Many prebiotic flours are sources of inulin, oligofructoses and sometimes galacto-oligosaccharides. The high molecular weights of inulins and some oligosaccharides enhance viscosity, as well as promoting the growth of probiotic organisms. A review of technological and sensory aspects of prebiotic flours in dairy food processing was in the special issue, followed by 25 reports of original work.

**Starter selection**

Selection of starter strains is a continuing interest. Six strains of *Streptococcus thermophilus* were genotyped and their fermentation properties compared, indicating greater functional than genotypic disparity.

Five strains of *Lactobacillus plantarum* were isolated from traditional dairy products and assayed for antifungal properties. One strain with a strong inhibitory effect was used for further investigation and found to produce an antifungal peptide with relative molecular mass of 40.32 kDa that might have further use as a bio-preservative.

In a separate paper, a strain of *Lactobacillus mesenteroides* was fermented in a whey-based medium. The activity of partially purified bacteriocins from the cell-free extract was measured by inhibition of *Listeria monocytogenes*, while molecular weights (3.5 to 8.5 kDa) were estimated by electrophoresis.

**Yogurt**

Non-milk ingredients can modify the characteristics of yogurt. Addition of Fujian black tea – a black tea – was shown to reduce syneresis, increase viscosity and antioxidant activity plus counts of *St. thermophilus* and *Lb. acidophilus*.

In a separate report, addition of grape-seed oil at 0.5-1.5 per cent was shown to increase total phenolic content and radical scavenging activity in set yogurt without significant effect on sensory properties.

Low fat yogurt bases were supplemented with oven dried and freeze dried Jerusalem artichoke powders, which are
sources of inulin. Overall, the lower-cost oven dried powder gave better consistency than both sources exhibited prebiotic properties in increasing the microbial counts from the mixed starter (Lb. delbrueckii subsp. bulgaricus, St. thermophilus, Lb. acidophilus and Bifidobacterium animalis subsp. lactis). A similar starter blend was also used in a comparison of six prebiotic ingredients in low fat probiotic yogurt, where supplementation by 1.5 per cent of either Hi-maize resistant starch or 6-glucan was recommended.

Probiotic yogurts including Lb. rhamnosus were produced from bases containing skimmed milk prepared with a series of cereal and legume seeds. There were no significant differences in the production of the seed addition on microbial counts.

Addition of 6-glucans, from either barley or oats, to the reconstituted skim milk base prior to fermentation with a starter including B. animalis subsp. lactis, gave set yogurts. The glucans modified the properties of the set yogurts, including the viscosity, and enabled higher counts of the probiotic bacteria.

Probiotic set yogurts were made with supplementation by whey protein concentrate (WPC), a sodium-calcium caseinate or a mixture of the two. The initial angiotensin converting enzyme inhibitor (ACE-I) activity was highest with the casein supplement but after 14 days the highest ACE-I and proteolytic activities were associated with WPC addition. WPC was also associated with a higher viability of B. animalis subsp. lactis.

Fermented milk beverages

Yogurt starter was complemented with Lb. acidophilus and B. animalis subsp. lactis plus juices from black mulberry, red grape or cornelian cherry. Addition of the fruit juice increased antioxidant levels without interfering with growth of the probiotic cultures.

ACE-I activity can be important in avoiding hypertension. Fermented skim milks were produced using probiotic lactic cultures and Kluyveromyces marxianus. Proteolytic activity and ACE-I activity were measured. The milk cultured with K. marxianus alone displayed higher activity than when used in combination with the lactic cultures. Another paper described fermentation with Lb. helveticus plus an aminopeptidase (Flavourzyme) to enhance cell viability and yield of ACE-I peptides. Sensory properties of the products were compared to those of Yakult.

An investigation of the effects of fortification of Doogh, an Iranian yogurt drink, with zinc, vitamin B12, thyme and aloe vera extracts, on the viability of a strain of Lb. acidophilus suggested a greater benefit from zinc addition than from B12. Addition of the plant extracts was also beneficial, with the greatest effect from a combination of zinc plus aloe vera extract.

Kefir
Kefir continues to see global interest. An examination of Tibetan kefir grains saw concentration of lactic acid bacteria on the outside with acetobacteria growing internally, bound by polysaccharide. A study of kefir grains and beverages reported similar ranges of lactobacilli plus yeasts, absent and there was no seasonal variation in coliforms, but the season had a significant effect on levels of Staphylococcus aureus, presumptive lactococci and mesophilic lactobacilli.

The use of Lb. kefiriocaciens ZW3 as an EPS-producing adjunct starter in mozarella manufacture was associated with improved stretchability, meltability and fat leakage but had little effect on the cohesiveness, elasticity and resilience of the cheese. The microstructure appeared to be more filamentous,ropy and compact than that of the controls.

Divle Cave cheeses made from raw ovine milk were monitored over 120 days. Staphylococci and enterobacteriaceae declined over the first 60 days while yeasts and moulds declined more slowly over 120 days. Lactococci peaked at over 105 at 30 days then declined to 106 cfu/g while lactobacilli remained dominant at 108 cfu/g at 120 days. Peptide profiling exhibited extensive proteolysis while lipolysis generated a steady increase in free fatty acids, averaging 100 mg/kg/day.

Semi-hard Dutch-type cheeses are susceptible to clostridial spoilage. Lactococcus and enterococcal adjunct starters were evaluated in milks contaminated with Clostridium tyrobutyricum. Two strains of Lactococcus lactis subsp. lactis were found to have significant anti-clotstridial activity.

Experimental mascarpone-type cheese including inulin and B. animalis subsp. lactis was subjected to simulated gastrointestinal conditions. Viable counts of bifidobacteria remained above 106 and survived the treatment, indicating a protective effect of the cheese matrix.

Despite copper being recognised as a potent pro-oxidant, some cheese has been reported to taste better if made in copper rather than stainless steel vessels. Growing Lb. helveticus under copper stress was found to lower acid and bile tolerance but improve other desirable properties such as auto-aggregation, cell surface hydrophobicity and antibacterial activity.

Fermentation of whey with a bacteriocinogenic strain of St. thermophilus resulted in a high titre of thermophilin. Ovine milk was added to the whey at 10%, and the Myzithra cheese exhibited antimicrobial properties, sufficient to inhibit growth of coliforms and micrococci, while giving stable sensory properties that might enable a longer shelf life.