Market trends and opportunities for functional dairy beverages

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Abstract

Functional foods promise to deliver health and wellness to consumers in an environment where lifestyle diseases and an ageing population are threatening the wellness of society. Milk is a natural, multi-component, nutrient-rich beverage. Market trends indicate that milk-based beverages are ideal vehicles for newly discovered bioactive food ingredients targeting lifestyle diseases. Low-fat milk and drinking yogurt are the most commonly used vehicles for the delivery of bioactive food ingredients. Among the recent trends, low-fat milk is commonly used for delivery of omega-3 fatty acids, while probiotic yogurt drinks are preferred for the delivery of plant sterols. Drinks containing combinations of dairy and fruit juices with added bioactive components are also becoming common in the US and EU markets. Although a range of bioactive components is available for incorporation into dairy beverages, there are significant formulation challenges. Experience indicates that consumers will not buy food products that imply they are sick. Therefore, functional foods need to be promoted as convenient, nutritious and tasty formulations with specific health benefits. Although health claims in Australia remain elusive, innovations in functional dairy beverages are likely to follow the trends in the US and Europe. Australian manufacturers need a proactive, rather than a reactive, approach to the development of innovative functional dairy beverages.

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Introduction

Current developments in functional foods are fuelled by the rapid increase in lifestyle diseases and the desire by innovative companies to seize the resulting opportunities to market bioactive ingredients addressing these diseases. The slow pace of regulatory approvals for functional foods and bioactive ingredients is constantly being challenged by the rapid increase in innovative ingredients and a desire to make health claims. Although Japan leads in the development and approval of functional foods, the US and Europe are closely behind. This has allowed these countries to lead in the innovation and capture of intellectual property in the area of functional foods and bioactive ingredients. Today, supermarket shelves in US, Europe and Japan carry a range of functional dairy beverages with probiotics, prebiotics, omega-3, plant sterols and many other components.

Market trends

According to Stagnito's New Products Magazine (Penn 2005), the development focus for beverages for 2005 will be heavily dominated by health (53%), followed by taste (25%) and convenience (23%). In identifying the Top 10 trends, similar predictions are made by the market analysis company, New Nutrition Business (2005). In her annual review of the Top 10 global trends, Sloan (2005) identified health and convenience as the key trends for food products.

Market trends indicate that although the inherent functional benefits of milk remain largely unexploited, milk-based beverages are proving to be ideal vehicles for newly discovered bioactive food ingredients. In the past couple of years, a number of functional dairy beverages containing a range of non-dairy bioactive additives have been launched, mainly in the US, Europe and Japan. Non-fermented, milk-like beverages and fermented yogurt drink beverages have been used as vehicles for bioactive food ingredients. Tables 1 and 2 highlight selected examples of non-fermented and fermented dairy beverages, respectively.

Two bioactive ingredients targeted for functional dairy beverages are omega-3 fatty acids and plant sterols. In general, low-fat milks appear to be preferred for fortification with omega-3 fatty acids, while probiotic yogurt drinks have been preferred for fortification with plant sterols and stanol esters.

Omega-3 fatty acids are polyunsaturated fatty acids that are considered essential because they cannot be synthesised by the human body. Dietary sources of omega-3 fatty acids include plants (particularly flax, canola, walnuts and hemp) and fish (particularly ocean fish such as sardines, anchovies, salmon and mackerel). Plants contain the parent omega-3, alpha-linolenic acid (ALA), which can be converted into eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). A number of dairy beverages containing omega-3 fatty acids from plant and marine sources have been launched in the US, Canada, Europe and Australia. In Canada, in order to claim a source of omega-3, the food must contain 300 mg/serving. According to USDA, the acceptable limit for an adult male is 1600 mg/day and for an adult female is 1100 mg/day. The Heart Foundation in Australia recommends 200 mg of omega-3 (including ALA) a day. According to Canadian dairy company Natrel, omega-3 fatty acids:

- promote the reduction of blood cholesterol;
- prevent certain illnesses, such as cardiovascular disease;
- foster brain and visual development in children;
- improve immune reactions against allergies; and
- reduce the risk of forming blood clots.

Other bioactives included in functional dairy beverages are minerals (calcium, magnesium and iron), peptides and lactoferrin.

Table 1: Selected examples of non-fermented functional dairy beverages with added bioactive components.

Functional dairy beverage	Brand name	Manufacturer	Source of bioactive	Comments
Low-fat milk	Lactantia nature Addition	Lactantia (Parmalat), Canada	Omega-3 (flaxseed oil)	300 mg/250 mL serve, mainly ALA
Low-fat milk	Heart Plus	PB Foods Australia	Omega-3 (fish oil)	200 mg/250 mL serve, mostly DHA and EPA
Low-fat milk	Natrel Omega-3	Natrel, Canada	Omega-3 (organic flaxseed oil)	300 mg/250 mL serve
Low-fat milk (Fresh)	Dawn Omega Milk	Dawn Dairy, Ireland	Omega-3 (fish oil)	150 mg/250 mL serving. Europe's first, fresh pasteurised omega-3 milk. DSM supplied omega-3 is added at final stage of production using TetraPak-developed dosing system
Low-fat milk	Farmers Best	Dairy Farmers, Australia	Omega-3 (vegetable oils)	33 mg/250 mL serve. First product to be made from fresh milk where almost all saturated fat has been replaced with the healthier monounsaturated and Omega-3 fats. Approved by the National Heart Foundation of Australia
Low-fat milk (UHT) and milk powder	Omega Plus	Nestlé, Malaysia and Singapore	Omega-3 (vegetable oil – canola and corn oil)	UHT and powdered milk
Milk	Meiji Love	Meiji Milk, Japan	Calcium and Iron	350 mg calcium and 3 mg iron per 200 mL serve
Milk-fruit juice drink	NaturaLinea	Corporacion Alimentaria Penananta S.A. Spain	Conjugated linoleic acid (CLA) (Tonalin brand from Cognis)	Carries the health claim "helps to reduce body fat"
Low-fat milk	Flora Pro-Activ	Unilever, UK	Phytosterol	Carries the claim "clinically proven to reduce cholesterol"
Hyper-immune milk (powder)	Stolle Milk Alpha	Stolle Milk Biologics (US)	Casein-phospho-peptide (CPP) & IgG	Distributed in South-East Asia by Eurotai
Low-fat milk	Night Time Milk	Cricketer Farm, UK	Melatonin	Promoted as a natural solution for good night sleep

Selective recent examples of functional dairy beverages containing omega-3 fatty acids are shown in Table 1.

Fermented dairy beverages containing phytosterols have been launched both in the US and Europe. Phytosterols (including stanol esters) are promoted for their cholesterol-lowering action that is achieved by suppressing intestinal cholesterol absorption while partially suppressing cholesterol biosynthesis. Yogurt with active probiotic cultures has been known to improve the intestinal microbial balance and improve gut health. Yakult and Danone brands dominate the probiotic yogurt market. Each daily dose bottle of Yakult is believed to contain 6.5 billion active bacteria of the strain *Lactobacillus casei* Shirota. Several studies have

Table 2: Selected examples of fermented functional dairy beverages with added bioactive components.

Functional dairy beverage	Brand name	Manufacturer	Source of bioactive	Comments
Yogurt drink	Flora ProActiv	Unilever, UK	Phytosterol	Claims "clinically proven to reduce cholesterol"
Yogurt drink	Benecol	McNeil Nutritionals, UK	Phytosterol	Licensed technology from Raisio, Finland. Contains 3% phytosterol ester
Low-fat dairy drink	Danacol	Danone	Phytosterol	1.6 g phytosterol/100 mL bottle. Claims "consuming 1.6 g of plant sterols per day, as part of a healthy diet, is proven to reduce cholesterol"
Fermented milk drink	Zen	Danone, Belgium	Mg	Zen is targeted at the whole family, particularly those people who want to relax at the end of the day.
Fermented dairy – fruit beverage	Evolus	Valio, Finland	Bioactive peptides obtained by milk fermentation	Evolus claims to be the first European functional food to help lower blood pressure
Probiotic fermented milk	*L. casei* + Lactoferrin	Kyodo Milk, Japan	*L. casei*, lactoferrin	Promoted as anti-bacterial and preventing infections

shown the health benefits of probiotic bacteria. However, the market has become fairly crowded and, therefore, recently developed yogurts have also seen addition of other bioactive ingredients, such as lactoferrin, plant extracts and fibres. Selected recent examples of fermented functional dairy beverages containing bioactive ingredients are shown in Table 2.

In addition to the perceived health benefits, functional dairy beverages have also been marketed based on unique packaging, convenience features (e.g. single serve) and refreshing taste. In Japan, functional dairy beverages are seen as foods and consumers don't even use the term 'functional foods'. As all foods must taste good, functional foods are considered no exception. It appears that people will not compromise on taste, because they want to enjoy their food regardless of health status. Therefore, producing a great-tasting functional beverage that fulfils a real consumer need for health remains the key to success.

Australasian perspective

Australia, although being a major exporter of food and agricultural products, has been slow in responding to the newly emerging consumer market needs, and developing intellectual property in functional food and bioactive ingredients. This could partially be attributed to the slow pace of approval for novel foods and health claims and partly due to the risk-averse nature of food companies who have failed to inject sufficient funds into R&D and innovation. On the other hand, Australia and New Zealand cannot ignore the market trends and consumer needs and this is recognised by the Food Standards Australia New Zealand (FSANZ).

Slow advances in developing functional foods have many long-term implications to the food industry, such as:

- innovation in the development of bioactive ingredients and functional foods has been stifled due to the uncertainty in marketing the products;
- there is little or no IP protection or positioning by Australian companies in a number of already launched bioactive components for functional dairy beverages, such as phytosterol and omega-3 fatty acids;
- Australian manufacturers may have to rely on licensing technologies from overseas and their profit margins are likely to be eroded; and
- the awareness among consumers is limited and hence marketers may need large budgets for promotions.

On the positive side, there are a number of advantages that can be gained by the wait-and-see approach. These are:

- A number of bioactives have been tried in functional dairy beverages, so there is some information about processing and technology.
- Information on the market success or failure of already launched products can be useful in positioning products by Australian manufacturers.
- There is some feedback from consumers and hence an ability to improve products to meet their needs.
- There is information about pricing and the premium that is likely to be available.
- There is some information on health benefits and a number of consumer products have been put through clinical trials overseas.
- Overall risks are minimised.

Opportunities and challenges for functional dairy beverages

Dairy beverages easily fulfil the requirements for the three main drivers of functional foods, i.e. health, taste and convenience.

Among the many drivers for the growth of functional foods, the health concerns of consumers and rising healthcare costs for health authorities remain the most important. A good understanding of the health needs of the population can create opportunities for functional dairy products. The rise in obesity appears to be one of

Table 3: Bioactive ingredients for functional dairy beverages and associated formulation challenges.

Bioactive ingredient	Potential health benefit	Potential formulation challenge
Omega-3 fatty acids	Several benefits: cardiovascular and heart diseases, mental health, joint health, skin conditions	Undesirable flavour, sensitivity to heat, light and air
Phytosterol	Cholesterol reduction	Insolubility and difficulty in incorporation into low or no-fat beverages
Isoflavones	Breast, colon and prostate cancers	Bitterness, beany taste, poor solubility in water
Protein hydrolysates	Reduced allergenicity, improved absorption, Anti-hypertensive and other health benefits	Bitterness, poor emulsifying properties
Bioactive peptides from milk	Several including anti-hypertensive, immune enhancing, anti-bacterial and other benefits	Stability towards processing, poor emulsifying properties and flavour
Probiotic bacteria	Several benefits such as boosting immunity, reducing the effects of lactose intolerance, constipation, diarrhoea,irritable bowl syndrome, lowering cholesterol	Exposure to heat, oxygen, low pH, moisture and direct light can reduce activity. Ensuring enough probiotic bacteria reach the gut
Calcium	Bone health, osteoporosis	Insolubility, sedimentation and grittiness and protein instability
Iron	Oxygen transport, prevention of anaemia	Undesirable colour development, iron insolubility and protein instability
Dietary fibre	Colon cancer, heart health	Poor suspension and sedimentation

the biggest challenges in the society, but also offers unique opportunities for functional foods. As obesity is also linked to a number of lifestyle diseases, such as metabolic syndrome, cardiovascular disease (CVD), cancer and diabetes, developing functional dairy beverages targeting obesity alone can offer significant market opportunities.

The dairy industry needs to be aware of the major health-related concerns and address those concerns through functional dairy products. In a recent report, the Australian Institute of Health and Welfare (Australia's Health 2004) highlighted CVD, cancers, diabetes, arthritis and other musculoskeletal conditions, high blood cholesterol and obesity as major health concerns for Australia.

Table 3 highlights some of the available opportunities and challenges for the development of functional dairy beverages. It includes bioactive ingredients that are likely to address some of the major lifestyle diseases and have potential to be approved by the FSANZ.

Table 3 also highlights that there are several formulation challenges that need to be overcome for the development of stable functional dairy beverages with desired taste attributes. For example, omega-2 fatty acids, which possess undesirable flavour and are sensitive to heat, require encapsulation to protect from flavour release and from processing, such as pasteurisation and UHT. The added bioactive ingredient may also interact with dairy components such as protein or minerals, causing physical instability during the processing of beverages or affecting the efficacy of the bioactive ingredient. Basically, each non-dairy bioactive ingredient, when added to a dairy beverage, poses unique challenges that require scientific and technological solutions.

Market experience indicates that consumers will not buy food products that imply they are sick. Future functional foods are likely to be promoted as nutritious and tasty formulations with specific health benefits. Although health claims in Australia remain elusive for the time being, innovations in functional dairy beverages are likely to follow the trends in the US and Europe. A proactive, rather than a reactive, approach to the development of innovative functional foods is needed to catch up with Europe, US and Japan.

Conclusions

There is a growing trend for fortification of dairy beverages with non-dairy bioactive ingredients. Functional dairy beverages can satisfy the growing market need for health, taste and convenience, but the formulators require significant knowledge of the bioactive components and their interaction with dairy components.

References

Australian Institute of Health and Welfare (2004), *Australia's Health*.

New Nutrition Business (2005) December/January 2005 pp. 25-42.

Penn C. (2005), 5th annual new products survey. Part 1. *Stagnito's New Products Magazine*, January 2005 pp. 38-44.

Sloan E. (2005), Top 10 global food trends. *Food Technology* **59**, 20-32.