2 and 3.2, SSPS-stabilized acid dispersions were not affected by pH, while dispersions homogenized with pectin showed a size distribution that depended on pH. The differences in structure between SSPS and HMP account for the unique functionalities of the two polysaccharides in acid milk systems.

SSPS and HMP both can stabilize casein particles in low pH milk. SSPS functionality seems to complement pectin, as at pH>4.6 pectin stabilizes acid dispersions, while under acidic conditions (pH 3.2-4.0) SSPS adsorbs onto the surface of casein micelles and prevents aggregation. The differences in functionality are caused by the different molecular structures of the two polysaccharides [Nakamura Akihiro, Yoshida Ryuji, Maeda Hirokazu and Corredig Milena, The stabilizing behaviour of soybean soluble polysaccharide and pectin in acidified milk beverages, Int Dairy J, 2006, 16(4), 361-369].

Gellan : A suitable stabilizer for reconstituted carrot juice

Carrot juices are preferably used as a natural source of provitamin A in the production of alpha-tocopherol-beta-carotene drinks (ATBC-drinks) because of its high content of β-carotene. The cloudy stability of carrot juice is a great concern during storage. In general, the loss of juice cloudiness resulted from the pulp sedimentation. However, apart from pulp sediment (PS), the occurrence of white sediment (WS) was also observed in commercial carrot juice during storage, which was an insoluble calcium salt in carrot juice obtained by X-ray diffraction. Because the occurrence of PS and WS may badly affect the organoleptic quality of carrot juice, prevention of PS and WS to maintain a better cloudiness of reconstituted carrot juice (RCJ) is very important.

The effect of hydrocolloids such as guar (GU), xanthan (XA), sodium carboxymethylcellulose (CMC), gellan (GE) and a mixture of GE and XA (GX) on PS, WS, turbidity and viscosity of RCJ were investigated by researchers at College of Food Science and Nutritional Engineering, China Agricultural University, Beijing, China. The respective addition of 0.200 g/100 ml GU, 0.200 g/100 ml XA, 0.300 g/100 ml CMC and a mixture of 0.015 g GE + 0.100 g XA/100 ml into RCJ could decrease the amount of PS and WS, but could not prevent the occurrence of PS
and WS after 60 days of storage. However, PS and WS were not observed due to a smaller quantity in GE (0.020) sample, indicating that 0.020 g/100 ml GE could prevent the occurrence of PS and WS effectively. The prevention of PS and WS in GE (0.020) sample may be caused by a combined effect of the electrostatic repulsion between the GE molecules, viscosity and networks of GE. GE with a concentration of 0.020 g/100 ml had a least effect on the turbidity and viscosity of RCJ as compared to other hydrocolloids. Thus, GE was more suitable as a stabilizer in the application of RCJ [Liang Chulin, Hu Xiaosong, Ni Yuanying, Wu Jihong, Chen Fang and Liao Xiaojun, Effect of hydrocolloids on pulp sediment, white sediment, turbidity and viscosity of reconstituted carrot juice, Food Hydrocolloids, 2006, 20(8), 1190-1197].

A new oat-based probiotic drink

Long known for its benefits, oats is becoming popular as part of a healthy diet and new oat products emerge at the functional food market. It is also reported that after appropriate processing, oats is a suitable substrate for fermentation with lactic acid bacteria. Enzymatically treated oat bases have been developed and applied as substrates for lactic acid fermentation with dairy starter cultures. Researchers in Bulgaria conducted studies to develop a synbiotic functional drink from oats by combining a probiotic starter culture and whole-grain oat substrate. In this study, a whole-grain oat substrate was fermented with lactic acid bacteria to obtain a drink, combining the health benefits of a probiotic culture with the oat prebiotic beta-glucan. The levels of several factors, such as starter culture concentration, oat flour and sucrose content, affecting the fermentation process, were established for completing a controlled fermentation for 8 hours. The viable cell counts reached at the end of the process were about $7.5 \times 10^{10}$ cfu/ml. It was found that the addition of sweeteners aspartame, sodium cyclamate, saccharine and Huxol (12% cyclamate and 1.2% saccharine) had no effect on the dynamics of the fermentation process and on the viability of the starter culture during product storage. Beta-glucan content in the drink (0.31-0.36%) remained unchanged both throughout fermentation and storage of the drink. This would ensure its beneficial health effect at regular consumption of the drink. The shelf life of the synbiotic oat drink was estimated to 21 days under refrigerated storage [Angelov Angel, Gotcheva Velitchka, Kuncheva Radoslava and Hristozova Tsonka, Development of a new oat-based probiotic drink, Int J Food Microbiol, 2006, 112 (1), 75-80].