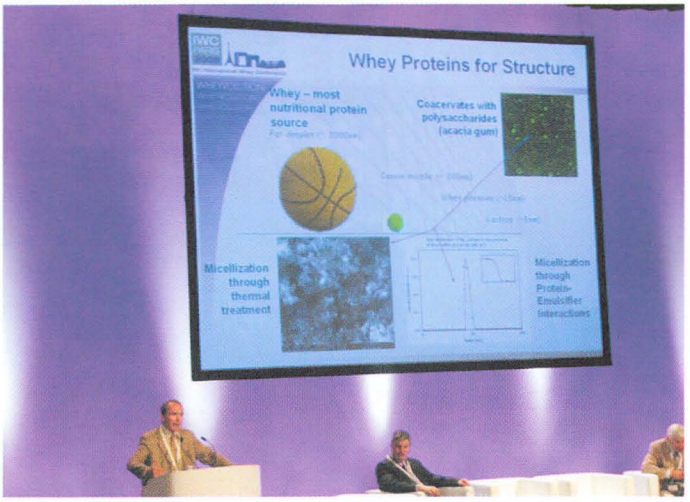
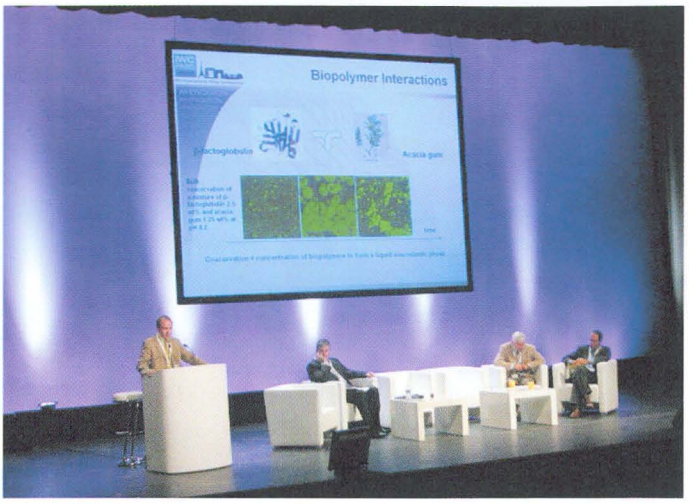


IWC Paris, Prof. Bruce German



IWC panel discussion

Th. Kützemeier, Bonn, Germany

The whey story – from waste to major functional food specialty

5th International Whey Conference in Paris

"Wheyvolution" was the 5th in a series of International Whey Conferences, held every three years alternating between locations in the US and Europe. Actually, more than 600 participants from around the globe attended in two plenary and six parallel sessions over two days. Whey is one of the milk derivatives with high potential in terms of human health, wellness and nutrition. Whey, a never-subsidized product has changed in application dramatically over the past decades: originally considered part of the effluent stream and dumped in rivers, later on used as sprayed fertilizer on crop and as feed for pigs it nowadays turns out to be a revolutionary preventative means against major diseases such as high blood pressure and coronary heart disease.

Whey: more science, new patents, better business

A panel of leading scientists representing major companies such as Nestlé, Lactalis, DMV Campina, Market Research Institutes and US-based Universities clearly indicated a shift in whey products in the dominating markets of the US and Europe: in recent years 700 scientific papers have been published out of which 18 per cent highlighted new processing techniques. Top companies are focused mostly on bioactive compounds. At the same time, non-surprisingly the number of patents is growing.

New patents include the GEA Microformula with a new membrane system or a protein isolate claiming health benefits manufactured by US-based Hilmar Cheese Co.

In Europe the feeling among industries is that a tough regulatory health claim regime hinders real innovation due to the risk of receiving a negative EFSA response on submitted claims as has only recently happened to some dairy claims. Nevertheless, Patrick Mannion of Innova Market Insights, Netherlands, reported of 355 whey products on the market in 2007, most of them targeting at confectionary and bakery applications. As a side effect, in health related products the term "diet" is more and more replaced with "Additional value" and whey components are actually often used in smoothies.

The term "wellness", originally used in German only, is becoming popular now in the US where health claim regulations for elderly people are not that restrictive as for infants and young children. Some of the areas of interest are muscle rebuild, prevention of cardiovascular disease through peptides, and long-term mental health. A study of the German Society for Consumption Research (GfK) in 2006 has shown a willingness of elderly people to pay more for more benefit.

Whey programmed by evolution to be good for man

Prof Bruce German of the California University in Davis who is also involved in Nestlé Research referred to the power of the Darwinian selection process showing that plants have done their best to avoid being eaten. In the case of milk it is just the other way round: mammals have done their very utmost over 120 million years to best feed their babies. There are certainly positive associations between the intake of whole grains and gut health. But nowadays, from the evolutionary standpoint man should be in a rather comfortable position when it comes to demonstrating how healthy milk is in comparison to plant products. One of the major differences between plant and whey proteins seems to be the glycosilation: plant proteins are never glycosilated.

According to Prof Ulrich Kulozik, a technologist from Munich University, glycosilation takes place at various positions of the proteins, glyco-

IWC Paris, one of six parallel fora

portions are probably more functional, not only in nutrition but also in terms of technology.

Whey: muscle promoter and weight loss aid

"Diets with increased proteins (PRO) and reduced carbohydrates are effective for weight loss and improved body composition", said Prof Don Layman, University of Illinois. A possible explanation focuses on the essential amino acid (EAA) leucine as a trigger for muscle protein synthesis. "In this respect, whey proteins with their significant leucine content have a big future", added Prof Rene Koopman of Maastricht University.

Whey: an ever increasing market

Looking at market developments, Dr Frans Visser, DMV International, reported that 75 per cent of the whey world market is dominated by the EU and US cheese production with an annual growth rate of three per cent out of which 96 per cent is derived from cheese whey and four per cent from casein whey. The highest growth rate in the US is shown by high concentrate WPC whereas the increase in mainstream products remains moderate. But, WPC 80 requires ten times the cheese production compared to standard whey powder. Due to the lower input of whey powders in feed (21 per cent) compared to food (36 per cent) or nutrition/pharmaceuticals (43 per cent) the feed industry can switch within three months to other ingredients with plant origin. This is considered to be one of the major risks for the dairy industry in the situation of increasing prices for whey. Asia is the most important market with an input of approximately 400.000 m t. However, whey powder prices have varied over 300 per cent within the last years, whereas WPC 34 fluctuates less than whey powder and WPC 80 fluctuates even less than WPC 34. The market-driven downsizing of ice-cream in terms of applied WPC concentration has made ice-cream ever since cheaper. In the EU, WPC greater than 50 has followed the price movement of SMP, in the US price curves vary but still follow very closely. Increasingly, Lactose replaces refined sugar. In mid 2007, Lactose was very expensive but since the beginning of 2008 prices have dropped offering new opportunities.

Whey: driving forces for growth

A panel debate focused on some of the key questions around whey: the main driving force seems to be new technologies and the diversification in whey products. A healthier life style adds to this effect with whey proteins increasingly showing health benefits from oligosaccharides. At the same time a move is observed from a food mode to a goods and services mode.

Fonterra researcher Dr Havea reported on model studies applying heat and adding calcium on WPC 80 concentrates aiming at better gel structures for compound foods. However, Dr Havea refused to respond to more detailed questions with regard to potential applications.

Valio's Researcher Dr Harju explained the company's strategy towards lactose intolerance in parts of the Finnish population and abroad. Commercially available lactases include yeast lactases, mould lactases and also immobilized lactases. In whey the problem can be solved by hydrolysation resulting in higher solubility while doubling sweetness. The demineralization of permeate has become cheap by nanofiltration and calcium is easily removed through cation exchange. Hydrolysed lactose comprises 50 per cent of the sweetness of sucrose, the resulting Galactose can be isomerized to tagatose which shows 92 per cent sweetness of sucrose but only 34 per cent of the sucrose's calories. Whey derived oligosaccharides are increasingly used in baby foods. They soften the stool and improve digestion. Hydrolysis also improves solubility and digestability of feeding stuffs for animals.

Whey: a great future to come

Prof Ernst H. Reimerdes, one of the world's most renown scientists in this field, said in his concluding presentation: "Whey offers endless opportunities for innovation. Due to the dramatic change of paradigm from process-oriented food production to products with health and nutrition functionalities, whey provides an extremely high potential for macro- and micro-nutrients. But, science needs to be used in a different way. An interdisciplinary, integrated approach for product research and development is required. Based on specific nutrient requirements for selected target groups new concepts and procedures for the step by step refinement of whey need to be developed."

Reimerdes added: "Research and Development will focus on nutrient blocks with specific bioactive functionalities e. g. proteins, prebiotics, preservation, minerals etc. resulting in primary, secondary and tertiary raw materials."

Besides all negative connotations around the world towards globalization, the whey story is an excellent example for global scientists working together to identify new opportunities for nutrition, health, wellness and business for the dairy industry.

The 6th International Whey Conference will be held in 2011 in Chicago. EDM