Functional Foods for the Australian industry: definitions and opportunities
2005

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Foreward

This report is a useful tool for the Australian food industry as well as researchers. It brings together relevant market and scientific information which will help food companies to filter out and focus on key opportunities in Functional Foods.

The food industry makes a significant contribution to the Australian economy. The value of the Australian food industry has grown at 6% annually and will exceed $125 billion by 2006/7. Functional Foods represent an opportunity to stretch this baseline trend well beyond 6%.

Increased investment in innovation is an integral part of the National Food Industry Strategy, a five-year blueprint focussing on increased export growth, improved productivity, efficiency and skills within the Australian Food Industry. Food Innovation Grants (FIG) are a co-invested partnership with food companies to address challenging scientific and technological issues and drive those issues through to a commercial outcome.

The ability to use science and technology to achieve a commercial outcome is one of the key challenges of food innovation. With limited resources in R&D in Australia, it is the role of the National Centre of Excellence in Functional Foods to build capability in science and people, consolidate fragmented R&D resources and create more effective linkages between R&D providers and food companies.

Food companies have called on the Centre to provide the leadership that identifies emerging opportunities for Functional Foods. This report demonstrates how to bring together opportunities in science, market intelligence and regulatory affairs as part of the commercialisation process. It brings together top line information from these key areas which will help to reduce the risk in food innovation and give food companies a better chance of achieving a good commercial outcome through science.

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Executive summary

The aim of this report is to provide Australian food companies with information to assist in the development and commercialisation of Functional Foods. It provides an objective definition to estimate the market size. It also provides core information on opportunities by integrating knowledge on science and regulatory trends.

Definition

Functional Foods are defined as "foods that meet consumer needs for general health and wellbeing, and the prevention and management of compromised health conditions".

Functional Foods include ‘minimally and substantially transformed’ foods containing known bioactives and ‘substantially and elaborately transformed’ food products, beverages or food ingredients containing known or added bioactives. Any food promoted on a health platform, where the health benefits are supported by good scientific evidence, is a functional food.

This strong underpinning in science is what differentiates Functional Foods from other food categories. Credibility is critical to not only meet regulatory requirements but to ensure the acceptance and sustainability of the Functional Food market segment.

Opportunities - drivers

The best opportunities for Functional Foods can be seen as those where the market is ready; the underpinning science to substantiate benefits is available; the regulatory requirements are achievable; and the company has the technical support and ability to develop and commercialise the food product.

For the major export industries such as meat, grains, dairy and wine, a stronger competitive advantage may be achieved by increasing export of value referenced commodities and/or value added processed foods. This would be in addition to their unique benefits already offered by Australian foods of combined product quality, food safety and environmental friendliness.

Rapid urbanisation, health concerns and demand for convenience present many opportunities for Functional Foods which combine the need for both health and convenience. Specific markets for functional food opportunities are identified in this paper, particularly in Asia.

The most developed areas of supportive science relate to lifestyle diseases (obesity, heart disease and diabetes) and bone health. Further scientific development is required in other areas of functionality such as performance, gut health, immunity and cancer prevention. The challenge is to develop effective synergies between science, technology and food product development for the benefit of the consumer.

Opportunities - concepts

An analysis of market, science and regulatory factors reflects opportunities for Functional Foods for healthy aging, appetite control and kids nutrition. Demand for foods for appetite control will increase with growing awareness of obesity as a problem. Currently the science and regulatory environments are targeting foods that may help reduce energy intake. Interest in kid’s nutrition may increase as the number of children per family unit decreases. Opportunities for Functional Foods will need to be considered in view of ethical marketing and regulatory standards.

Functional Foods present real opportunities in food innovation. This paper has identified indicative areas for further exploration but needs to be blended with the brand owners’ knowledge and experience to drive the food innovation process.
1 Introduction

Food innovation has the potential to grow the Australian food industry, making it more competitive in the global food market and hence more profitable and sustainable. As the consumer becomes more interested in health, there is increasing interest in the Functional Foods concept.

Food companies are increasingly recognising the need to connect with public health messages. They are responding to mounting pressure to reduce negative ingredients in the foods such as sugar, excessive calories and fat content leading to a reformulation of ‘bad foods’.¹

According to Mellentin (2005), health is the future of food and recent moves by some major companies suggest that perhaps, ‘healthy foods’ may one day be the only types of foods that successful companies make.¹

Estimations of the size of the functional food market worldwide vary considerably with calculations from reputable organisations, such as Mintel and Euromonitor (2004), suggesting the market is worth between US$30-50 billion.² ³

Most market analysts agree that the worldwide functional food market is growing steadily with growth rates generally around 8% per annum.² Mintel (2004) has suggested that recent growth in the US market may be around 14% per annum.²

Australia’s share of the global functional food market was estimated at $A1 billion in 2003 and growing at a rate between 8-14% per annum.⁴

The purpose of the White Paper is to provide Australian food companies with a tool to assist in the development and commercialisation of Functional Foods.

Australian food companies are open to exploring commercial opportunities in Functional Foods. However, there is confusion regarding what they are and hence how their potential can be unlocked.

Guidance for food companies regarding how best to identify opportunities for the development and commercialisation of Functional Foods is being requested.

A key step in this process is to identify the potential market size. In fact, the Australian food industry have called for an estimation of the market size for Functional Foods for a number of years.

There is currently no objective definition or methodology for calculating this. Consequently, estimations of the market size and the potential growth of Functional Foods vary.

A reliable definition is required in order to determine the potential for Functional Foods to become more competitive in a global market. A clear definition for Functional Foods provides a platform from which opportunities for food innovation can be identified.

The aim of the White Paper is to:

1. Provide an objective definition for food companies to estimate the market size of their potential Functional Food products.

2. Provide core information on the opportunities for Functional Foods by analysing current market, science and regulatory trends.
2 Definition of Functional Foods

There are many definitions of Functional Foods, representing various sectors, including the market, science and regulatory domains. Individually, these definitions potentially underestimate the opportunities for Functional Foods.

The National Centre of Excellence in Functional Foods (Functional Food centre) proposes a working definition for Functional Foods that incorporates a multiplicity of meanings and in so doing, optimizes the commercial potential for Functional Foods.

Functional Foods are “foods that meet consumer needs for general health and wellbeing, and the prevention and management of compromised health conditions.”

Functional Foods are those promoted on a health platform and based on scientific evidence.

The best opportunities for Functional Foods may be seen as those where there is synergy between four key factors:

1. An acceptance of the market to these food products.
2. The underpinning science to substantiate the food product's benefits is available.
3. The regulatory requirements are achievable.
4. The food industry is willing and able to successfully develop and commercialise the proposed food product.

Figure 1 The National Centre of Excellence in Functional Foods: commercialization model
2.1 The market perspective

2.1.1 The food supply

One way to view the market potential of Functional Foods is to consider the value chain of food supply. For the Australian food industry, the value chain for food comprises of farm and fish production, food processing, retail food sales, imports and exports (Figure 2).5

![Value chain for food in Australia 2003-4](Adapted from Australian Food Statistics, DAFF, 2004)

Functional food opportunities will vary for primary industry (grains, dairy, meat, seafood, horticulture), manufacturing/processing (food and beverage sector) and retailing. For instance, ‘minimally transformed foods’, such as grains, fruit, vegetables, meat and fish, may be able to capitalise on their natural formulations in differentiating their position in the market. Food with ‘intrinsic health’ (‘inherently healthy’), such as fruits, vegetables, whole grains and nuts, was listed in the top global food trends by both Mellentin (2005) and Sloan (2005).1, 6 Five fruit and vegetable categories – frozen fruit, refrigerated salad dressing, fresh ready-to-eat salads, fresh vegetables, and shelf-stable nuts and fruits grew 6-9% worldwide.6 The USDA projects that fruits (especially citrus), vegetables and fish will be the fastest-growing food categories through 2020.7

Substantially and elaborately transformed foods, such as dairy, meat, cereals and beverages, are more likely to have improved formulations targeting specific health benefits. Most Functional Foods will be identified in this category and include foods, food ingredients and beverages containing known or added bioactives. However, both categories can apply to individual food groups (eg dairy, meat, fruit and vegetables), and on this basis opportunities have been identified in both domestic and export markets (Figure 2).

**Functional Food categories include:**

1. Minimally transformed foods containing known bioactives (such as fruits and vegetables)
2. Substantially and elaborately transformed food products including:
   - Food ingredients with known bioactives
   - Foods containing added bioactives
   - Beverages with known bioactives
   - Beverages with added bioactives
2.2 The consumer

The success of these products depends on consumer responsiveness. Consumers are becoming health-conscious and most agree that eating healthfully is a better way to manage illness than using medication.\(^8\)

Market analysts report that this ‘do-it-yourself doctoring’ or ‘personalised nutrition’ is an increasing trend.\(^1\,\,6\) We are now seeing consumers select foods which they perceive will help them treat or manage their individual health conditions, such as heart health, allergies, arthritis and general wellbeing.\(^1\)

Any food product which is promoted as a means of achieving general health and wellbeing or managing or preventing specific health conditions can therefore be considered a Functional Food.

Market research provides a useful insight into consumers perceived health and lifestyle needs. However, it is equally important to understand public health issues and trends as well as recommendations from health authorities surrounding specific health issues.\(^9\)

Food products which are consistent with public health goals are more likely to be recommended by health practitioners and hence are more likely to be sustainable. Targeting key public health concerns provides access to a potentially larger and well defined audience.

For Functional Foods to be accepted and adopted by both health practitioners and consumers, they will require a strong underpinning in science.

Consumers are becoming more discerning regarding food choices. As information becomes more accessible, there will be a need for authoritative scientific evidence which ‘proves’ that consumption of the food product will provide the promised health benefit.

Shifting the focus to key health issues (identified by both consumers and health authorities) and demonstrating the contribution of Functional Foods to positive health outcomes is likely to maintain the credibility and ultimately the sustainability of the Functional Foods market.

The ability to understand and respond to consumers’ perceived health and lifestyle needs are critical for commercial success in Functional Foods. An understanding of public health issues and recommendations is necessary to gauge the market potential.

2.3 The science perspective

The scientific community have defined Functional Foods as “foods that provide benefits beyond basic nutrition”.\(^10\) This definition has been interpreted in various ways by different scientific groups.\(^11\,\,13\)

For some, Functional Foods includes conventional foods which already contain nutrients or bioactives as part of a healthy diet, for example, fruits, vegetables and nuts.\(^13\) Others place greater emphasis on the addition of nutrients or bioactive components to foods, food ingredients or supplements, for example, plant sterol-enriched spreads.\(^11\)

These various interpretations of Functional Foods have focused on defining the delivery agent for achieving ‘benefits beyond basic nutrition’. Whilst the Functional Food centre’s definition encompasses all of these categories, it also provides a qualification of the term ‘beyond basic nutrition’.
The opportunity for Functional Foods is in highlighting the health benefits that can be achieved via their consumption.

In the past, principles of nutrition have been based on assumptions of requirements for food components to prevent deficiency. Now, advances in nutrition science have demonstrated that providing nutrients to simply prevent deficiency does not necessarily represent the full benefit of that nutrient, nor the benefit of that nutrient in conjunction with the total food (whole food matrix).

At the same time, nutritional requirements are changing with increasing emphasis on the prevention and management of chronic diseases. At the other end of the spectrum, concepts of toxicity and imbalance in nutrition are also important and are beginning to be understood. ‘Reference values’ for nutrients are now replacing that of ‘requirements’, incorporating these different aspects of nutritional requirements.14

The Functional Food centre’s definition acknowledges a strong underpinning in science. It encompasses the concept of food as a delivery agent for achieving general health and wellbeing, as well as an active agent in facilitating conditions to support and improve health.

2.4 The regulatory perspective

Food regulations play an important role in determining opportunities for Functional Food development and their promotion.11

The regulatory system for food varies substantially internationally; however, there are a number of consensus groups working on supportive aspects, such as health claims substantiation (see Process for the Assessment of Scientific Support (PASSCLAIM) in Europe).12

A key principle driving food regulations is the need to ensure that consumers are reliably informed and public health and safety is protected.

The regulatory system relies on science to ensure that these objectives are met. Evaluation of the scientific evidence supporting health claims will require the use of rigorous and systematic methods.

The priority of the Functional Foods centre is to provide the underpinning science to substantiate the benefits these products may offer consumers.

An understanding of regulatory requirements in this area is crucial for identifying and addressing opportunities and barriers to the development and commercialization of Functional Foods.

Regulatory requirements for product development and marketing can impact on the achievement of commercial outcomes in specific markets.

The Functional Food centre’s definition acknowledges the need for information related to the consumption of Functional Foods to be truthful and not misleading by ensuring a strong scientific underpinning.
2.5 The industry perspective

Food is a business of brands in a modern trading market. It is the brand that establishes trusted, known and appealing images to its audience.

Australian food is a brand in itself, and individual brands are central to the business of manufacturing companies.

Brands can be extended by value-adding with the Functional Foods concept, however, this needs to be done strategically. If positioned incorrectly, this move can undermine existing brands.

The Functional Food centre understands this, but most importantly appreciates that the strategic direction for brand development is driven by the brand owners themselves.

The aim of the Functional Food centre is to differentiate and value add to food industry initiatives by integrating knowledge from market trends, science/technology, regulation and industry/company capability.

The Centre helps to develop solutions to diminish risk from the science and regulatory interface. It facilitates the integration of expertise and knowledge from concept to commercialisation by working in partnership with industry, acknowledging its experience in the field.

To ensure consumer acceptance, companies need to address issues associated with the taste, texture, smell, safety and stability of their products. In addition, they also need to attend to packaging and distribution issues.

With Functional Foods, the ability to deliver bioactive components in the required amounts and with demonstrated bioactivity may require advanced expertise such as microencapsulation and extraction technologies.

These technological challenges may be addressed in-house or may require the input of specialist providers.

The Centre provides a core resource for the Australian industry where all expert parameters cannot be delivered within the companies themselves.

It focuses on industries and companies that see functionality as key to their future.

The aim is to increase the success strike rate of commercialisation.
3 Market opportunities for the Australian food industry

3.1 Market landscape

In 2003/4 Australian consumers expended nearly $A89 billion on food, mainly through supermarkets and grocery stores, although the café, restaurant and liquor retailing sectors are making inroads.\(^5\)

Domestic consumption patterns remained relatively stable, reflected in around 46% of total retail turnover on food and liquor.\(^5\) In 2002/3, total sales and service income in the food processing industry was estimated at $65.9 billion.\(^5\) As a result of increased growth in 2002/3, the food and beverage sector maintained its position as the largest sector of Australia’s manufacturing industry in 2002/3.

The United States Department of Agriculture (USDA) identified opportunities for US exporters in the Australian Functional Food market to lie principally in the food processing and retailing sectors and the market is expected to grow to $A3.5M.\(^4\) A rate limiting step in the growth of this market is consumers’ understanding of Functional Foods.\(^4\) One of the roles of the Functional Food centre is to raise consumer awareness and acceptance of Functional Foods.

Australia is a net exporter of food, with a surplus between exports and imports of $16.4 billion.\(^5\) Exported foods are mainly primary products, whereas substantially transformed food products dominate imported foods.\(^5\)

For the major food industries such as meat, grains and dairy, and more recently, wine, where over 70% of products flow to export markets, Functional Food opportunities will most certainly be in export markets and then possibly in functional ingredients (and as elaborately transformed foods).\(^5\)

Total world food exports were valued at around US$421 billion in 2002, of which around 36 per cent was ‘minimally transformed’. The most traded ‘minimally transformed’ food products on world markets in value terms are fruit and nuts, vegetables, fish and shellfish, grains and oilseeds.\(^5\)

Whilst Australia is ranked seventh in world exports of ‘minimally transformed’ food (mainly in grains, shellfish, fruit, nuts and vegetables), it is ranked eleventh in ‘substantially or elaborately transformed’ (mainly beef and other meat, wine, dairy products and sugar).\(^5\) The most traded ‘substantially or elaborately transformed’ products on world markets in value terms are alcoholic beverages, meat, cereal flour and starches and milk.

A survey of Australian manufacturers indicates that of those who export some or all of their products, 68% intend to increase the degree of processing of their exports over the next 5 years. Increased exports were reported to be a major growth strategy for 74% of these companies.\(^15\)

Australia’s key perceived food export strengths were product quality, food safety, environmental friendliness and proximity to Asia. Major product opportunities that will be focused on over the next 5 years by respondents included wine, meat, dairy, sauces, flour mixes and fruit/vegetables.\(^15\)

Increasing exports of ‘substantially and elaborately transformed’ food products may therefore suggest an area requiring further development. Converting commodities into functional ingredients or foods will allow Australian companies to maximise their value add.

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Capitalising on the unique benefits of Australian produce, the added health benefit of Functional Foods may provide a means of differentiation from other similar products in export markets.
3.2 Market drivers

3.2.1 Population trends: identifying target markets

3.2.1.1 The aging population

Population growth rates are expected to decline in most countries. At the same time, life expectancy is increasing with females continuing to live longer than males.\(^\text{16}\)

- By 2025, life expectancy in males is predicted to be around 79 years in Japan to 71 years in Indonesia and in females, from 85 years in Japan to 75 years in Indonesia.
- Consequently, the percentage of the population aged over 65 years is increasing and is expected to represent almost a quarter of the population in countries like Japan, North America and Europe and around 10-15% of the population in Asian countries (Figure 3).\(^\text{17}\)
- The Japanese government’s response to the increasing population of aged people in Japan was to develop ‘Food for Specified Health Use’ or FOSHU in an attempt to reduce health care-related costs.\(^\text{18}\)
- Health issues and costs associated with an aging population, may increase the demand for Functional Foods, including in food service operations.\(^\text{19}\)

![Figure 3 Predicted life expectancy (years) and percentage of the population aged 65+ years in 2025\(^\text{16, 17}\)](image)

3.2.1.2 Fewer children per family unit

With declining population growth, the percentage of the population below 14 years of age is expected to decline by about 10% in most countries to around 20% of the population by 2025 (Figure 4).\(^\text{17}\)

- This means that in countries, such as Japan, there will be more older people than children by 2025.
Household size is expected to decrease from around 4 persons per households currently in Asia to around 2 in key markets such as China, Japan, Korea, Europe and North America by 2025.\textsuperscript{16}

Social and economic implications associated with a decreasing number of children in a family unit will impact on families’ food consumption behaviour and attitudes towards children.

There may be greater interest in nurturing the well-being of children and more pressure to restrict marketing of products perceived to be unhealthy to kids.

Figure 4 Predicted percentage of population aged below 14 years and household size in 2025\textsuperscript{16, 17}

3.2.1.3 Largest population groups - Baby boomers and Generation X

The largest age group around the world is Generation X (20-44yrs) (Figure 5).

- They represent between 30 to 40% of the population globally.\textsuperscript{17}
- Growth rates in this cohort are expected to drop slightly in this age group.
- Young adults (18-25 years) are used to supplementation, interested in performance and have had different exposure to information than the previous generation.
- This may explain why energy beverages were the fastest growing supermarket item for 2003 in the USA.\textsuperscript{20}

Baby boomers are the second largest age group around the world (45-65yrs) (Figure 5).\textsuperscript{17}

- They represent approximately a quarter of the population in countries around the world.\textsuperscript{17}
- They are growing cohort and are expected to represent approximately a third of the population in 2015.
- Their health needs will differ because there is a 20- year age gap in this age group.
- The changing household structure, with children leaving home, will also impact on their food consumption behaviour.\textsuperscript{6}
### 3.2.2 Health drivers: reflecting the need

Lifestage (age) and disease risk are the two main variables in health status that can be applied to populations, so profiling these will help determine the ‘Functional Food’ consumer. On a global scale, diet and nutrition can play a key role in the prevention of excess weight and obesity, diabetes, cancer, dental disease and osteoporosis.²¹

#### 3.2.2.1 Obesity

Obesity is increasing globally putting the prevention and management of overweight and obesity at the top of the list of diet related public health concerns.

- Since 1980, obesity rates have tripled or more in some parts of North America, Eastern Europe, the Middle East, Australia and China.²²
- In Australia, 60% of Australian adults are either overweight or obese.²³ In the US, 65% of adults are overweight or obese, 30% are obese and 5% are extremely obese.²⁴
- In China, whilst only about 18% of Chinese are currently overweight (mainly in 35-59 yr age group), it is expected to rise to 37% in men and 40% in women by 2025.²⁵
- Similarly, in India, the proportion of overweight and obese will increase from 9 to 24% from 1995-2025.²⁶

Children are also gaining weight.

- In Australia, the prevalence of overweight has doubled and obesity has tripled from 1985-1995.²⁶
- More recent data from the US indicates that 16% of children aged 6 to 19 years are overweight and 31% or at risk of overweight.²⁴
- In southern Europe, around 35% of children aged 7 to 11% are overweight.²⁷

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**Figure 5 Numbers of Generation X and baby boomers**¹⁷
In Asia, rising obesity has been reported in Japanese children where contributing dietary factors are thought to be changes in food choices and eating patterns (such as skipping breakfast and eating out). Overweight and obesity are associated with diseases and conditions such as coronary heart disease, heart failure, stroke, high blood pressure, high blood cholesterol, type 2 diabetes, certain cancers and psychosocial problems. Overweight and obesity are associated with diseases and conditions such as coronary heart disease, heart failure, stroke, high blood pressure, high blood cholesterol, type 2 diabetes, certain cancers and psychosocial problems.

There is concern that rising obesity may eventually challenge life expectancy. With more than 1 billion overweight adults worldwide and at least 300 million who are clinically obese, WHO predicts that unless action is taken, by 2020 there will be 5 million deaths attributable to overweight and obesity, compared to 3 million now. Reports of increasing incidence of type 2 diabetes in overweight children are emerging. This puts the prevention of overweight and obesity to the top of the list of diet related public health concerns.

Recommendations emphasise energy balance:

- Health authorities are recommending greater control of the energy density and portion size of food products to reduce the intake of energy (measured as calories or kilojoules).
- Nutrition practitioners are adopting more individualised dietary approaches to weight management including low fat, higher protein and low glycaemic index.
- Since the contribution of other factors to weight gain, such as physical activity, behaviour, social and cultural influences, are emphasized, there will be increasing demand for weight loss food products to adopt a holistic approach, by providing additional services which will help customers to succeed in weight loss.

3.2.2.2 Diabetes

The global prevalence of diabetes was estimated at 2.8% in 2000 (171 million people) and is expected to rise to 4.4% in 2030 (366 million people) with increasing urbanisation and an ageing population.

- In Australia, 7.2% over 25 yrs suffer from type 2 diabetes and a further 16.1% have impaired glucose metabolism.
- The prevalence of diabetes is expected to more than double in China and India.

This will increase the impetus for preventive approaches, including diet, exercise, pharmaceutical approaches as well as Functional Foods.

- Management of blood glucose and insulin along with weight control is the cornerstone of management for diabetes.
- There is increasing evidence that high insulin levels may be associated with other health conditions such as metabolic syndrome and some types of cancer.
- Functional Foods may provide opportunities for the use of highly specific dietary prescription in dietary counselling to improve compliance and client outcome.

3.2.2.3 Cardiovascular disease (CVD)

Cardiovascular disease (including heart disease and stroke) will be the leading cause of both death and disability worldwide – increasing from 20 million a year to 24 million by 2030. Cardiovascular disease (CVD) is responsible for 10% of disability-adjusted life years lost in low- and middle-income countries.
• CVD is more prevalent in India and China than in all economically developed countries in the world combined. It is the leading cause of death in China, accounting for a third of all deaths, due to the high prevalence of key risk factors including hypertension, high fasting serum glucose, high blood cholesterol and low HDL cholesterol and increases in BMI and waist circumference.40
• Compared to 2000, the number of years of productive life lost to CVD will increase in 2030 by 57% in China, 95% in India (compared to only 20% in US).25

In Australia, the AUSDIAB study showed that over 54% of adults surveyed had high blood cholesterol, 7.3% were on treatment for high cholesterol and 29% suffered from high blood pressure.34

Dietary recommendations for the prevention and treatment of cardiovascular disease:
• The main focus is on lowering saturated fat.41
• More recently, there is debate regarding the adverse effect of trans fatty acids and whether to introduce mandatory trans fatty acid food labelling.42
• Intake of foods containing long chain omega 3 polyunsaturated fatty acids, such as fish, whole grains, nuts fruit and vegetables are encouraged.43
• Concerns about cardiovascular are influencing food choice.6 Attempts to manage high blood pressure and high cholesterol are influencing choice of foods which are low fat, low saturated fat, whole grain and low sodium.6

3.2.2.4 Mental health

Major depression is the leading cause of disability worldwide (5 years and older), particularly amongst women.39
• In terms of disease burden, major depression is ranked second in established market economies.
• With the aging of the world population and a decrease in the incidence of infectious diseases, the prevalence of phsychiatric and neurological conditions will increase.

Although current health recommendation do not focus on diet, it is possible that as scientific evidence becomes available, opportunities for Functional Foods will emerge.
3.2.3 Regional opportunities: a growing market for Functional Foods in Asia

Around 70% of Australia’s 2003-4 food exports went to Asia Pacific Economic Cooperation (APEC) member countries.\(^5\)

Asia is a major market, with annual food and beverage expenditure estimated at $US858 billion, where Japan ($US322b) and China ($US118b) provide the largest markets.\(^5\)

China and India represent 37% of the world population, followed by the USA at 4.6%.\(^17\)

The changing demographics in the Asia Pacific region provide opportunities for Functional Food development for Australian food companies

- In particular, those countries experiencing increasing urbanisation and higher incomes, lower birth rates and greater life expectancy.\(^16\)
- The high profit margin aged care sector is growing.\(^19\)
- Younger age groups are demanding more processed foods.\(^44\)
- Both these factors reflect opportunities for value added and more nutritious foods.

Increasing urbanization will increase consumer expenditure in foods and beverages and demand for processed foods from restaurant and fast food outlets and pre-prepared meals from supermarkets.\(^5\)

- Urbanization is expected to reach more than 60% globally by 2030.\(^16\)
- Although the level of urbanization has been slower in Asia compared to the rest of the world, it is expected to increase.
- In China and Indonesia, the percentage of the population living in urban settlements was 34% and 40% in 2000 and is expected to increase to 52% and 58%, respectively, in 2025.\(^16\)

Although Gross National Income (GNI) per capita in Asia in 2003 was lower compared to other countries, it is expected to rise.\(^45\) It varies from:

- US$12,020 in Korea to US$3,780 in Malaysia,
- US$2,190 in Thailand to US$1,100 in China, and
- US$810 in Indonesia to US$530 in India.

China, Korea and Indonesia have experienced the largest increases in GNI per capita from 1999 to 2003 of around 20-30%.

- In comparison, the United States and Japan have the highest Gross National Income (GNI) per capita. In 2003, it was US$37,610 and US$34,510, respectively.
- GNI per capita of Australia and the European Union was US$21,650 and US$22,850 in 2003, respectively.

Consumers in the Asia Pacific region reported being concerned about health (57%), which is the second most important issue after the economy (66%).\(^46\)

- In China, 70% were concerned about health and 68% in Korea.\(^46\)
- Media coverage of Functional Foods and supplements in Asian magazines is increasing.\(^47\)

Functional Foods are perceived as vegetables (whole, juiced), fruit (watermelon, cranberry juice, mango, papaya, pineapple), soy products, fish and fish sauce, green tea and traditional foods (Korea – pickles, fish paste, green tea, beancurd).
• Health drivers such as concerns for diabetes, obesity and heart disease, once rarely mentioned were now amongst the most popular topics, and were linked to the use of foods for their management and prevention, such as high fibre foods, specific bioactive phytochemicals such as lycopene and calcium. Interest was also seen in wellbeing (immunity, aging, visual acuity and mental health).

Although dietary recommendation from health authorities in Asia are similar to Western societies, relationships to food, and in particular Functional Food, may be different.

• Strong traditional beliefs and philosophies, where diet is perceived as integral to good health, are likely to facilitate the acceptance and uptake of Functional Foods for general health and wellbeing, and for the prevention and management of health conditions.
• A point which is demonstrated in Japan. Since the FOSHU was developed in 1990, approximately 5,500 new Functional Foods have been introduced in Japan.
• Traditional beliefs on the health giving properties of food may have more significance with consumers than formal regulatory processes and marketing efforts. The same may be true of China.

Like most consumers globally, Asians are also trying to lose weight:

• 90% of Koreans, 80% of Singaporeans and 66% of Chinese reported trying to lose weight.
• It seems that weight loss practices may be unrelated to perceptions of weight status but more related to perceptions of optimal health.
• Interestingly, the ‘low carb’ trend appears to be less popular in Asia than in the US. Most Asians reported cutting out fat and/or sugar for weight loss. In Korea, Weight Watchers or other slimming programmes were popular.

3.2.4 Consumer insights

Health and convenience were the major drivers of the global food industry in 2004 and are predicted to continue to be important in 2005.

• Overall, there is a trend for the percentage of the female population who are economically active to increase and this will have an impact on food consumption behaviour.
• Time pressures are causing an increasing use of prepared meals, meals eaten out of the home and snacking.
• In the Asia Pacific region, 59 per cent of Malaysians, 41 per cent of Chinese and 30 per cent of Australians reported eating at take-away restaurants at least once a week and smart consumer packaged goods manufacturers are tapping into consumers need for convenience.
• The need for convenience will drive top trends such as ‘easy to prepare’ meals, take-away or restaurant meals and snacks.

As health concerns continue to rise, demand for fresh, healthy convenient foods will increase, including healthy food service options.

• ‘Organic’, ‘natural’, ‘sustainably grown’, ‘free range’ and ‘grass fed’ will also need to be considered in the mix, at least in the USA.
• Vending machines are including more healthy food options in the US where half of Americans are already regular snackers, and one-third of consumers are either skipping a meal or grazing all day.
• Bars and beverages, particularly energy drinks and flavoured water, are the fastest growing part of the nutrition business and reflect the trend towards personalised choices about nutrition, single-serve, hand-held products.1,6
• Personalised nutrition will drive packaging innovation such as ‘daily dose’ drinks and other dietary solutions to meet individual health needs.1
• Similarly, ingredients for treating health conditions, such as arthritis and high cholesterol which are currently found in pills and supplements will be used in drinks and food.1

Consumers’ desire for health coupled with convenience-style eating, which is generally perceived as unhealthy, creates a tension for consumers. It does, however, present an opportunity for the development of Functional Foods that not only deliver health benefits, but also convenience such as healthy ‘easy to prepare’ meals, snacks, bars, beverages, food service options, ‘daily dose’ drinks and other dietary solutions.

3.3 Opportunities in key markets

By highlighting key trends from information derived from market trends and health intelligence, it is possible to identify opportunities for Functional Foods.

Australia exports most of its food, but ostensibly as primary product. A stronger position may be achieved by capitalising on the unique benefits provided by these foods as well as increasing numbers of processed foods.

Functional Foods provides a means to this end by virtue of demonstrated benefits that differentiate them from similar products.

Opportunities in specific markets can be identified through analyses of population and disease risk trends combined with an understanding of culture specific consumer responses.

A summary of potential opportunities for Functional Food markets in specific countries is outlined in Appendix 1, using information from research commissioned by the National Food Industry Strategy.

This report emphasises the extent of variation in the Asian region in particular, noting key differences with respect to health and social drivers, and the types of foods that may be successful within core food categories.
4 Science drivers – where are the best opportunities?

The relationship between food and health is fundamental in the growth, development and wellbeing of humans as well as the protection of health and subsequent management of disease. There is a strong body of evidence underpinning this knowledge. Functional Foods now challenge the way this information is communicated and health claims are regarded as important in this process.8

Functional Foods have the potential to relate to a large number of health benefits. Although there is a vast body of scientific methodology supporting this process, it is uneven in the extent to which it can provide convincing evidence.

Consensus on the scientific evidence required to support health claims is a significant part of the evolution of Functional Foods around the globe. A number of government, scientific and industry organisations have worked collaboratively to facilitate this process.

Here, science helps to categorise Functional Foods based on the type of health benefit and describes the type of evidence required to claim that health benefit. The scientific evidence is further qualified as ‘convinving’, ‘probable’, ‘possible’ or ‘insufficient’.51

One of the most productive activities in this regard has been the European project PASSCLAIM (Process for the assessment of scientific support for claims on foods), which has identified key markers of health outcomes relevant to different health and disease states in which there is substantive science to support the development and commercialisation of Functional Foods.52, 53

PASSCLAIM reports that there must be robust scientific evidence to measure a product’s ability to provide health benefits. Where there are sound markers of disease by which to measure benefits; there is good evidence supporting these health benefits.

The most developed scientific areas relate to lifestyle diseases including:
- Body weight regulation
- Cardiovascular disease
- Diabetes
- Osteoporosis.

There is a need for consensus on performance measures.

More specific understanding of how concepts of gut health and immunity might relate directly to food is required.44

Nevertheless, the body of science is extensive, and the challenge remains to develop effective synergies between science and food product development for the benefit of the consumer.

For each of the conditions below, the conclusions from the PASSCLAIM report in relation to the strength of the evidence for both markers and health benefits are summarized and implications for health claims considered.

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For each of the conditions below, the conclusions from the PASSCLAIM report in relation to the strength of the evidence for both markers and health benefits are summarized and implications for health claims considered.
4.1 Diet related cardiovascular disease

**LDL-cholesterol and blood pressure**
- There is good evidence that diet-induced changes in LDL-cholesterol and blood pressure are related to changes in risk of CVD.\(^{54}\)
- The available scientific evidence provides opportunities for the development of Functional Foods for the management and treatment of LDL-cholesterol and blood pressure.
- There is sufficient evidence to support use of enhanced function claims and risk reduction claims in the commercialisation of this category of Functional Foods, such as:
  - “Can help to lower cholesterol”
  - “Helps maintain a healthy heart”
  - “May lower blood pressure”
  - “May lower the risk of stroke/heart failure/cardiovascular disease/coronary heart disease”.
- However, the regulatory requirements of countries in which products will be marketed will ultimately determine the type of claim used. In some countries, the reduction of disease risk or management of biomarkers would not be permitted.

**HDL-cholesterol, triglycerides, homocysteine**
- Further research is required to demonstrate that diet-induced changes in HDL-cholesterol, triglycerides and homocysteine reflect enhanced function and reduction of disease risk.

**Haemostatic function and oxidative damage**
- For haemostatic function and oxidative damage, further research is required to develop validated markers of enhanced function and disease risk reduction that are sensitive to dietary changes.
- A high concentration of plasma antioxidants is not sufficient evidence to conclude that an increased intake of antioxidants helps prevent CVD.
- Further research is required to determine bioavailability of antioxidants, synergistic activities of combinations and their impact on CVD risk.
- However, increasing intake of fruit and vegetables is considered beneficial and this presents opportunities for the development of Functional Foods.

4.2 Bone health and prevention of osteoporosis

Scientific evidence linking the consumption of a food or food component to bone health outcomes provides opportunities for the development and commercialisation of Functional Foods.\(^{55}\)

Two main outcomes were identified:

**Enhanced bone health**
- Evidence of enhanced function is available for people of any age and sex through the intermediate marker of bone mineral density (BMD).
- This evidence is sufficient to substantiate an enhanced function claim such as:
  - “Increases bone density”.
- However, bone turnover and calcium bioavailability do not stand alone as bone health endpoints.
Reduced risk of osteoporosis

- In populations of peoples over 50 years with high incidence of fracture, BMD can be an intermediate marker of osteoporotic fracture risk, although this would require clinical trials indicating treatment and prevention.
- Evidence of an increased probability of a reduction in osteoporotic fracture risk could be used to substantiate a claim such as:
  - “May reduce the risk of osteoporosis in a defined subgroup of the population”
  - “May reduce the risk of fracture in a defined subgroup of the population”.

Nutrient function claims

PASSCLAIM also noted the need to research nutrient bioavailability, in the context of the food matrix and whole diet, when addressing nutrient function claims.

4.3 Body weight regulation, insulin sensitivity and diabetes risk

Opportunities for Functional Foods related to body weight regulation address the prevention and treatment of metabolic syndrome (a cluster of conditions associating obesity with diabetes and heart disease risk).56

The evidence reviewed indicates that in body weight regulation, metabolic syndrome and diabetes the link between nutrition, biological responses and disease is clearly established and therefore, there is strong potential to develop Functional Foods.

Overweight

- There is good evidence to substantiate the beneficial effects of foods in relation to body fat deposition.
- Examples of the type of claims associated with this evidence, regulatory requirements permitting, include:
  - “Reduces the risk of body weight gains”
  - “Decreases body fat”.
- There is also good evidence that lowering energy intake either by reducing the appetite or by lowering the energy density of the eaten foods is able to facilitate body weight reduction. However, long term studies are required.
- Examples of claims associated with relevant associated functions which could be considered, if regulatory requirements permit, include:
  - “Helps to reduce energy/food intake”
  - “Reduces appetite”
  - “Increases satiety”
  - “Increases metabolic rate/energy expenditure”

Insulin sensitivity

- It is well established that impaired insulin sensitivity increases the risk of developing metabolic syndrome and type 2 diabetes mellitus.
- Functional Foods able to improve validated markers of insulin sensitivity may possibly be able to apply for an enhanced function claim, regulatory requirements permitting. Examples include:
  - “Improves insulin sensitivity”
- “Helps to reduce the risk for the metabolic syndrome”.

- Evidence supporting functions associated with insulin sensitivity is strongest for non essential fatty acids (NEFA).

- Further research is required to support claims for changes in fatty acid composition, oxidative stress, inflammation and vascular function in relation to insulin sensitivity.

**Diabetes**

- The link between blood glucose levels and the incidence of long-term diabetic complications is clearly established.

- Since blood glucose levels are markers of disease risk for diabetes and cardiovascular disease, there is scope for the development of Functional Foods which have a positive effect on blood glucose for both patients with and without diabetes.

- These type of foods may possibly apply for the following types of claims, depending on regulatory requirements, such as:
  - “Improves blood glucose control”
  - “Reduces the risk of type 2 diabetes”
  - “Helps to reduce the risk of long-term complications of hyperglycaemia”.

- Further research is required to determine the effect of a low glycaemic index/load diet on post-prandial glucose levels and subsequent CVD risk. The PASSCLAIM report noted that beneficial effects of foods would relate to functions associated with insulin sensitivity and blood glucose regulation.

The PASSCLAIM report provides critical debate on the methodological validity of markers of disease and the physiological functions listed above, noting that the quantity and quality of evidence varies. The main issue here, however, was the need for more and better quality dietary intervention trials of sufficient duration to demonstrate long term effects.

### 4.4 Physical performance and fitness

Opportunities for Functional Foods related to fitness would target links between food consumption and enhanced physiological functions. The PASSCLAIM report notes that guidelines for assessing the scientific support of claims have yet to be developed, however, areas to which these may relate have been identified as:

- Muscle strength and power
- Endurance, energy supply and recovery
- Hydration/re-hydration
- Flexibility
- Tissue growth
- Free radical scavenger capacity
- Immune function

There are a range of methods in the scientific literature with generally good reproducibility and precision, but conducting these studies in appropriate target populations will need considering when determining marketing messages.
4.5 Mental state and performance

Opportunities for Functional Foods in this area rely on evidence of functional specific effects rather than broad effects of mental wellbeing. The PASSCLAIM report identified a number of acceptable scientific methods to demonstrate effects, but there are complexities associated with definitions and study conditions requiring close attention to detail. The potential specific effects related to58:

- Mood
- Arousal, activation, vigilance, attention and sleep
- Motivation and effort
- Perception
- Memory
- Intelligence

The PASSCLAIM team note that issues requiring special consideration in this field include:

- The amount of active substance and duration of effect.
- The generalisation of effects, particularly under normal food consumption conditions.
- The dependence on verbal reports to measure effects and the challenges created by cross cultural and language differences with this methodology.
- The size of the effect and the potential differences between statistical and clinical significance of results.
- Differences in target populations.

This is perhaps one of the most problematic areas in establishing sound evidence. Again the context of the study is important with a need to fully characterise the food, the conditions in which it is consumed, the target population and the position of the food in the overall diet. Consideration would then be required in extrapolating this to the ‘free living’ conditions of the consumer.

4.6 Gut health and immunity

Opportunities for Functional Foods in this area were linked to notions of bowel habit and transit time (linked to disease risk), as well as the concept of immune function as an adaptive system.59

Immunity

- It was questioned whether immune function can be improved.
- While no single definitive test exists, the functional capacity of the immune system could be measured by specific cell function ex vivo; responses to in vivo challenges; and population studies of infection rates and severity at specific times.

Gut health

- While the bacterial population of the gut is recognised as important in digestion and the maintenance of defence systems, the PASSCLAIM team argue that it is difficult to substantiate benefits with little knowledge of optimal function or an understanding of human variation.
- Gut wellbeing may be a subjective matter, not something that lends itself well to scientific methodology.
For gut health and immunity, therefore, demonstrating the benefits of Functional Foods is likely to be limited to results of single descriptive tests without a global claim to overall health benefit.

4.7 Prevention of diet related cancer

Opportunities for Functional Foods in this area focus necessarily on cancer prevention and thereby are reliant on biomarkers and surrogate endpoints to establish evidence of benefits. The PASSCLAIM team identified 5 targets/markers that might suggest potential benefits via reduced disease risk from Functional Foods including tumours (eg polyps) and precancerous lesions; cellular targets and markers; gut luminal markers; angiogenesis and metastasis; carcinogen metabolising enzymes; and genetic events.

- Tumours appear amongst the strongest markers, in humans and animal models respectively.
- Polyp recurrence was seen as the only marker currently suitable for adequately demonstrating reduction of disease risk.
- The report emphasised that evidence for reduction of disease risk needs to be based on human intervention trials with acceptable endpoints and that more research was required in validating these end-points.
- Most markers to date can only support evidence of effects on risk such as exposure to carcinogens and reduced DNA damage.
- Susceptibility to the disease and to the effects of protective agents was another important consideration in the application of science to Functional Food development.
5 Regulation

An understanding of regulatory affairs is crucial in determining opportunities for product development as well as planning their promotion and labelling. There are three areas which may need to be considered in the development and marketing of Functional Foods:

- Whether particular novel ingredients will require special permission before use in a Functional Food. In Australia and New Zealand, food regulations require companies to apply for permission to market novel or non-traditional foods or ingredients that do not have a history of safe use.

- Whether food regulations control the type and amount of vitamins, minerals and other bioactive (such as phytoestrogens, probiotics or antioxidants) substances which can be added to foods. In Australia and New Zealand, the current legislation permits the addition of vitamins and minerals to specified foods only, with maximum permitted levels.

- What form of health claims are permitted on labels and in advertising and the level of evidence required to substantiate claims.

Food regulations differ significantly internationally but, with the exception of Japan, most countries do not have special food standards governing Functional Foods. What is permitted in one country may not be permitted in another. It is therefore essential to check the regulatory requirements in each country where products are to be marketed.

5.1 Health claims

Since Functional Foods are marketed on a health platform, regulations related to health claims are of most interest. Health claims are seen by many companies as essential tools for the successful marketing of Functional Foods. 61

There are different types of claims, including 51:

- **Nutrient content** and comparative claims such as “this product is a good source of X” or “this product is low in X”.

- **Structure function claims** such as “this product contains X which help maintain blood vessels” or “this product contains X which is important for healthy teeth and bones”.

- **Health claims** usually describe a relationship between diet and health. For example, “this product contains X which may reduce blood cholesterol levels”.

- **Therapeutic claims** such as “this products contains X which prevents cancer” are not permitted on foods.

Nutrient content and function claims are commonly found on food products throughout the world, however the regulation of health claims varies widely.

In many countries, health claims are forbidden, or permitted only after approval by a national regulatory body. However, a number of countries or regions have or are in the process of developing regulations about health claims for foods.

There is a recognition that regulations relating to Functional Foods and the use of health claims is required. Several regulatory bodies are working towards a harmonization of legislation relating to
health claims, including Codex Alimentarius (the international body that aims to develop common approaches to food regulations between countries) and the European Union.\textsuperscript{62}

At present health claims are currently not permitted on food labels or associated advertising in Australia or New Zealand, with one exception (folate and prevention of neural tube defects). However, a new standard is being considered that would permit general-level or high-level claims to be made, provided there was rigorous scientific substantiation, is being considered. General-level claims include nutrient content, structure function claims, or health claims that refer only to non-serious diseases or conditions; and high-level claims refer to serious diseases or conditions or biomarkers of such diseases (such as cholesterol). It is expected that the new regulations will be in place in 2006, including pre-approved high-level health claims and detailed requirements for substantiation of claims. Pre-approved high-level health claims are being considered for the following relationships\textsuperscript{63}:

- Sodium (with or without potassium) and hypertension
- Fruit and vegetables and coronary heart disease
- Wholegrains and coronary heart disease
- Saturated and/or trans fat and elevated serum cholesterol or heart disease
- Calcium (with or without vitamin D) and osteoporosis
- Folate and neural tube defects
- Omega-3 fatty acids and coronary heart disease

The following countries have approved health claims for use on food products\textsuperscript{62}:

- The Food and Drug Administration (FDA) in the USA has approved a total of 19 health claims for use on food labels.
- Health Canada has approved five high-level claims.
- In Sweden, the Swedish Nutrition Foundation has approved 10 high level claims and 4 product-specific physiological claims.
- The Joint Health Claims Initiative (a co-regulatory organization with industry, consumer and government representation) in the UK has approved 6 health claims, but only 3 are permitted for use on foods. JHCI also maintains a register of approved nutrient function statements.
- Japan has a system of scientific evaluation of product-specific health claims: Foods for Specified Health Use (FOSHU). There are over 300 FOSHU approved products. An additional system of ‘Foods with Nutrient Function Claims’ (FNFC) includes approved nutrient function claims for twelve vitamins and two minerals.

The type of health claims that are permitted in these countries, listed in order from the most commonly permitted claim, include:

- Saturated fat and trans fat/dietary fatty acids and reduced risk of coronary heart disease or lower blood cholesterol (Canada, USA, UK, Sweden)
- Calcium and vitamin D and reduced risk of osteoporosis (USA, Sweden and Canada)
- Low sodium/salt and high potassium and reduced risk of hypertension (USA, Sweden, Canada)
- Wholegrain foods and reduced risk of heart disease (Sweden, UK, USA)
- Fruit, vegetables and some cancers (Canada, UK, USA)
• Fermentable sugars and avoidance or reduced risk of dental caries (Canada, Sweden, USA)
• Omega-3 fatty acids and reduced risk of cardiovascular disease (Sweden, USA)
• Soluble dietary fibre and lower cholesterol (Sweden; USA)
• Soy protein (25g/day) and reduced blood cholesterol (UK, USA)
• Folate and neural tube defects (USA, Australia/New Zealand)
• Fruit, vegetables, grain products reduced risk of coronary heart disease (USA)
• Energy content of foods and weight control (Sweden)
• Nuts and reduced risk of heart disease (USA)
• Plant sterols/stanol esters (at least 3.4g in two meals) and reduced risk of heart disease (USA)
• Monounsaturated fatty acids from olive oil (23g daily) and reduced risk of coronary heart disease (USA)
• Dietary fat and reduced risk of cancer (USA)

5.2 Opportunities and challenges

5.2.1 Applying to use health claims

While the approval of a claim in one country can provide useful evidence when applying for approval in another, permission to use a health claim has to be sought in each market independently.

The process for gaining approval for health claims will differ between countries. In the US, for instance, companies may apply to the FDA for approval of specific health claims, and this has been granted for some ingredients, such as oats and soy protein.

The scientific evidence required to substantiate health claims in most countries will need to address established evidence-based principles for assessing nutrition evidence including consistency, quality, biological plausibility and relevance. This can be a costly and lengthy process. However, consumers are sceptical of health claims from food companies and strongly agree with the idea that health claims should be regulated by government agencies.

Even if health claims are permitted, marketing of health benefits can be limited by restrictions in the wording of the health claim. Consumers generally don’t like long and complex, scientifically worded claims on foods and prefer split claims – with a short succinct statement of the claim on the front of pack.

In the US, after the introduction of legislation that allowed regulated health claims, there was a significant decrease in the use of health claims on pack and in advertising. Manufacturers were reluctant to use high-level health claims mainly due to the cost of substantiation and the restricted (and sometimes unfriendly) wording required for the claims.

5.2.2 Leveraging nutrient content claims

While the health benefits of Functional Foods need to be communicated to consumers if products are to be successfully launched, this does not always have to be via overt high-level claims about disease or performance on pack or in advertising.
Health claims on foods are seen by consumers as useful and when a product features a health claim they view it as healthier and state they are more likely to purchase it.66

Interestingly, consumers do not make clear distinctions between nutrient content claims, structure-function claims and health claims. Consumers may respond equally well to simple nutrient content claims, once they are aware of the benefits of ingredients (e.g. “with the benefits of omega-3 fats”).

In addition, a range of well established nutrient function claims are approved for use in Australia, Japan, Malaysia, UK and Sweden and these may be useful for identifying nutrition marketing opportunities other than health claims.

Public relations opportunities can be used to raise awareness of emerging new research results among consumers.

Credible scientific information provided to health professionals is usually essential to promote a climate of acceptance of the role of innovative Functional Foods.

Using this approach, polyunsaturated margarines - among the first Functional Foods in Australia - were successfully launched forty years ago without any direct health claims about cardiovascular health.

5.2.3 Providing the evidence

The proposed new Australian standard on health and related claims will impose strict requirements for documentation and scientific substantiation of health claims that manufacturers will have to understand - even for general level claims.

Companies will probably need to seek expert assistance in developing dossiers of substantiation evidence to support claims about products.

However it is likely that the Australian system will permit general-level claims about health maintenance and wellbeing, without pre-approval by FSANZ. This should allow greater speed to market and retention of intellectual property than in many other countries.

5.2.4 Engaging in the process

Manufacturers need to keep abreast of developments in food legislation, which change rapidly.

In Australia there are always formal calls for comment on proposed changes to food standards, and companies should take the opportunity to make their views known.

Details of regulations in Australia as well as other key countries are kept on the website of the National Centre of Excellence in Functional Foods (www.nceff.com.au).

In particular the issues of approval of novel ingredients, fortification and health claims need to be understood.
6 Next steps

This paper defines Functional Foods as those promoted on a health platform and based on scientific evidence.

- This strong underpinning in science is what differentiates Functional Foods from other food categories.
- Credibility and a strong scientific underpinning is critical to not only meet regulatory requirements but to ensure the acceptance and sustainability of Functional Foods.

By combining knowledge of market opportunities, science drivers and regulatory conditions, we have identified that key opportunities for Functional Foods:

- Lie in export markets, particularly Asia;
- Should address the aging population;
- Concern for children’s health; and
- Diseases of lifestyle.

This suggests industry and companies should consider Functional Foods for healthy aging, appetite control and kids nutrition.

6.1 Foods for healthy aging

With an aging global population there is likely to be interest in food products which contribute to healthy aging both by individuals and governments.

- Baby Boomers are expected to demand Functional Foods which delay the onset of aged-related health issues.
- Health authorities are more likely to be driven by a need to reduce health care-related costs associated with aging.
- Health issues associated with aging include cardiovascular disease, diabetes and osteoporosis.

Opportunities for the development of Functional Foods to reduce risk of cardiovascular disease are supported by:

- Strong consumer demand - Consumers are already choosing food products to manage their blood pressure and blood cholesterol and demand is expected to rise as cardiovascular disease becomes the leading cause of death and disability worldwide.\(^5^4\)
- Extensive scientific evidence - There is good scientific evidence to measure dietary induced changes in LDL-cholesterol and blood pressure, and that these changes in LDL-cholesterol and blood pressure will reduce the risk of CVD.
- A suggestive regulatory environment - Several countries, including the USA, Sweden, Canada and the UK have approved health claims relating the consumption of dietary fatty acids, plant sterols, soy protein and soluble fibre with reduced blood cholesterol.\(^6^2\)
- Approved health claims also encourage intake of wholegrains, fruit and vegetables, omega-3 fatty acids and nuts to reduce risk of coronary heart disease.\(^6^2\)
- For blood pressure, approved claims relate to reducing sodium and increasing potassium.\(^6^2\)
- Core foods and ingredients already provide wide opportunities for the development and commercialisation of Functional Foods for a healthy aging heart.
Similarly, scientific evidence and approved health claims support the development and commercialisation of Functional Foods for healthy aging bones.\textsuperscript{55}

Diabetes is emerging as a major public health issue and demand for Functional Foods to manage blood glucose is likely to increase.

- The science is well established so it is possible to measure the effect and demonstrate the benefit.
- Whilst there are currently no approved health claims relating to consumption of foods and blood glucose and risk of diabetes, as the prevalence of diabetes increases, there will be pressure to instigate various public health measures, including food labelling.
- It should be noted that glycaemic index (GI) is a physiological assessment rather than a food component. Further research is required to determine how GI impacts on the risk of diabetes and CVD.

### 6.2 Foods for appetite control

With almost 1 in 2 people likely to be overweight or obese in the next twenty years, overweight and obesity is set to become the major public health issue globally.

- Although body image may no longer be a key motivator for weight loss as overweight becomes mainstream, health issues, such as risk of diabetes, heart disease and cancer, will drive demand for Functional Foods.
- There is scientific evidence that lowering energy intake by either reducing appetite or lowering the energy density of the eaten foods is able to facilitate body weight reduction.\textsuperscript{56}
- Consequently, health authorities are recommending greater control of energy density and portion size of food products to reduce energy intake (measured as calories or kilojoules).\textsuperscript{21}
- Sweden has approved a health claim relating reduced energy intake with weight loss.\textsuperscript{62}
- Developments such as these reflect both the pressure and the opportunity to develop more satiating and less energy dense foods. The Centre’s research suggests that the addition of protein to foods and low glycaemic index foods may help to increase satiety and other bioactives may also play a role.\textsuperscript{67}

### 6.3 Kids nutrition

As the number of children per family unit decreases, it is likely parents will be even more attentive to their children’s health needs. As the proportion of children decreases as a percent of the population, there may be increasing pressure to optimize children’s physical and mental performance.

Increasing childhood obesity has shown how health issues in children can elicit a response from society at all levels, including government and the food industry.

- The food industry may be pressured to produce only healthy foods for kids. Restricted marketing of products perceived to be unhealthy to kids has been debated.
- Changes in lifestyle, including both parents working, and increasing urbanisation will impact on the life of a child and will need to be considered.
- It is unlikely that health claims directed at children will be permitted but the use of nutrient content claims and public relations will help to raise awareness of the importance of nutrition for children’s health.
6.4 Working together

Functional Foods represent real opportunities in food innovation. The Functional Food centre is taking a lead role in identifying emerging opportunities in:

- Foods for healthy aging
- Foods for appetite control
- Kids nutrition

These form the basis of our strategic research program and the strategic initiatives that we are undertaking in partnership with industry.

We do this with the understanding that brand owners need to combine our work with their understanding of the market to further explore these opportunities for differentiation in the market.
References


42. Food and Drug Administration U. Food labeling: Trans fatty acids in nutrition labeling; Consumer research to consider nutrient content and health claims and possible footnote or disclosure statements: Docket no. 03N-0076. *Department of Health and Human Services*. Available at: http://www.cfsan.fda.gov/~1rd/fr03711b.html.


7 Appendices
### Appendix 1: Indicative opportunities for Functional Food markets

Information provided through commissioned research by the National Food Industry Strategy.

#### China

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<thead>
<tr>
<th>Health and social drivers</th>
<th>Opportunity by food category</th>
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<td>Dairy</td>
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<td>Increasing middle class (19% in 2003 rising to 40% in 2020)</td>
<td>Milk powder</td>
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<tr>
<td>Change in diets of urban population (less staples like rice and more poultry, seafood, oils and dairy products)</td>
<td>UHT milk</td>
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<td>Increase in supermarkets/hypermarkets</td>
<td>Cheese</td>
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1. In 2003, China imported $US1.9bn in seafood.
### Indonesia

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<tr>
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<th>Opportunity by food category</th>
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<td><strong>Dairy</strong></td>
<td><strong>Meat</strong> 1</td>
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<tr>
<td>Infant formula</td>
<td>Poultry</td>
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<tr>
<td>Milk and cream (concentrated and sweetened)</td>
<td>Beef, lamb, offal, goat, mutton</td>
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<td>Flavoured milk</td>
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<td>Cheese and curd</td>
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<td>Yoghurt</td>
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<td>Ice cream</td>
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<tr>
<td><strong>Expanding middle income segment – 30 million middle to upper income consumers shopping at supermarkets</strong></td>
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<tr>
<td><strong>Establishment of modern shopping malls in major cities</strong></td>
<td></td>
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<tr>
<td><strong>Increase in supermarkets / hypermarkets and associated refrigeration facilities</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Increasing variety of fast food chains and other specialty shops</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Preference for fresh over processed food and frozen over canned</strong></td>
<td></td>
</tr>
</tbody>
</table>

1 Frozen and chilled meat exports in 2001 were $A47m, $A16m for offal and $120m for live cattle.

2 Processed food sector estimated to be worth $US5.5bn, with growth forecast of 25 %pa.
Korea

<table>
<thead>
<tr>
<th>Health and social drivers</th>
<th>Opportunity by food category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dairy</td>
</tr>
<tr>
<td>Increased supermarkets (50% share of $US11.4b market)</td>
<td>Cheese</td>
</tr>
<tr>
<td>Health - a rising priority</td>
<td>Milk powder</td>
</tr>
<tr>
<td>Relatively low prevalence of obesity</td>
<td></td>
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<tr>
<td>Some awareness of ‘clean and green’</td>
<td></td>
</tr>
<tr>
<td>Traditional healthy eating customs (low fat, high vegetables)</td>
<td></td>
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</tbody>
</table>
### Malaysia

<table>
<thead>
<tr>
<th>Health and social drivers</th>
<th>Opportunity by food category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased urbanisation and middle income sectors</td>
<td>Dairy</td>
</tr>
<tr>
<td>Increase in supermarkets and hypermarkets (Giant, Carrefour, Tesco)</td>
<td>Infant formula / formulated milk powder</td>
</tr>
<tr>
<td>Increased demand for (Asian) convenience foods</td>
<td>Meat$^1$</td>
</tr>
<tr>
<td>Health conscious and vegetarian sectors</td>
<td>Cheddar and cheddar cheese</td>
</tr>
<tr>
<td>Australian 'clean and green' reputation</td>
<td>Ice cream</td>
</tr>
<tr>
<td></td>
<td>Beef (prime cuts, other cuts and offal), mutton, lamb</td>
</tr>
<tr>
<td></td>
<td>Halal certified meat</td>
</tr>
<tr>
<td></td>
<td>Live, chilled or frozen fish, crustaceans and molluscs.</td>
</tr>
<tr>
<td></td>
<td>Salted, dried and smoked seafood</td>
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<tr>
<td></td>
<td>Fresh fruit (oranges, apples, pears, grapes, plums, mandarins, lemons, mangoes, stone fruit, strawberries, kiwi fruit)</td>
</tr>
<tr>
<td></td>
<td>Fresh vegetables (cauliflower, carrots, broccoli, celery, lettuce, potatoes, onions)</td>
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<tr>
<td></td>
<td>Higher value processed foods</td>
</tr>
<tr>
<td></td>
<td>Cereal based products</td>
</tr>
<tr>
<td></td>
<td>Pure fruit juice orange juice concentrates, frozen vegetables, nits, canned fruit</td>
</tr>
<tr>
<td></td>
<td>Nutritious snacks (fruit rolls, yoghurt bars)</td>
</tr>
<tr>
<td></td>
<td>Health foods and bars</td>
</tr>
<tr>
<td></td>
<td>Halal processed meat</td>
</tr>
</tbody>
</table>

$^1$ Shift to interest in nutritional value of meat.

$^2$ $8.9M fresh and seafood products exported in 2002/3.

$^3$ $112.1M in 2002, (ABS).

$^4$ Packaged food market 2-3% growth to $14.8b in 2003.
### Philippines

<table>
<thead>
<tr>
<th>Health and social drivers</th>
<th>Opportunity by food category</th>
</tr>
</thead>
<tbody>
<tr>
<td>High population growth rate</td>
<td>Dairy¹</td>
</tr>
<tr>
<td>Increasing purchasing power</td>
<td>Meat</td>
</tr>
<tr>
<td>Increased health consciousness and interest in foods with low calories, cholesterol, sugar, salt and fat</td>
<td>Seafood</td>
</tr>
<tr>
<td>Increased interest in natural and organic food among high income consumers</td>
<td>Fruit and Vegetables²</td>
</tr>
<tr>
<td>Increase in supermarket and convenience store shopping</td>
<td>Cereals / Processed food³</td>
</tr>
</tbody>
</table>

- **Dairy¹**: Industrial ingredients (milk powders, milk fat, cheese curd), Bulk processed dairy products (e.g., Cheese), UHT milk, cheese yoghurt
- **Meat**: Frozen poultry pork, pork bellies and boneless beef, lamb
- **Seafood**: Frozen squid and mackerel, Meat products, fresh and processed – hot dogs, ham, bacon, cold cuts, corned beef, meat spreads, luncheon meats
- **Fruit and Vegetables²**: Fresh apples, mandarin oranges, grapes, lychees, iceberg and romaine lettuce, broccoli, cauliflower, celery, mung beans, garlic, peas and pulses, Frozen potatoes
- **Cereals / Processed food³**: Frozen ready meals, Confectionary and snack food, Non-alcoholic beverages, Health foods

¹ In 2000, dairy imports = $US377m, Australian exports of milk and cream in 2002/03 was $A213.
² Australia had 75% of the fresh/chilled vegetable market in 2003 and exported $A18 fruit and veg in 2002/03.
## Taiwan

<table>
<thead>
<tr>
<th>Health and social drivers</th>
<th>Opportunity by food category</th>
</tr>
</thead>
<tbody>
<tr>
<td>78% urban population with high level of disposable income</td>
<td>Dairy¹</td>
</tr>
</tbody>
</table>
| Processed food and drinks increasing in popularity - retail stores increasing their offerings of convenience, microwaveable, vegetarian and health foods | Fermented dairy drinks  
Powder milk  
Drinking Yoghurt                                                                                      |
| Food and beverage impetus in shopping malls is towards high value items (delicatessens, confectionary, specialty cakes, food and beverage gift items) | Meat¹                                                                                                                                                    |
| Increase in home shopping and internet retailing                                            | Meat                                                                                                                                                    |
| Increase in organic food specialty stores (fueled by growing awareness of organic foods and belief that they are healthier) | Seafood³                                                                                                                                                 |
| Increase in convenience, supermarkets and hypermarkets (Carrefour, Costco, Tesco, RT Mart) | Fish                                                                                                                                                    |
| Increasing popularity of specialty shops (inc. bakeries and confectionary shops) with stronger emphasis on novelty items | Fruit and Vegetables⁴                                                                                                                                  |
|                                                                                           | Cereals / Processed food⁵                                                                                                                                 |
|                                                                                           | Small packaged products                                                                                                                                   |
|                                                                                           | Ready to cook dishes - soup, pasta frozen food                                                                                                           |
|                                                                                           | Chilled ready meals                                                                                                                                          |
|                                                                                           | Organic grains, beans, lentils, tree nuts and dehydrated fruit                                                                                                |
|                                                                                           | Popular organic foods include noodles, pastas and canned soups, olive, sunflower, tea seed, and sesame oils, soy sauce and miso                              |
|                                                                                           | Popular beverages include herb teas, apple juice, veg. juice, low-salt tomato juice. Wheat grass powder and fibre powder also popular                        |

¹ Dept. Health suggested dairy to build immune system as a defence against SARS.
³ Fish consumption doubled between 1959/61 and 1989/91.
⁴ Fruit consumption increased 500% between 1959/61 and 1989/91.
⁵ Imported food and drink market > $US8.35bn in 2002; Packaged food sales expected to reach $US5.7bn in 2008; Organics expected to reach $US17.8 million over next 3 years.
<table>
<thead>
<tr>
<th>Health and social drivers</th>
<th>Opportunity by food category</th>
<th>USA</th>
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</thead>
<tbody>
<tr>
<td>High belief in food as medicine - 2/3 regularly consume at least 1 food for its functional health benefit</td>
<td>Dairy</td>
<td>Organic dairy products</td>
</tr>
<tr>
<td>Increasing interest in maintaining health via diet</td>
<td>Meat¹</td>
<td>Organic beef, Pork and poultry</td>
</tr>
<tr>
<td>Increasing aged population</td>
<td>Seafood</td>
<td>Organic fruit, vegetables and nuts (e.g. fresh or frozen asparagus, beans, carrots and potatoes, also fresh cabbage cucumbers, eggplant, lettuce tomatoes)</td>
</tr>
<tr>
<td>Media focus on diet as a lifestyle</td>
<td>Fruit and Vegetables</td>
<td>Pecans, Brazil, Pistachio, Cashew, Walnuts, Macadamia</td>
</tr>
<tr>
<td>Increasing demand for organic (organic food and drink sales estimated to surpass $US1.3bn in 2003 and reach $US30.7bn by 2007)</td>
<td>Cereals / Processed food²</td>
<td>Peaches, Plums, Bananas, Grapes, Melons, Citrus, Mangoes, Pineapples, apples, pears, Pineapples</td>
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</table>

¹ Sales projected to reach $US3.86bn by 2007; Demand for organic meats may surpass domestic supply in 2004 creating export opportunities; Sales of organic beef, pork and poultry projected to reach $US3.86bn by 2007.

² Functional Food industry worth $US20.2bn in 2002 and expected to grow 13.3%, but estimates vary; Americans will spend almost $US40bn on Functional Foods by 2008; Most Functional Food growth expected in soy foods and functional snack segment; Functional bakery, snacks ad cereals forecast to grow 13.2% by 2008, making it one of the strongest areas; Functional beverage spending doubled between 1998 and 2003 and forecast to grow by another 46% by 2008; Spending in 2000 includes Breakfast Cereals $8bn, Nutrition and Energy bars $600m, Cholesterol lowering spreads $56 million, Functional yoghurt $85m, Orange Juice $3.1bn, Soy Milk $25m, Sports drinks $1.9bn, Dairy drinks $30m, Energy drinks $200m.