

ESU 009– Recent trends in area of nutraceuticals and functional foods

Lecture 44



Functional food produ



- Most early developments of functional foods were those of fortified with vitamins and/or minerals such as vitamin C, vitamin E, folic acid, zinc, iron, and calcium.
- Subsequently, the focus shifted to foods fortified with various micronutrients such as omega-3 fatty acid, phytosterol, and soluble fiber to promote good health or to prevent diseases such as cancers.
- More recently, food companies have taken further steps to develop food products that offer multiple health benefits in a single food.
- Functional food products are not homogeneously scattered over all segments of the food and drink market and consumer health concerns and product preferences may vary between markets. These products have been mainly launched in the dairy-, confectionery-, soft-drinks-, bakery- and baby-food market (Kotilainen et al., 2006; Menrad, 2003).

Probiotics



- ❑ Probiotics are defined as **“live microorganisms, as they are consumed in adequate numbers confer a health benefit on the host”**.
- ❑ Lactic acid bacteria (LAB) and bifidobacteria, the most studied and widely employed bacteria within the probiotic field.
- ❑ Dairy products are the key product sector. The sensitivity of probiotics to physical and chemical stress, heat and acidity makes the product development challenging for other type of food product. Recently encapsulation was assessed as possible technology for decreasing sensitivity of such probiotics (Clair, 2007; Mattila-Sandholm et al, 2002).
- ❑ Extensive R&D activity resulted in a number of special new dairy products (e.g. Synbiofir drinking kefir, Synbioghurt drinking yoghurt, HunCult fermented drink, Milli Premium sour cream, Aktivit quark dessert, New Party butter cream, Probios cheese cream) (Szaka´ly, 2007).
- ❑ Fruit juice has also been suggested as a novel, appropriate medium for fortification with probiotic cultures because it is already positioned as a healthy food product, and it is consumed frequently and loyally by a large % of the consumer population (Tuorila & Cardello, 2002).

Prebiotics

- § Prebiotics are non-digestible food ingredients that beneficially affect the host by stimulating the growth and/or activity of one or a limited number of bacteria in the colon, thus improving host health. (Charalampopoulos et al., 2003; Stanton et al., 2005)
- § Fructo-oligosaccharide (FOS), inulin, isomalto-oligosaccharides (IMO), polydextrose, lactulose and resistant starch are considered as the main prebiotic components.
- § Primarily oligosaccharides, such as soy oligosaccharides (SOS), galacto-oligosaccharides (GOS) and xylo-oligosaccharides (XOS) are also marketed in Japan (Ouweland, 2007).
- § Oligosaccharides play important role in obesity control through resulting increased satiety and reduced hunger (Bosscher, 2007; Bosscher, Van Loo, & Franck, 2006; Cani, Neyrinck, Maton, & Delzenne, 2005).
- § Inulin and oligofructose besides being prebiotics, have shown to increase calcium absorption, thus improve both bone mineral content and bone mineral density (BMD) (Bosscher et al, 2006). Furthermore, they influence the formation of blood glucose, and reduce the levels of cholesterol and serum lipids (Lopez-Molina et al., 2005).
- § **SYNBIOTICS:** foods containing a combination of probiotics and prebiotics .



Functional cereals

- 80 Cereals, in particular oat and barley.
- 80 The multiple beneficial effects of cereals can be exploited in different ways leading to the design of novel cereal foods or cereal ingredients that can target specific populations.
- 80 Cereals can be used as
 - ❖ fermentable substrates for the growth of probiotic microorganisms
 - ❖ as sources of non-digestible carbohydrates that besides promoting several beneficial physiological effects can act as prebiotics.
 - ❖ cereal constituents, such as starch, can be used as encapsulation materials for probiotics in order to improve their stability during storage and enhance their viability during their passage through the adverse conditions of the gastrointestinal tract (Brennan & Cleary, 2005; Charalampopoulos et al., 2002).
 - ❖ functional cereal components e.g., beta-glucan, are also applied in the dairy and bakery industries for the manufacture of low-fat ice creams and yogurts. It makes their mouthfeel, scoopability and sensory properties resemble those of full-fat products (Brennan & Cleary, 2005).

Bakery products

- 80 In relation to Functional foods bakery is still relatively underdeveloped. Bakery products however provide ideal matrix by which functionality can be delivered to the consumer in an acceptable food.
- 80 It is important to realize that achieving functional food quality does not simply involve delivering the active principle at the appropriate level for physiological effectiveness, but also supplying a product which meets the consumer's requirements in terms of appearance, taste and texture (Alldrick, 2007).
- 80 In late 2003, Unilever innovated the bakery sector by introducing a white bread called Blue Band Goede Start, which was the first white bread containing the nutritional elements normally available in brown bread including fibers, vitamins B1, B3 and B6; iron; zinc; inulin, a starch that comes from wheat (Benkouider, 2005a).



Spreads



- It can be assumed that cholesterol-lowering spreads will gain increasing relevance in the coming years due to the market introduction of e.g. a functional variety of Becell margarine of Unilever (named “Becel pro-activ”), containing phytosterol esters which are supposed to lower the cholesterol level.
- Low-cholesterol butter under the trade name of Balade™ has been produced and marketed in Belgium since 1992. In this case more than 90% of the cholesterol in milk fat has been removed by the addition of crystalline betacyclodextrin to the molten butter.
- Other low-cholesterol milk products, like cheese, cream, or even low-cholesterol egg, are produced by this technology .

Functional eggs



Omega-3
Enriched Eggs

- Eggs are of particular interest from a functionality point of view, because they are relatively rich in fatty acids and the associated fat-soluble compounds.
- The idea of egg enrichment with omega-3 FAs simultaneously with antioxidants & other vitamins has recently been used to produce VITA eggs by Freshlay Foods (Devon, UK). They state that their eggs were enriched with omega-3 fatty acids, Se, vitamins D, E, B12 and folic acid.
- Eggs enriched in omega-3 and vitamin E produced by Belovo under the trade name of Columbus first appeared in Belgium in 1997, and since then they have been sold in the UK (from 1998), The Netherlands (from 1999), India, Japan and South Africa (from 2000). Currently, production of Columbus egg exceeds 50 millions/year in Europe.
- Similar eggs are produced by Pilgrim's Pride Company, Gold Circle Farms and OmegaTech in the USA (Surai & Sparks, 2001).



CONSUMER ACCEPTANCE OF FUNCTIONAL FOODS

- ✓ socio-demographic characteristics, cognitive and attitudinal factors emerged as potential determinants
- ✓ studies showed that consumer acceptance of functional foods is far from being unconditional, with one of the main conditions for acceptance pertaining to taste, besides trustworthiness of health claims. Although increasing the functionality of the food should not necessarily change its sensory quality (Urala & Lahteenmäki, 2004), bitter, acrid, astringent or salty off-flavours often inherently result from enhancing food functionality with bioactive compounds or plant-based phytonutrients.
- ✓ most of these studies identified typical functional food consumer as being female, well educated, higher income class and older than 55.
- ✓ Given the fact that prevention is a major motivation of use of functional food (Verbeke, 2006; Wruck, 1995), it can logically be hypothesized that experience with illnesses increases probabilities of functional food acceptance
- ✓ **Relatively high price** can be regarded as one reason for the limited market success of several functional food products.

Thank you

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