

Probiotics – the journey continues

The Society of Dairy Technology's spring conference focussed on regulations, scientific evidence and innovation for these 'friendly bacteria'

Linda V. Thomas

The 2016 spring conference of the Society of Dairy Technology, which was held at the University of Reading opened with a keynote lecture from Dr Carine Lambert (International Probiotics Association, Europe), who described the regulatory challenges faced by the probiotic industry in the EU. The implementation and interpretation of current nutrition and health claims regulations has effectively resulted in a ban on use of the term 'probiotic' on foods, drinks and food supplements. Despite the wealth of research on such microorganisms, and over 400 claim submissions, no probiotic health claims have (yet) been approved by the European Food Safety Authority. Companies will continue to work towards achieving strain-specific health claims, but they are also lobbying the Commission to change the current situation with regard to probiotics by suggesting various solutions that would allow the labelling of strains as probiotic, i.e. a nutrition claim, if conditions of use to qualify them as such are met.

Michael Hickey (Michael Hickey Associates Food) contrasted the regulatory impasse in the EU with other countries in the world, such as Japan. Here the government responded proactively to health problems observed in the general population by pioneering new functional food health claims regulations, such as FOSHU (Foods for Specific Health Use). Following assessment of the supporting scientific evidence, foods are allowed to bear health claims, as has happened for several probiotic products. The USA categorise claims according to type of product, with different approval systems for conventional foods and supplements compared to more medical products. Probiotic strains have been granted Generally Recognized as Safe (GRAS) in the USA but specific nutrition and health claims require FDA clearance. Probiotics cannot use wording that would be perceived as an unauthorised health or drug claims. Canada has approved several probiotic species to make non-specific claims and has published guidance for strain-specific health claim submissions, although none has been approved to date. China has now introduced various regulations for functional foods and their claims, and this country also requires technical review of the evidence before claims can be made.

Dr Linda Thomas (Yakult UK Limited) emphasised the huge body of research that has accumulated for probiotics, particularly since their commercial introduction into the West in the mid-1990s. This research has been driven by commercial need to substantiate health claims but also by medical interest. A recent survey of primary health care professionals in the UK found more than 65% advised probiotics for their patients, particularly if they were taking antibiotics (to prevent diarrhoea) and for gut disorders. New insights into the influence of the gut microbiota on health have also prompted investigation of probiotic efficacy for a spectrum of health and disease states. Dr Thomas described human trials that show probiotics can help protect against antibiotic-associated and infectious diarrhoea, common

colds, irritable bowel syndrome and cancer. Examples of research with *Lactobacillus casei* Shirota were shown.

Professor Paul Ross (University College Cork) gave an overview of work at the APC Microbiome Research Institute in Ireland, an internationally renowned research centre. One focus there is to understand how the gut microbiota changes over the course of a lifetime, and its influence on health at the extremes of life (infancy and old age). The researchers are also screening bacterial strain collections to identify those that could prove effective for specific conditions, with the ultimate aim of developing new bioactive molecules or strains as pharmabiotics. The examples he described included a *Lactobacillus mucosae* strain with potential heart health benefit and a novel bacteriocin (thuricin) effective against *Clostridium difficile*. The group are also developing strains for animals, and have selected strains with anti-*Salmonella* activity for use in pigs and for treatment of bovine mastitis.

Another speaker from UCC, Dr Elaine Patterson, explained the link between obesity, obesity-related disease and the gut microbiota. Animal models have shown that eating a high fat diet causes unhealthy changes to the composition of the bacteria in the gut with the result that bacterial components can leak from the gut into the bloodstream, causing the development of chronic systemic inflammation that can lead to type 2 diabetes. Probiotics strains are being engineered to deliver bioactive molecules that might prove useful for people with diabetes: glucagon-like peptide -1 and gamma aminobutyric acid.

The research capabilities at DuPont Nutrition and Health were described by Dr Andrew Morgan, before going into more detail about one of their projects: developing new probiotics, prebiotics and synbiotics to expand the company's current portfolio of products. Placebo-controlled human trials with some of these strains in different target groups were described. For example, a study in people with functional gastrointestinal symptoms showed *Bifidobacterium animalis* subsp. *lactis* HN019 reduced intestinal transit time and helped symptoms. The same strain, as well as a *Lactobacillus paracasei*, proved effective in reducing risk of diarrhoea for children living in an urban slum during winter. Du Pont strains have also been tested in athletes, showing effectiveness in reducing incidence of upper respiratory tract infections.

There is potential for cheese to be used as a delivery vehicle for probiotics strains but Dr Diarmuid Sheehan (Teagasc Food Research Centre Moorepark) noted that several physicochemical and microbial variables have to be considered in order to ensure (i) the strain's survival over the cheese's shelf-life and (ii) the probiotic did not affect the quality of the cheese. He outlined the changes in the cheese matrix that occur during the manufacture and ripening process, and how pH, salt, fat content and globule size, etc. influence this. His research group is using modern molecular methods to get an accurate idea of the survival capability of probiotic strains in different part of the cheese, and how probiotic growth can affect starter cultures.

The final talk was given by Dr Sean Tuohy, the President of the Society for Dairy Technology, on behalf of Dr Ken Burgess (the former president) who was unable to be present. His topic was prebiotics, indigestible dietary compounds that promote the growth of beneficial bacteria in the gut, and, specifically, galacto-oligosaccharides (GOS). Prebiotics such as GOS are often added to infant formula, since bovine milk contains much lower levels of beneficial oligosaccharides than human milk. The essential structure of GOS is a

galactose chain with a terminal glucose residue, and the compounds are produced by enzymic treatment of lactose. The source of the β -galactosidase enzyme and the precise conditions of the process influence the length of the resulting polymer chain and its degree of polymerisation. Purification of the crude GOS product, which can be done by various techniques, will remove colour and increase the concentration of the final product, which may be in the form of syrup or powder.

The full presentations from this meeting have been made available to SDT members via the society's website www.sdt.org. A full scientific report of the conference will be published in the International Journal of Dairy Technology.