

Finessing fermentation

Many claims have been made for the antioxidant, antiproliferative and anti-inflammatory properties of polyphenols. The review takes in their beneficial effects and application in dairy products, including *in vivo* and *in vitro* studies. Most of the products listed are fermented milks and cheeses, where the polyphenols may form part of a flavouring material or added as a functional ingredient.

Milk chemistry

Lactating donkeys were fed with cactus pear and the antioxidant capacity of their milk was compared to donkeys on a standard diet. There were no differences in gross composition but milk from those fed with cactus pear was found to have a higher radical scavenging activity.

Supplementation of ruminant diets with tannins has been used to modify the fatty acid profile of the milks produced. Feeding Saanen goats a diet based on pornunça silage changed the fatty acid profiles in the milks, with unsaturated C18 fatty acids increasing with dietary tannin while levels of C10:0, C12:0 and C14:0 decreased.

A study of Croatian spotted goats from the 60th to the 150th days of lactation identified changes in macro and micro-elements in their milk. During this time, milk yield decreased from 1.15 to 0.76 kg/day while the levels of Ca, Mg, P, Zn and Mo significantly increased. Levels of the undesirable heavy metals Cr, Cd, and Pb were very low and constant.

The sol-gel transition temperatures of skimmed milk concentrates made by microfiltration with 6-10% protein and pH values reducing to pH 4.6 were ascertained using small-amplitude oscillatory shear rheology. The transition temperatures lowered as the protein content increased, while lowering the pH also reduced the sol-gel temperature for a given protein concentration.

Gas chromatography was used for analysing sterols in commercial samples of milk, yogurt and butter. A direct relationship between fat and phytosterol content was found, with the phytosterol content of four samples of milk and yogurt exceeding 5% of total sterols.

The third issue of this year's *International Journal of Dairy Technology*, Volume 79, includes 27 reports of original research, says Andrew Wilbey



Burfi is an Indian sweetmeat based on sweetened milk concentrate. It has a high level of free fat and is susceptible to oxidation as well as mould spoilage. Credit: Afsana Samad, own work

Cheese making

Many countries have used vegetable coagulants in cheese making and in Pakistan the berries of *Withania* coagulans are a ready source. An aqueous extract from dried berries was subjected to storage at different temperatures, and the coagulating properties and cheese quality compared to using a freeze-dried preparation at fortnightly intervals over five months. The freeze-dried preparation gave the best yields and had the most consistent coagulating properties.

In Algeria there is a shortage of artisanal lamb and kid rennets, so ovine pepsin was investigated as a potential alternative. Skim milk curds produced using ovine pepsin were less firm than that made with rennet, with similar effects of pH, calcium activity and temperature on gelation. The alpha-casein fraction was more susceptible than beta-casein to hydrolysis.

Compositional characteristics are important in identification of PDO cheese. A study was made on the macrocomponents and volatile organic compounds in Feta cheese from two mountainous areas. The levels of macrocomponents did not vary greatly but levels of some volatile organic compounds characterised the specific area, reflecting the uptake of these compounds from the herbage. In a simi-

lar exercise, cheeses made from caprine milks in different regions of Poland were compared in conjunction with the botanical composition of their pastures. Differences in fatty acid profiles were found, together with an improvement in sensory property that reflected the richness of the flora of the pastures.

Njegusi cheese is the most popular in Montenegro, but there is no standard method of production. Typically it is made from raw ovine and/or bovine milk. Indigenous strains of lactic acid bacteria were screened for their utility as starter cultures and three strains were identified as capable of producing comparable cheese under pilot scale conditions to that of artisanal origin.

Bryndza cheese has PDI status in the Slovak Republic and is made by pressing, then milling and salting an ovine soft cheese, sometimes with a mixture of less than 50% bovine soft curd cheese. Raw or pasteurised milks may be used, leading to a variable microbiota. The production methods were associated with differences in salt and malondialdehyde content as well as in the presence of *enterococci* and *staphylococci*.

Soft low fat cheeses were produced with and without the addition of an aqueous green chilli pepper extract. Addition of the extract was found to decrease counts

of total and lactic acid bacteria, yeasts and moulds. Cheese with 2% extract was judged to have the best flavour.

A short communication on the partition of phospholipids during cheese making indicated that approximately 20% of milk phospholipids were lost into the whey fraction. Mass balance calculations suggested that biosynthesis of phospholipids by the starter bacteria might be increasing total phospholipids by up to 25%.

Yogurt and fermented milks

Various starch products have been used as thickening agents and fat mimetics in reduced fat yogurts. An octenyl succinylated pearl millet starch was used at up to 2% and the resulting yogurts examined for their rheological, textural and sensory characteristics. Syneresis decreased and sensory acceptability improved with increased starch content, suggesting that this form of starch is a potential ingredient for yogurt.

Aflatoxins can be produced during spoilage of animal feedstuffs and can subsequently be secreted in milk produced. Milk samples were spiked with aflatoxin M1 and fermented with a range of lactic cultures. Probiotic cultures were found to be more effective in reducing the aflatoxin level, *Lactobacillus casei* LC-01 being the most effective overall, while yogurt culture YC-380 was the most effective of the non-probiotic cultures.

Oxalate is widely occurring in fruits and vegetables, and can be potentially toxic. A study was made of the protective effects of exopolysaccharide (EPS) production by probiotic lactobacilli and the ability of the lactobacilli to degrade oxalate. While no correlation between EPS production and oxalate degradation was found, dietary supplementation by *Lactobacillus fermentum* IP5 was suggested as a strategy for prevention of oxalate stone disease.

Fortified strained dahi were produced, incorporating pomegranate pulp and flaxseed powder to increase the fibre content and modify the fatty acid composition. Pomegranate pulp also increased the antioxidant content, while the flaxseed powder influenced the sensory and textural properties.

Desserts

Different methods were used to produce a sour cherry beverage incorporating whey

protein and angum gum. Heat treatment denatured the protein and increased complex formation with the gum, inhibiting serum separation.

Some instant dessert formulations include emulsifying salts to increase casein hydration by sequestering calcium and altering the pH of the systems.

A rheological study of desserts prepared with different proportions of disodium phosphate and tetrasodium pyrophosphate demonstrated that tetrasodium pyrophosphate affected gel stiffness while increasing disodium phosphate levels resulted both in decreased tan delta

values and syneresis.

Burfi is an Indian sweetmeat based on sweetened milk concentrate. It has a high level of free fat and is susceptible to oxidation as well as mould spoilage. Incorporation of mixtures of essential oils was better than the individual oils in providing antioxidant properties but not as effective as the addition of butylated hydroxyanisole.

The addition of essential oils introduced their characteristic flavours, with the combination of turmeric and ginger essential oils receiving the lowest score overall. **Dii**

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