

The natural antioxidants

Issue 2 of Volume 70 of the *International Journal of Dairy Technology* looked at milk fat adulterants and kefir. Andrew Wilbey reports

The second issue of this year's volume of the *International Journal of Dairy Technology* contains two reviews, 15 accounts of original research and a report of the 2016 British Mastitis Conference.

A review of the physiological, husbandry and seasonal factors affecting the physiological properties of bovine milk concludes the extensive review of best use for milk that was started in the previous issue. The second review, on natural antioxidants in milk and dairy products, covered both lipophilic and hydrophilic antioxidants and their key roles in maintaining pro and anti-oxidant homeostasis in the human body. The authors concluded that there was a negative correlation between milk consumption and the incidence of diet-dependent diseases, confirming the benefits of milk and dairy product consumption.

Milk and milk products

Milk is a good substrate for many bacterial species and good hygiene is critical at all stages of its handling. Efficacy tests on teat dip solutions based on lactic acid and chlorhexidine digluconate demonstrated their effectiveness against both Gram-positive and Gram-negative test organisms, plus biofilm inhibition with some species. Bacterial isolates from udders were more sensitive than reference strains to the test chemicals.

Control of the microflora of pasteurised milk during storage will have a significant effect on its shelf life. Low-density polyethylene pouches were prepared from film subjected to corona discharge and coated with silver nanoparticles. The effectiveness of the treatment increased with the discharge voltage.

Omega-3 fatty acids are believed to confer health benefits but are prone to oxidation unless protected. Flaxseed microcapsules containing alpha-linolenic acid were used to fortify milk and found to have no effect on sensory properties at up to 2g per 100 mL and be stable to oxidation over the five days of the trial.

Sweetened concentrated milk products such as dulce de leche are widely used in some markets. In South America, sheep milk production has increased and experiments on browning and gelation kinetics in this product indicated that temperature had a greater impact than sucrose content. Khoa is a similar product, originating from India. A comparison was made between products made from camel, cow and buffalo milks. Similar levels of 5-hydroxymethyl furfural, a heat-treatment indicator, were found but the product made from camel milk was noticeably different.

Milk protein powders are important industrial ingredients and vary considerably in flowability and wettability. A product comparison found that composition was more important than particle size and microstructure. High fat powders had poor flow and wettability while wetting was also influenced by casein content and release of ionic calcium.

Skimmed milk was subjected to a series of membrane separation processes and the buffering curves for permeates from each step were plotted over the 4-7 pH range. With microfiltration permeate, 37% of the buffering was contributed by the whey proteins, and the rest by milk salts.

Fermented milks

Conjugated linoleic acid (CLA) supplementation of strawberry-flavoured yogurt was carried out at up to 100% of the recommended daily allowance. In addition to the effect on the fatty acid composition, viscosity and pH increased with CLA addition with no effect on the yogurt starter bacteria, and the sensory properties were satisfactory with all treatments.

Milk plus barley flour at 4-6 per cent (w/w) was used in the preparation of fermented milk drinks. Sensory scores and microbial counts decreased and viscosity increased with barley flour content.

Pine honey was proposed as a sweetener with antioxidant properties. Addition at 3-7% (w/v) was accompanied by increases in viscosity, water-holding

capacity, red and yellow colour indices. While sweetness increased with honey addition, overall sensory scores were similar for the control, five and seven per cent addition rates.

Kefir may be made from a variety of milks, using mixed lactic and alcoholic fermentations. Examination of three Greek kefir found 14 yeast species belonging to 10 genera, including two that had not been reported before. Dahi is made by mesophilic fermentation of milk, where the flavour is dominated by diacetyl. Fortification by vitamin D2 and calcium salts gave good sensory acceptability but resulted in a decrease in microbial counts, firmness and viscosity when calcium phosphate was used. Greater firmness and viscosity was found with the calcium citrate fortification.

Cheese

Fructans (non-digestible fructose polymers) from agave were used in reduced-fat soft cheese as a fat replacer in addition to its prebiotic properties. The modified reduced-fat product was found to be similar to the full-fat control in both microstructure and sensory properties.

Ethyl esters often contribute to the flavour of Camembert cheese. Addition of 0.4-1.2 mg/g ethanol to the cheese milk increased the fruity notes without affecting the composition, microflora or texture of the cheese. **Dii**

