

Measuring what counts

Export revenue from New Zealand's high-value foods

*High-Value Nutrition
National Science
Challenge*

March 2017

Introduction from the Challenge Director

New Zealand has a strong reputation internationally as a source of high quality food that is efficiently produced and safe. At the same time, whether we are researchers, policy makers or in business, we know the potential if we can add significant nutritional value to our food exports.

At the Centre for High-Value Nutrition, a key role is to provide insight and information into how we can do that. This report, *Measuring what counts: Export revenue of New Zealand's high-value foods*, sets out a methodology devised by PwC for estimating the export returns from our high-value foods in total and by food category.

Measuring what counts: Export revenue of New Zealand's high-value foods calculates the revenue but also sets out the opportunity. Worldwide, there is strong interest in food with health benefits, but nowhere more so than in China where the health and wellness food and beverage market has grown by almost 18% in five years. Chinese consumers, and consumers elsewhere, will pay a premium for food with health benefits. But for those foods to have inherent and lasting value, the health claims need to be backed by the best science.

The Centre for High-Value Nutrition forms one of 11 National Science Challenges designed to take a strategic approach to the Government's science investment by targeting a series of goals that if achieved, would have major and enduring benefits for New Zealand.

Our challenge is to support the growth of the value of New Zealand's food and beverage exports significantly by 2025. To do that the Centre for High-Value Nutrition brings science and industry together to grow the ecosystem required for the creation, development and delivery of high-value foods to market.

The driver is to increase export revenue for New Zealand Inc. and we will continue to track this over time. The real return will be in building New Zealand's reputation internationally as a country where the quality of our science, environment and innovation is exceptional.



Joanne Todd
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Executive summary

The Centre for High-Value Nutrition National Science Challenge commissioned a report that benchmarks the export revenue of high-value nutrition foods and identifies where the potential for growth lies.

New Zealand's potential high-value nutrition foods brought in more \$23 billion in 2014 and \$22 billion in 2015. This accounted for around 79 per cent and 77 per cent of New Zealand's food and beverage export revenue in 2014 and 2015, respectively. We group high-value foods into three separate categories of food that have proven health claims, have general health claims and are especially nutritious.

Only kiwifruit was a scientifically validated functional food export in New Zealand and falls into the proven claims category in 2014 and 2015. Kiwifruit is New Zealand's only food export with a proven claim, which was first substantiated in May 2014. It brought in \$0.6 billion from May 2014 onwards and \$1 billion in 2015.

Foods with health claims are attractive to consumers in Asia. Secondary research in Asia shows that over 90% of Asian consumers are willing to pay more for these foods. Between 2010 and 2015, the market in China for foods and beverages that deliver health and wellness grew by 18.4%. Over the same period the global growth for these foods and beverages was 3.4%.

There are hurdles to substantiating health claims, including:

- food health regulations differ across different countries
- other ingredients or components can preclude a food from making a health claim
- it takes a long time for the science to be established.

We also show some product case studies to highlight the findings:

- As there is only one New Zealand export product with a proven health claim, the functional food industry is exposed to the same risk factors as the kiwifruit industry.
- Mānuka honey accounts for around 75 to 80 per cent of New Zealand's honey exports. Despite its perceived health benefits, it is difficult to market a health claim due to high sugar content.
- Omega Lamb is a premium red meat product with high levels of healthy omega-3 oils. Similar to mānuka honey, it is too difficult to make a health claim on the lamb due to high fat content.
- Fonterra's Anlene milk powder is a good example of a functional food as it is an enhanced milk product that aids in calcium absorption and bone health. It is not produced in New Zealand however, so was not included in the measurement of high-value nutrition exports, which is the National Science Challenge's main KPI with the Government.

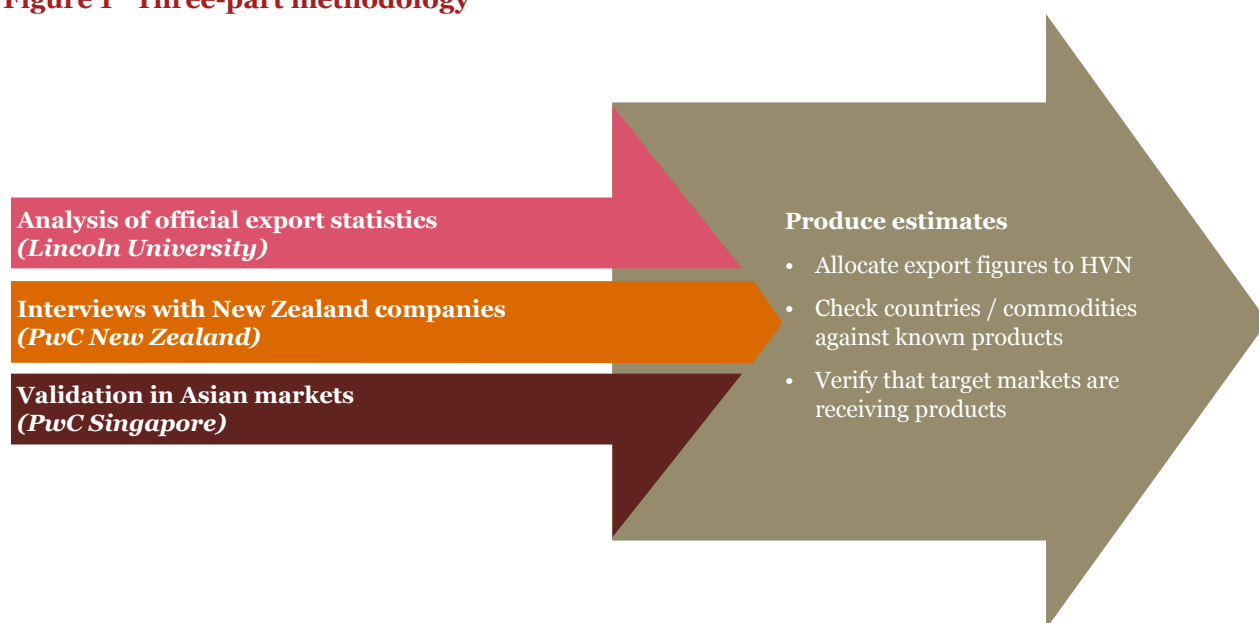
Introduction

Purpose

This Report measures what counts by setting an important baseline for measuring New Zealand's food export revenue from functional foods. This measurement includes exports that arise from High-Value Nutrition-funded and -aligned research and related activities. The Report describes the use of both quantitative data from secondary sources held in New Zealand, and qualitative data from interviews and market analysis in New Zealand and overseas for the years ended 31 December 2014 and 2015.

This Report is the result of a three-part methodology undertaken by Lincoln University's Agribusiness and Economics Research Unit, PwC New Zealand and PwC Singapore, as shown in Figure 1. We have triangulated the above sources of information on New Zealand food exports, cross-referencing bottom-up information from interviews, national-level statistics and information from New Zealand's overseas markets. As a result, we have produced a holistic estimate of the total export revenue from functional foods for 2014 and 2015.

Figure 1 Three-part methodology



Our work assists the Centre for High-Value Nutrition to measure progress towards its main KPI with the New Zealand Government: additional export revenue of at least \$1 billion per annum by 2025 from foods with scientifically validated health benefits, based in part on High-Value Nutrition-funded or -aligned research and related activities.

Context

Food exports are important to New Zealand's economy, accounting for over 60 per cent of total exports (Statistics New Zealand, 2015). Traditionally, exports have comprised commodity-type products exported to New Zealand's key markets, initially, principally to the UK and more recently into China and the rest of Asia. However, falling commodity prices have begun to erode the value of New Zealand's food exports. It is therefore important to New Zealand's economic prosperity that food production moves from low-value commodity exports to high-value added exports.

Higher value-add can come from market differentiation and build on the positive attributes associated with New Zealand food products. This can be from taste and quality, but also from other attributes such as health enhancing characteristics. Information is required on what these characteristics are and where these premium products are being traded.

On 1 April 2014, the Minister of Science and Innovation launched High-Value Nutrition (HVN) as the first of a series of National Science Challenges in New Zealand. The HVN National Science Challenge aims to increase the value of New Zealand food exports through scientifically validated health claims that lead to price premiums and increased sales volumes.

The HVN National Science Challenge includes food products that have scientifically validated health benefits and make scientifically validated health claims. The broad health targets of food products captured by the HVN National Science Challenge include (Smart, Cameron-Smith, & Allain, 2014; 2015):

- metabolic health
- gastrointestinal and immune health
- weaning foods for health.

The Centre for High-Value Nutrition requires the contribution of the HVN National Science Challenge to New Zealand's exports to be measured over time. This includes estimating a baseline of the export value of relevant product categories, developing a methodology for measuring the contribution of the HVN National Science Challenge over time and estimating the value derived from funded or aligned research and related activities.

High-value nutrition food concepts

In the Report, we estimate and discuss high-value nutrition foods. Based on the mission of the HVN National Science Challenge, we include all potential high-value nutrition foods defined as all New Zealand food products where health claims have been or potentially could be made. These include raw produce such as kiwifruit, apples and green lip mussels, as well as processed and enhanced foods such as milk powders.

The Report divides potential high-value nutrition foods into a hierarchy of three categories for the purpose of estimating export revenue:

- 1 **Proven claims** – scientifically validated or substantiated health claims. The product contains a nutrient and a claim is made against the product itself.
- 2 **General health claims** – a specific nutrient does something good. The claim is made on the specific ingredient or nutrient, but the product containing the ingredient or nutrient does not make a claim.
- 3 **Especially nutritious** – a food or nutrient is generally perceived to improve overall health and well-being, reduce the risk of specific diseases or minimise the effects of other health concerns, but does not make a claim as such. These are not strictly functional foods but have the potential for enhancement, fortification or further research to make the product a functional food.

We chose the definition of functional foods from Diplock, et al. (1999) to use when selecting foods that fit into the first tier, proven claims: “A food can be regarded as ‘functional’ if it is satisfactorily demonstrated to affect beneficially one or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to either an improved state of health and well-being and/or reduction of risk of disease. Functional foods must remain foods and they must demonstrate their effects in amounts that can normally be expected to be consumed in the diet: they are not pills or capsules, but part of a normal food pattern.”

Organisation

This Report is structured as follows:

- 1 It outlines the collection of export revenue data from Statistics New Zealand.
- 2 It explains the process and the key theme from interviewing New Zealand firms in the food and beverage industry.
- 3 It then discusses the insights from market research in Asia.
- 4 It explains the technique used to separate Statistics New Zealand data on export revenues into its high-value nutrition components.
- 5 It presents results of the baseline data year 2014 as well as 2015 export revenue.
- 6 The Report concludes by outlining three product case studies that show some barriers firms face in entering the functional food market.

Data analysis

Statistics New Zealand breaks down trade data through different categorisations in Infoshare using the Harmonised System codes (the HS codes). New Zealand's trade data is based on the World Customs Organisation's international classification of HS codes, which allows for the classification of traded goods on a common basis across countries. The HS codes are not established to categorise foods into functional components or by specific ingredients.

As outlined in the Methodology report (PwC New Zealand, 2016), there is no accepted HS code that records functional foods. There is no explicit category for functional or high-value nutrition food in the HS code system and the existing data is not specific enough to identify functional food products as its own category.

Using our chosen definition of functional foods outlined in our Methodology report and Statistics New Zealand's Infoshare, we extracted New Zealand food product categories where scientifically validated health claims have been or could potentially be made. These food products include raw produce such as kiwifruit, apples and mussels, as well as processed and enhanced foods such as milk powders and fruit juices. We were as inclusive as possible.

Table 1 shows the total number of 4- and 6-digit codes in each food category and the number we selected. We used 62 HS codes down to the 6-digit level. The selection of relevant product categories and HS codes was validated by literature and HVN National Science Challenge documents.

Table 1 Number of 4- and 6-digit HS codes selected for 2014 and 2015

HS code	Product category	4-digit HS codes		6-digit HS codes	
		Total	Selected	Total	Selected
02	Meat and edible offal	10	3	66	-
03	Fish	8	6	189	8
04	Dairy	10	7	32	3
05	Animal products n.e.c.	9	-	15	-
06	Plants	4	-	16	-
07	Vegetables	14	5	67	-
08	Fruits and nuts	14	5	66	5
09	Coffee, tea, and spices	10	-	39	-
10	Cereals	8	1	26	-
11	Milling industry products	9	-	27	-
12	Oil seeds	14	-	48	-
13	Gum, resins and vegetable extracts	2	-	10	-
14	Vegetable products n.e.c.	2	-	5	-
15	Fats and oils	21	4	48	3
16	Meat and fish preparations	5	1	41	1
17	Sugar	4	-	17	-
18	Cocoa	6	-	11	-
19	Cereal preparations	5	2	19	-
20	Vegetable, fruit, and nut preparations	9	3	52	2
21	Miscellaneous food preparations	6	1	16	2
22	Beverages	9	-	22	-
Total		179	38	832	24

Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, HS codes 02 to 22.

The selected HS codes are listed in Appendix B. Export revenues from these product categories form the basis of decomposing export revenues across the tiers of potential high-value nutrition foods described in Figure 3.

We suspected that one HS code 2106, Food preparations not elsewhere specified or included, was possibly a proxy for potential high-value nutrition products. This hypothesis was tested in our interviews with New Zealand firms and was overwhelmingly rejected. No interviewed firms reported using this HS code.

We looked at the trend in trade data over an historical period of calendar years 2005 to 2015 as well as across countries for 2014 and 2015. Trade data is reported as export revenue, free on board (FOB) in New Zealand dollars.

New Zealand interviews

The second stage determined the share of selected exports that could be classified as high-value nutrition products. The objective was to interview New Zealand firms to separate export revenue into a high-value nutrition component. This would enable us to provide a holistic estimate of the total export revenue from functional foods and other revenue in 2014 and 2015.

We collected primary data from the food industry through interviews and discussions with key producers and researchers in New Zealand. The interviews collected a mix of qualitative and quantitative information about what and how much is being produced, barriers to entering the functional food market and what New Zealand firms understand regarding trends in functional food exports.

We contacted 30 food and beverage firms across the supply chain and sector to request participation in an interview around functional foods and exports. We interviewed 21 food and beverage firms. The firms we interviewed and their reported food and beverage sectors are shown in Appendix A.

Table 2 shows the number of interviewed firms in each part of the supply chain. It was positive to see that all firms were involved in research and development at some level. This matched the general sentiment from interviews that New Zealand firms were generally working towards producing foods with scientifically validated health claims.

Table 2 Number of interviewed firms in each part of the supply chains

Supply chain	Number of firms
Grower	9
Agribusiness	6
Processor	14
Manufacturer	17
Wholesaler	15
Exporter	20
Research and development	21
Marketing and communications	14

Source: PwC interviews with New Zealand food and beverage firms (2016).

Note: Firms could select more than one option.

The key message that came across when conducting the interviews was that there is no consensus within the New Zealand industry of what is necessary for a product to be considered a functional food.

There was a consensus amongst interviewees that scientifically validated health claims for specific products were nearly non-existent in New Zealand. Some respondents reported exporting functional food exports based on food products being especially nutritious. Others reported having health benefits, substantiated or unsubstantiated, of the ingredients or nutrients in their products, but did not directly link the product to a health benefit.

Some interview respondents reported they did not export functional food exports, as they had no validated or proprietary claim linking their product to a substantiated health benefit.

Zespri was the only firm that reported having a scientifically validated health claim on their product and selling on the basis of the health claim. Importantly, the claim can be made only in some markets. Other candidate products are discussed in the chapter on Product case studies below.

Asian export markets

We also collected information on demand for functional foods from New Zealand, from key markets in Asia. We conducted a review of trade publications and interviewed local market contacts to cross-check the New Zealand-based information. In Asia, we carried out:

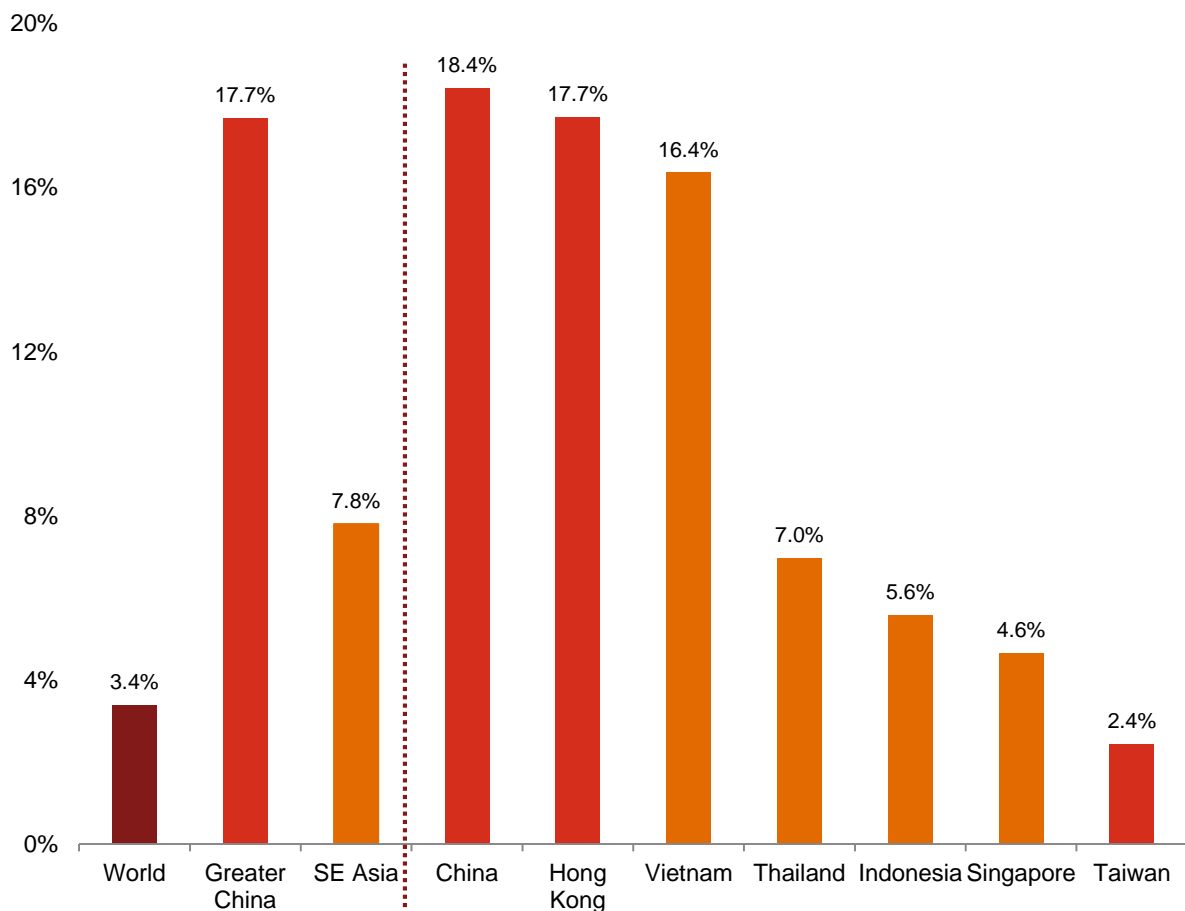
- quantitative and qualitative reviews of trade publications and reports
- interviews with importers, supermarket chains and Government
- New Zealand product identification from store visits.

Functional food and beverage market

Consumer interest in healthy food is increasing in Asia. From market analysis and interviews, we established that the functional food and beverage market is very large in Asia, the market is growing very quickly and there is a heightened interest in New Zealand food products.

Over 90% of the consumers in Asia are willing to pay a premium for foods with health benefits, higher than Europe and North America (The Nielsen Company, 2015). Figure 2 shows the functional food and beverage market grew rapidly in China and South-East Asia, with double digit growth in China, Hong Kong and Vietnam.

Figure 2 Growth of health and wellness food and beverage market, 2010 to 2015 (CAGR*)



Source: Euromonitor International (2015).




Note: Health and Wellness is defined by Euromonitor International to include the following categories: Food Intolerance, Organic, Better for You, Fortified/Functional, Naturally Healthy.

Greater China refers to China, Hong Kong and Taiwan. SE Asia refers to Indonesia, Thailand, Vietnam, and Singapore.

* CAGR is the compound annual growth rate over the time period.

Research data shows that consumers in Asian countries are amongst the most likely to search for key New Zealand functional food products. This search data verifies interest in New Zealand functional foods. Table 3 shows interest levels, calculated on a scale from 0 to 100, where 100 is the location with the most search popularity as a fraction of total searches in that location, a value of 50 indicates a location which is half as popular and a value of zero indicates a location where the term was less than 1% as popular.

Table 3 Top 11 countries, by search interest level by product

Milk powder 			Mānuka honey 			Kiwifruit 		
Rank	Country	Interest level	Rank	Country	Interest level	Rank	Country	Interest level
1	Sri Lanka	100	1	New Zealand	100	1	New Zealand	100
2	Singapore	81	2	Singapore	94	2	Kenya	56
3	New Zealand	55	3	Australia	50	3	Australia	42
4	Malaysia	42	4	Ireland	48	4	India	33
5	UAE	39	5	Hong Kong	41	5	Singapore	26
6	Bangladesh	32	6	United Kingdom	39	6	Pakistan	23
7	Hong Kong	31	7	Malaysia	28	7	UAE	21
8	Australia	29	8	UAE	19	8	South Africa	17
9	India	28	9	Canada	13	9	Philippines	16
10	Pakistan	26	10	United States	11	10	United Kingdom	15
11	Philippines	22	11	Philippines	8	11	Hong Kong	13

Source: Google trends and PwC calculations.
Notes: China data is not available on Google.

Other key messages

The following key messages also came out of market research and interviews in Asia:

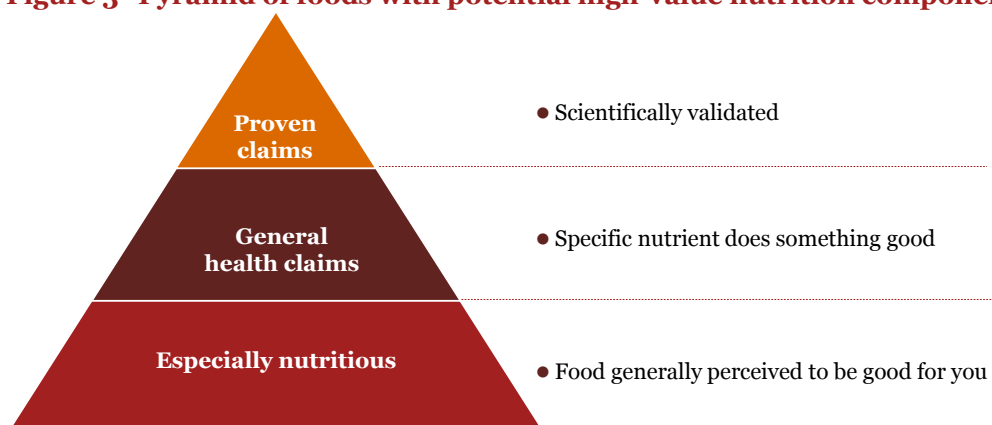
- A success factor for New Zealand food manufacturers in Asia could be food safety. Following recent scandals there is an emphasis on food hygiene and safety. Food trust and product safety play a key role in food consumption decisions in Asia (Canadean, 2015; Wilkinson, 2016).
- In South-East Asia, residents tend to be price sensitive: price comes first, then quality. In contrast, Hong Kong residents are more willing to pay for health products. Food products with scientifically validated health claims are more attractive, although a lot of health claims are not yet scientifically proven (Elite Fine Food LLP, 2016).
- New Zealand's strength is that it has good quality products. To provide a stronger offering, New Zealand producers could provide more health certifications and certificates of origin on their products. The New Zealand Government could even subsidise producers to obtain these health certifications (Frosts Food & Beverage Pte Ltd, 2016; Food Xervices Inc., 2016).

Value is hard to measure

Overall export revenue from functional foods is hard to measure. There are different understandings among New Zealand industry participants of what sort of claim is sufficient for a food to be considered a functional food. Our measure of export revenue is a holistic estimate that draws on the previously mentioned sources of information.

To measure export revenue from functional foods, including exports that arise from HVN-funded and -aligned research and related activities, we generalised potential high-value nutrition food products into three tiers as shown in Figure 3.

Figure 3 Pyramid of foods with potential high-value nutrition component



Potential high-value nutrition tiers shown in Figure 3 are defined as follows:

- 1 **Proven claims** – scientifically validated or substantiated health claims. The product contains a nutrient and a claim is made against the product itself.
- 2 **General health claims** – a specific nutrient does something good. The claim is made on the specific ingredient or nutrient, but the product containing the ingredient or nutrient does not make a claim.
- 3 **Especially nutritious** – a food or nutrient is generally perceived to improve overall health and well-being, reduce the risk of specific diseases or minimise the effects of other health concerns, but does not make a claim as such. These are not strictly functional foods but have the potential for enhancement, fortification or further research to make the product a functional food.

In line with our Methodology Report (PwC New Zealand, 2016) and given New Zealand exports food products to a range of countries, we applied the following definition of functional foods from Diplock, et al. (1999) when establishing whether a food product could fit into the top tier, proven claims: “A food can be regarded as ‘functional’ if it is satisfactorily demonstrated to affect beneficially one or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to either an improved state of health and well-being and/or reduction of risk of disease. Functional foods must remain foods and they must demonstrate their effects in amounts that can normally be expected to be consumed in the diet: they are not pills or capsules, but part of a normal food pattern.”

By taking export revenues by product and country using the HS codes identified above, and industry interviews and research, we selected where export revenues fit into the above pyramid for each year. This involved selecting three series of weights for each HS code. These weights are multiplied by the level of aggregate export revenue to arrive at a level of food export revenue in each tier.

We also analysed kiwifruit export revenue for each month in 2014 and by country to establish the top tier revenue, given claims on kiwifruit were first announced on 7 May 2014. Claims are not made in Europe and kiwifruit claims are not registered on the EU register of health and nutrition claims (European Commission, Several years).

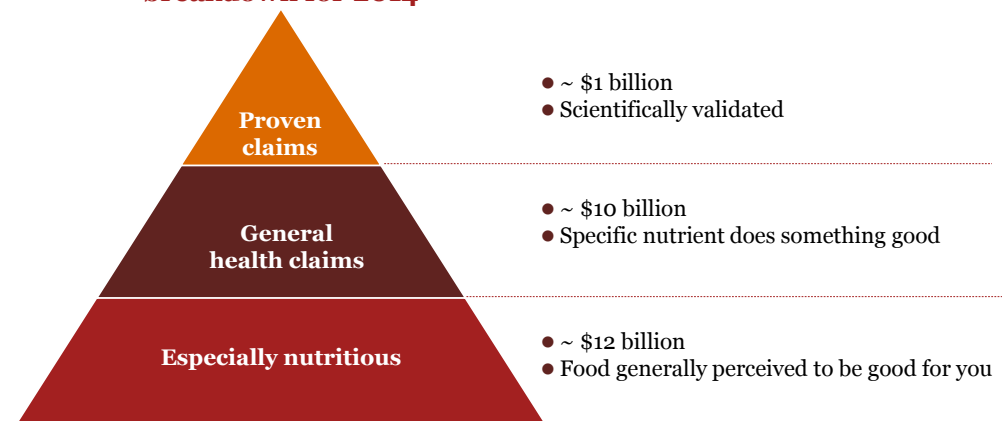
The following sections provide a breakdown of the holistic estimates for 2014 and 2015. Figures and Tables showing product and regional variation across the three product tiers are also presented.

Estimates of export revenue

2014 baseline export revenue

The holistic estimates of the proportions of potential high-value nutrition foods in each export category are shown in Figure 4. The complete breakdown of high-value nutrition food products for 2014 is listed in Appendix C.

Figure 4 Pyramid of potential high-value nutrition food products, export revenue breakdown for 2014



Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations.

The top tier of proven claims is estimated at \$565 million and consists only of kiwifruit export revenues, at the 6-digit HS code level, consistent with our interview with Zespri. We excluded European Union countries after finding that kiwifruit was not on the EU register of health and nutrition claims. Kiwifruit export revenue from European Union countries was included in the second tier as kiwifruit is not an authorised product to make a health claim (European Commission, Several years).

May 2014 was chosen as the first month to record proven claims as this was the month in which Zespri announced kiwifruit to have New Zealand's first self-substantiated health claim in regards to the digestion of Green Kiwifruit (Zespri Group Limited, 2014). Other kiwifruit, and especially SunGold Kiwifruit, also has a claim on the vitamin C content.¹

For the second tier, general health claims, export revenue is estimated at \$10 billion and consists mainly of dairy powder products, confirmed from interviews with dairy firms. Larger exports in the second tier also consist of seafood, kiwifruit exported between January and April 2014 and to Europe, and mānuka honey.

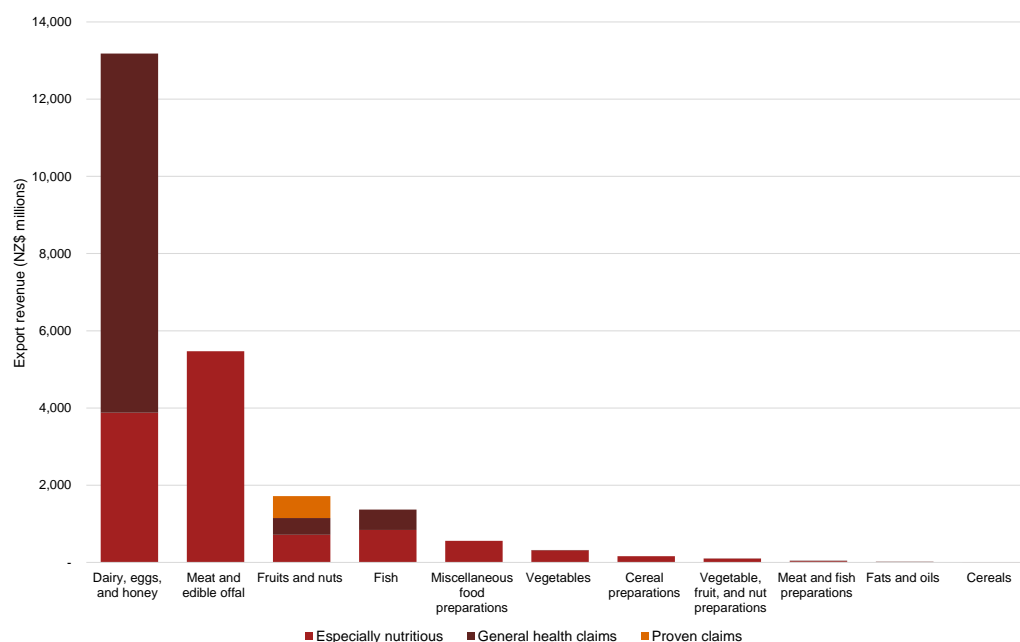
The bottom tier, especially nutritious, has been treated as catch-all for the remaining products identified as having potential to be a high-value nutrition food products. This tier includes meat subcategories, most fruit and vegetables, and some seafood, and is estimated at \$12 billion for 2014.

Figure 5 shows that high-value nutrition export revenue is concentrated into a few specific product categories and follows a power law distribution in 2014.²

¹ Further claims are being established. See Riddet Institute and Zespri Group Limited (2016).

² A power law distribution describes the proportional relationship between two variables, where a relative change in one is associated with a proportional relative change in the other variable. High levels of high-value nutrition export activity are concentrated in product categories where there are high levels of export revenue for New Zealand.

Figure 5 High-value nutrition export revenue for 2014, by selected product categories (2-digit HS codes) (NZ\$ millions)



Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations.

Table 4 shows the breakdown of export revenue from high-value nutrition food products for 2014, by the food product category at the 2-digit HS code level.

Table 4 New Zealand and high-value nutrition export revenue for 2014, by selected product categories (2-digit HS codes) (NZ\$ millions)

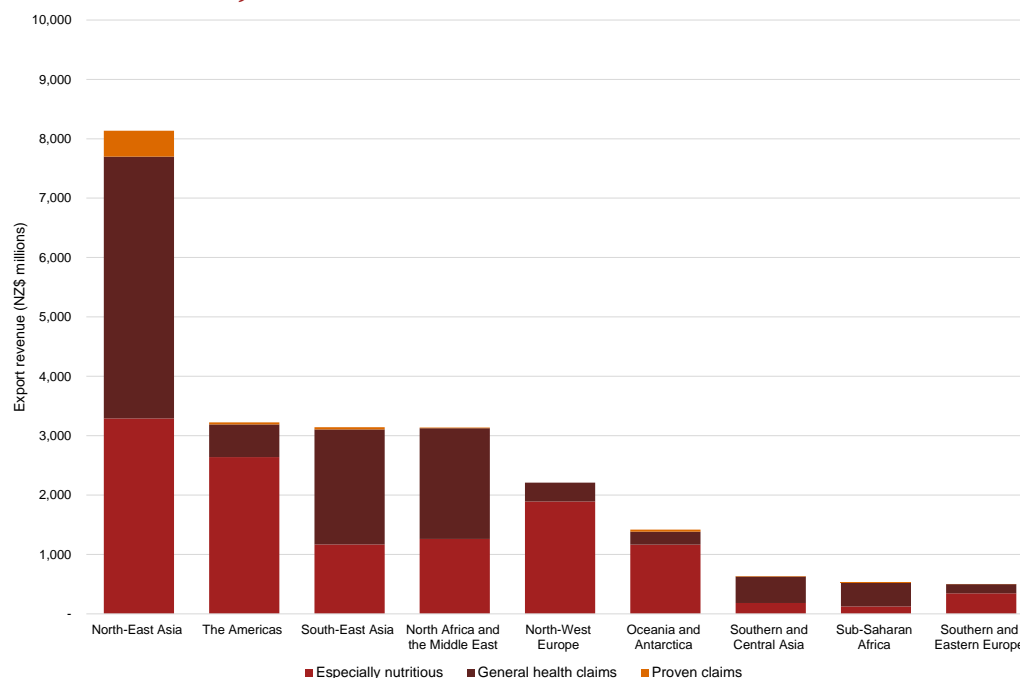
Product category	Total product category exports	High-value nutrition food product		
		Proven claims	General health claims	Especially nutritious
Dairy, eggs and honey	14,726	-	9,305	3,878
Meat and edible offal	5,929	-	-	5,473
Fruits and nuts	1,769	565	437	714
Fish	1,374	-	528	841
Miscellaneous food preparations	811	-	-	559
Vegetables	392	-	9	311
Cereal preparations	786	-	-	162
Vegetable, fruit, and nut preparations	291	-	3	96
Meat and fish preparations	252	-	11	32
Fats and oils	162	-	9	10
Cereals	52	-	-	0
Total	26,545	565	10,300	12,075

Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations.

Note: Totals may be subject to rounding error.

Figure 6 and Table 5 show the breakdown of export revenue from high-value nutrition food products for 2014, by geographic region. High-value nutrition export revenue is primarily concentrated in North-East Asia, which includes exports to China. The majority of top tier, proven claims, export revenue is also concentrated in North-East Asia in 2014 and 2015.

Figure 6 High-value nutrition export revenues for 2014, by region (Macro group) (NZ\$ millions)



Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations.

Table 5 New Zealand and high-value nutrition export revenues for 2014, by region (Macro group) (NZ\$ millions)

Region	Total NZ food exports	High-value nutrition food product		
		Proven claims	General health claims	Especially nutritious
North-East Asia	9,696	436	4,408	3,291
The Americas	4,152	35	550	2,639
South-East Asia	3,679	36	1,937	1,170
North Africa and the Middle East	3,477	10	1,866	1,261
Oceania and Antarctica	3,191	37	217	1,167
North-West Europe	3,063	-	318	1,893
Southern and Central Asia	668	6	447	182
Sub-Saharan Africa	653	5	403	127
Southern and Eastern Europe	571	2	155	346
Total	29,151	565	10,300	12,075

Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations.

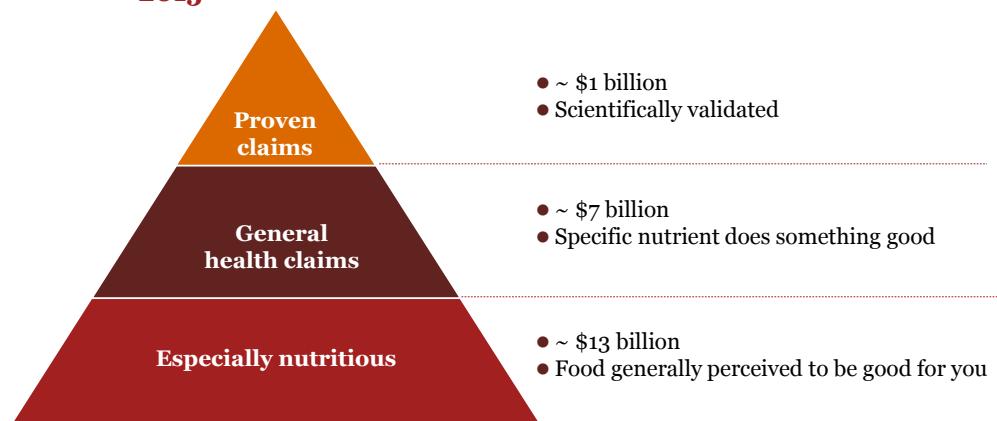
Note: Totals may be subject to rounding error.

Table 5 also shows export revenues from food and beverages (HS codes 02–22) were \$29 billion in 2014. Potential high-value nutrition food products included in our analysis comprised around 79 per cent of New Zealand's food exports: 2 per cent from proven claims, 35 per cent from general health claims and 41 per cent from especially nutritious products. Food and beverages excluded from potential high-value nutrition food products accounted for \$6 billion accounted for food and beverages: 21 per cent of New Zealand's food exports.

2015 export revenues

The holistic estimates of proportions of potential high-value nutrition foods in each export category for 2015 are shown in Figure 7. The complete breakdown of high-value nutrition food products for 2015 is listed in Appendix D.

Figure 7 Pyramid of high-value nutrition food products, export revenue breakdown for 2015



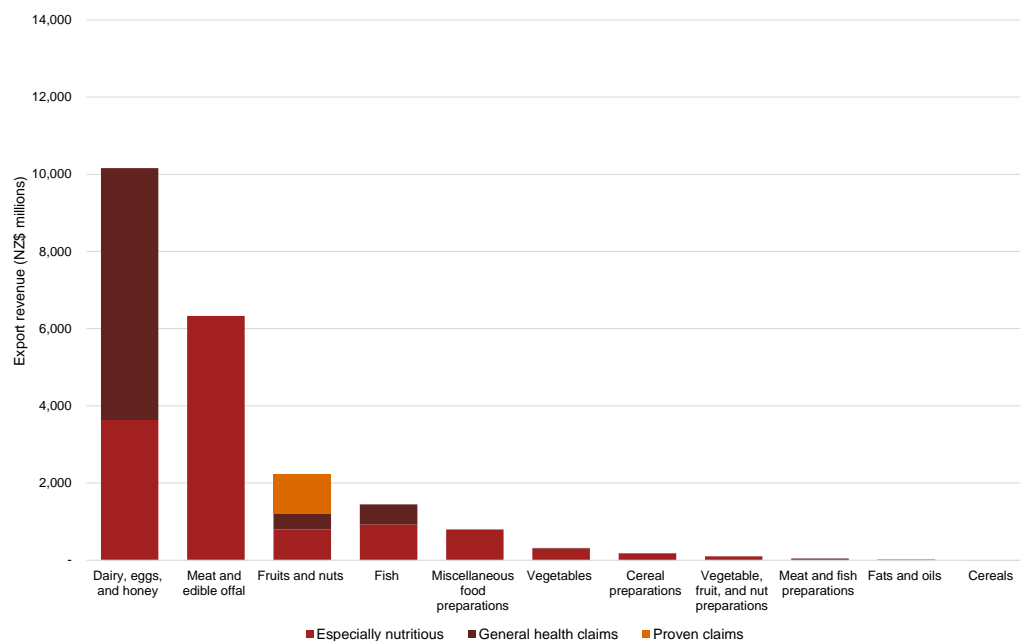
Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations.

The top tier of proven claims again consists only of kiwifruit export revenues to non-European countries. Again, kiwifruit export revenue from European Union countries was included in the second tier as kiwifruit is not an authorised product to make a health claim (European Commission, Several years).

Falling dairy prices is the main reason the value of New Zealand's food exports in tier two, general health claims decreased between 2014 and 2015.

Figure 8 shows that high-value nutrition export revenue follows a power law distribution in 2015.

Figure 8 High-value nutrition export revenue for 2015, by selected product categories (2-digit HS codes) (NZ\$ millions)



Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations.

Table 6 shows the breakdown of export revenue from high-value nutrition food products for 2015, by the food product category at the 2-digit HS code level. When compared to 2014, falling dairy prices have eroded the value of New Zealand's food exports attributable to tier two, general health claims. This is due to the inclusion of milk powders in tier two, general health claims, which fell from \$9 billion in 2014 to \$6 billion in 2015.

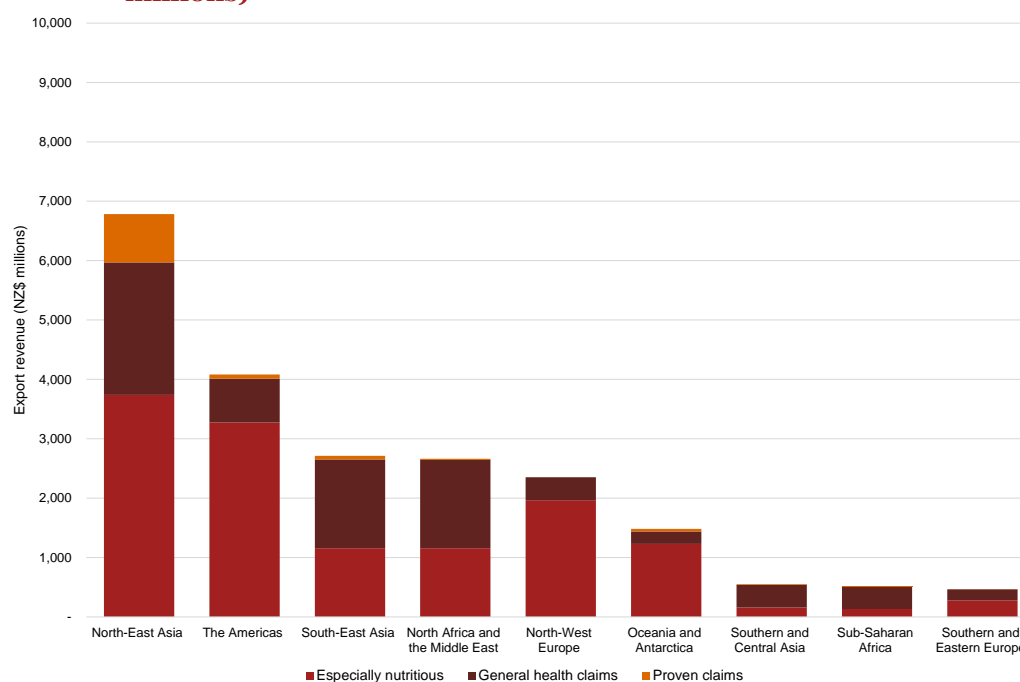
Table 6 New Zealand and high-value nutrition export revenue for 2015, by selected product categories (2-digit HS codes) (NZ\$ millions)

Product category	Total product category exports	High-value nutrition food product		
		Proven claims	General health claims	Especially nutritious
Dairy, eggs and honey	11,822	-	6,524	3,634
Meat and edible offal	6,824	-	-	6,329
Fruits and nuts	2,301	1,032	404	797
Fish	1,448	-	524	920
Miscellaneous food preparations	1,026	-	-	797
Vegetables	406	-	10	305
Cereal preparations	865	-	-	179
Vegetable, fruit, and nut preparations	276	-	4	95
Meat and fish preparations	271	-	11	32
Fats and oils	148	-	9	9
Cereals	20	-	-	0
Total	25,408	1,032	7,486	13,097

Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations
 Note: Totals may be subject to rounding error.

Figure 9 and Table 7 show that high-value nutrition export revenue fell in 2015, with the reduction primarily concentrated North-East Asia: \$8 billion in 2014 versus \$7 billion in 2015.

Figure 9 High-value nutrition export revenues for 2015, by region (Macro group) (NZ\$ millions)



Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations.

Table 7 New Zealand and high-value nutrition export revenues for 2015, by region (Macro group) (NZ\$ millions)

Region	Total NZ food exports	High-value nutrition food product		
		Proven claims	General health claims	Especially nutritious
North-East Asia	8,544	813	2,230	3,741
The Americas	5,195	72	739	3,273
South-East Asia	3,289	62	1,493	1,159
North Africa and the Middle East	3,007	21	1,487	1,156
Oceania and Antarctica	3,269	43	211	1,229
North-West Europe	3,223	-	386	1,967
Southern and Central Asia	586	13	379	161
Sub-Saharan Africa	610	6	377	133
Southern and Eastern Europe	524	2	186	278
Total	28,249	1,032	7,486	13,097

Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations

Note: Totals may be subject to rounding error.

The increase in proven claims export revenue was due to growth in the kiwifruit export market and inclusion of the full year of kiwifruit export revenue in the proven claims tier. Decreases in dairy export revenue contributed highly to the decrease in general claims export revenue in 2015.

Table 7 also shows export revenues from food and beverages (HS codes 02–22) fell to \$28 billion in 2015. Potential high-value nutrition food products included in our analysis comprised around 77 per cent of New Zealand's food exports: 4 per cent from proven claims, 27 per cent from general health claims and 46 per cent from especially nutritious products. Food and beverages excluded from potential high-value nutrition food products accounted for \$7 billion accounted for food and beverages: 23 per cent of New Zealand's food exports in 2015.

Product case studies

Organisations are moving towards the high-value nutrition model to extract more value from food products. There is some rebranding going on but it can take a long time to scientifically validate a health claim and there is a costly regulatory landscape to navigate in order to have the basis for making a claim. In this section we present some product case studies with high-value nutrition potential that were of interest from our interviews.

Even with a validated health benefit, there are regulatory hurdles that firms must navigate in order to make a claim on a specific product. Examples of regulatory hurdles that were discussed in interviews include:

- Regulations are different across different countries. For example, kiwifruit has a substantiated health benefit but is currently unable to be marketed as such in the European Union.
- Attributes of food products can preclude health claims being made on that product. For example, sugars in mānuka honey means that marketing the product with a health benefit goes against general principles underlying health claims and would send conflicting messages to consumers.

Premium value from functional foods may not come from exports. For example, Fonterra has production facilities in Asia to manufacture Anlene closer to the consumer. Accordingly, only intermediate ingredients from New Zealand would show up in the export codes.

Kiwifruit

As outlined above, kiwifruit is the only product for which we have found a scientifically validated health claim attaching to the product itself, and of which export revenue comes through the HS codes in 2014 and 2015.

On 7 May 2014, Zespri established New Zealand's first self-substantiated health claim from FSANZ: that Zespri's Green Kiwifruit can contribute to normal bowel function. This was based on ten years of data from clinical trials along with supporting evidence from other research, including a systematic literature and data review by independent scientists on behalf of Zespri (Zespri Group Limited, 2014). Zespri also has health claims surrounding vitamin C, especially on SunGold Kiwifruit and they reported all of their kiwifruit as functional foods (Zespri Group Limited, Several years; New Zealand Firms, 2016).

Table 8 provides a breakdown of these kiwifruit exports and top tier, proven claims, in both 2014 and 2015.

Table 8 Kiwifruit export revenue and proven claims in 2014 and 2015, by region (Macro group) (NZ\$ millions)

Region	Kiwifruit exports		Proven claims	
	2014	2015	2014	2015
North-East Asia	543	813	436	813
The Americas	39	72	35	72
South-East Asia	43	62	36	62
North Africa and the Middle East	12	21	10	21
Oceania and Antarctica	38	43	37	43
North-West Europe	210	265	-	-
Southern and Central Asia	7	13	6	13
Sub-Saharan Africa	5	6	5	6
Southern and Eastern Europe	105	141	2	2
Total	1,002	1,436	565	1,032

Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations.

Notes: Proven claims for kiwifruit are recorded from May 2014 and exclude European countries.

Kiwifruit exports currently account for all of 2014 and 2015 proven claims revenue. In 2014, kiwifruit proven claims accounted for \$565 million of export revenue to New Zealand. In 2015, export revenue of kiwifruit, excluding those exported to countries in the European Union was \$1,032 million. North-East Asia is the largest market with \$543 million and \$813 million for 2014 and 2015, respectively. North-West Europe is the second largest by value, with export revenue of \$210 million and \$265 million for 2014 and 2015, respectively.

Kiwifruit is not listed on the EU Register of nutrition and health claims made on foods (European Commission, Several years). Although Europe is a key market for kiwifruit by volume, the crucial difference between Asia and Europe is that 80% of kiwifruit exports in 2014 and 100% of kiwifruit exports are attributable as a proven claims in North-East Asia, whereas no kiwifruit export revenue is attributable in North-West Europe.

Therefore, growth in proven claims in Table 8 can be decomposed into two components:

1. Proven claims for 2014 only covers a part year of kiwifruit export revenue, beginning in May 2014, and a smaller change would have occurred if the claim was substantiated as at the beginning of 2014.
2. When we take into account annual growth of kiwifruit export market, the growth rate in the European Union was smaller than the overall global growth rate. Accordingly, New Zealand sold more kiwifruit into those markets that want to buy high-value nutrition foods.

Top tier proven claims are entirely attributable to growth of kiwifruit industry. Since kiwifruit is the only export product with a proven claim, there is no diversification of products at the top tier. Accordingly, the functional food industry is exposed to the same risk factors as the kiwifruit industry.

Mānuka honey

New Zealand is the world's third largest honey exporter, with export revenue growing at an annual rate of 23% between 2005 and 2015. This growth is primarily fuelled by mānuka honey sales growth. Mānuka honey accounts for around 75 to 80 per cent of New Zealand's honey exports (ANZ Bank New Zealand Limited, 2015). Table 9 shows honey and our estimated mānuka honey export revenue in 2014 and 2015.

Table 9 Honey and estimated mānuka honey export revenue in 2014 and 2015, by region (Macro group) (NZ\$ millions)

Region	Honey exports		Mānuka honey	
	2014	2015	2014	2015
North-East Asia	74	106	58	82
The Americas	20	35	16	27
South-East Asia	20	24	15	18
North Africa and the Middle East	4	4	3	3
Oceania and Antarctica	30	49	23	38
North-West Europe	54	67	42	52
Southern and Central Asia	0	0	0	0
Sub-Saharan Africa	0	0	0	0
Southern and Eastern Europe	0	0	0	0
Total	202	285	157	221

Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations.

Notes: There is no product category for mānuka honey. Mānuka honey export revenue, included in General Claims, is estimated as 77.5% of total honey export revenue.

Honey has been included in this analysis. While it is recognised that it may not qualify for a proven health claim, it is shown as an example of where a perceived health benefit can lead to increased value of a foodstuff.

Mānuka honey's perceived health benefits include anti-bacterial and anti-inflammatory properties, allowing it to command an average price premium of 4.5 times other varieties of honey exports.

From the interviews, we discovered that there were regulatory hurdles, other than establishing the science. It is difficult to make a health claim on mānuka honey due to its high sugar content. Instead, marketing is carried out on the Unique UMF grading system. The UMF system represents the unique signature compounds characteristic which ensure purity and quality. The unique compounds include the key markers of leptosperin, dihydroxyacetone and methylglyoxal (Unique Manuka Factor Honey Association, 2016).

There are eight non-authorized health claims on honey on the EU Register of Nutrition and Health Claims made on foods (European Commission, Several years). They are non-authorized for being non-compliant with the Regulation. Based on the current scientific evidence assessed, the claimed effects have not been substantiated. Further, specific claims on glucose are generally prohibited in the European Union because these claims are generally contrary to the general principles for health claims.

The Omega Lamb Project

Lamb accounted for export revenues of \$2,996 million in 2014 and \$3,061 million in 2015 (HS code 0204). Of these, lamb exports to Europe were \$1,356 million in 2014 and \$1,487 million in 2015.

Omega Lamb is an emerging product of premium lamb with improved health qualities including lower levels of saturated fat, and higher levels of polyunsaturated fat and healthy omega-3 oils. An omega lamb has more fat and conditioning on it than other sheep breeds and was designed to survive in the foothills of the Southern Alps (Alliance Group, 2016).

We discussed this product in our interview with Alliance Group Limited. Health claims are unable to be made on some lamb because of the fat content. When Alliance Group Limited started the project they were unsure if it would generate demand but consumer interest has begun to pick up. Claims on the omega-3 can only be made on the leaner cuts, limited to a 5% fat content. In contrast, fish does not have a limit to the level of fat when making a claim on omega-3.

This is in line with the restriction on claims around fat in the EU Register of Nutrition and Health Claims made on foods. The registered claim that fats are necessary for the absorption of fat-soluble vitamins is not authorized as the claim is contrary to the general principles for health claims (European Commission, Several years).

Anlene

Fonterra stated they had no validated health claims with regulatory approval as at the date of our interview. We also discussed whether the value comes through the exports, as a lot of Fonterra's final products, including Anlene, are assembled offshore. Based on interviews with dairy producers, we took a conservative approach for measuring milk powders, and included milk powder export revenue (HS codes 040210 and 040221) in the second tier of general health claims instead of proven claims for 2014 and 2015.

Fonterra's Anlene is an adult milk brand, mainly marketed to Asia that offers a range of high calcium dairy products specially formulated to encourage optimal bone health. Anlene is enriched with a formulated mix of calcium, vitamin D, zinc and magnesium to ensure enhanced calcium absorption and bone health (Fonterra, 2014).

Anlene is a very good example of the type of functional food New Zealand is trying to produce. The premium value should flow to New Zealand through Fonterra's ownership of offshore operations. However, only intermediate goods export revenue would be accounted for, with the premium flowing to New Zealand through returns to capital. Accordingly, value from foods with scientifically validated health benefits may not only come from export revenue (which is the metric in the HVN National Science Challenge's KPI with the Government) and come into New Zealand through overseas investment.

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Appendix A – New Zealand firms interviewed

Table 10 lists the New Zealand food and beverage firms interviewed by PwC in relation to measuring high-value nutrition export revenues in 2014 and 2015. New Zealand firms' reported industries are also reported in Table 10.

Table 10 New Zealand firms interviewed by PwC New Zealand

Firms	Industry
a2 Milk Company Limited	Dairy
Alliance Group Limited	Meat
The Anagenix Group	Neutraceutical
ANZCO Foods New Zealand	Meat
Blackcurrants New Zealand Inc.	Fruit and Vegetables
Dairy Goat Co-Operative (N.Z.) Limited	Dairy
Danone Nutricia	Dairy
Douglas Nutrition Limited	Dairy
Firstlight Foods Limited	Meat
Fonterra Co-operative Group Limited	Dairy
Frucor Beverages Limited	Beverages
Goodman Fielder New Zealand Limited	Grain
Kono	Mussels Seafood
Manuka Health New Zealand Limited	Honey
Miraka Limited	Dairy
New Zealand Extracts Limited	Fruit and Vegetables
Sanford Limited	Fish
Smartfoods Limited	Grain
Synlait Milk	Dairy
Vitaco	Nutritional Supplements
Zespri Group Limited	Fruit and Vegetables

Appendix B – HS codes

Table 11 HS codes with potential high-value nutrition food products

HS Section	Main category	HS code	Description	
HS Section I – Live Animals, Animal products	Meat	0201	Meat of bovine animals	
		0202	Meat of bovine animals; frozen (frozen beef meat)	
		0204	Meat of sheep or goats	
	Fish, Mussels & Crustaceans		0302	Fish, fresh (excluding Pacific Salmon below)
			0302.13	Pacific salmon, fresh
			0303	Fish, frozen (excluding Pacific Salmon below)
			0303.11	Salmon, frozen
			0303.12	Salmon, frozen
			0304	Fish fillets (excluding Pacific Salmon below)
			0304.41	Salmon fillets, fresh
			0304.81	Salmon fillets, frozen
			0305	Fish, dried salted in brine smoked (excluding Pacific Salmon below)
			0305.41	Salmon, smoked
			0306	Crustaceans
			0307	Molluscs (excluding mussels below)
			0307.31	Mussels
	0307.39	Mussels		
	Dairy		0401	Milk and cream, not concentrated, not sweetened
			0402	Milk and cream, concentrated or sweetened (excluding powders below)
			040210	Dairy produce; milk and cream, concentrated or containing added sugar or other sweetening matter, in powder, granules or other solid forms, of a fat content not exceeding 1.5% (by weight)
			040221	Dairy produce; milk and cream, concentrated, not containing added sugar or other sweetening matter, in powder, granules or other solid forms, of a fat content exceeding 1.5% (by weight)
			040229	Dairy produce; milk and cream, containing added sugar or other sweetening matter, in powder, granules or other solid forms, of a fat content exceeding 1.5% (by weight)
			0403	Buttermilk, curdled milk and cream, yoghurt
0404			Whey and products consisting of natural milk constituents	
0405			Butter and other fats	
Eggs			0407	Birds eggs in shell
Honey			0409	Honey, natural
HS Section II – Vegetable	Vegetables	0702	Tomatoes; fresh or chilled	
		0703	Onions	

HS Section	Main category	HS code	Description	
products		0704	Cabbages, cauliflower, broccoli, kale	
		0709	Vegetables (not elsewhere included, e.g. spinach)	
		0710	Vegetables, frozen	
	Fruits and Nuts		0804	Dates, figs, pineapples, avocados, guavas, mangoes and mangosteen, fresh or dried
				080440 fruit, edible; avocados, fresh or dried
			0805	Citrus fruit, fresh or dried
			0808	Apples, pears and quinces, fresh (excluding apples)
				080810 Apples
				Fruit, fresh, not elsewhere included (excluding berries and kiwifruit below)
				081020 Blackberries, fresh
				081040 Cranberries, fresh
		081050 Kiwifruit, fresh		
		0811	Fruits and Nuts, uncooked or cooked	
	Cereals		1004	Oats
HS Section III – Animal or Vegetable fats and oils	Oils and Fats	1504	Fats and Oil and their fractions of fish and marine mammals (excluding fish oil below)	
			150410 Oils of fish	
		1509	Olive oil and its fractions (excluding olive oil below)	
			150910 Vegetable oils, olive oil, virgin	
		1512	Sunflower seed	
		1517	Margarine (excluding liquid margarine below)	
			151710 Margarine, liquid margarine	
HS Section IV – Prepared foodstuffs	Meat, Fish or Crustaceans, Molluscs and other preparations	1605	Crustaceans, prepared or preserved (excluding mussels below)	
			160553 Mussels, prepared or preserved	
	Preparations of cereals, flour, starch or milk, pastrycooks' products		1904	Prepared foods obtained by swelling or roasting cereals or cereal products (e.g. cornflakes) cereals in grain form of in the form of flakes or other worked grains, pre-cooked or otherwise prepared, n.e.c.
			1905	Bread, pastry, cakes, biscuits, other bakers wares
	Preparations of Vegetables, Fruit and nuts		2002	Tomatoes, prepared or preserved
			2008	Fruits, nuts, not elsewhere included, preparations (excluding cherries and cranberries)
				200860 Fruit, cherries, prepared or preserved
				200893 Fruit, cranberries, prepared or preserved
	Miscellaneous edible preparations		2009	Fruit juices and vegetable juices
			2106	Food preparations, not elsewhere specified or included (excluding codes below)
			210610 Protein, concentrates and textured protein substances	
		2106.90 Food preparations; n.e.c. in item no. 210610		

Source: Statistics New Zealand (2011).

Appendix C – 2014 exports

Table 12 High-value nutrition export revenue for 2014, all selected product categories (NZ\$ million)

HS code	Description	Proven claims	General health claims	Especially nutritious
0201	Meat of bovine animals	-	-	281
0202	Meat of bovine animals; frozen (frozen beef meat)	-	-	2,195
0204	Meat of sheep or goats	-	-	2,996
0302	Fish, fresh (excluding Pacific Salmon below)	-	22	65
	0302.13 Pacific salmon, fresh	-	6	19
0303	Fish, frozen (excluding Pacific Salmon below)	-	96	287
	0303.11 Salmon, frozen	-	0	0
	0303.12 Salmon, frozen	-	1	4
0304	Fish fillets (excluding Pacific Salmon below)	-	61	184
	0304.41 Salmon fillets, fresh	-	0	1
	0304.81 Salmon fillets, frozen	-	2	5
0305	Fish, dried salted in brine smoked (excluding Pacific Salmon below)	-	1	3
	0305.41 Salmon, smoked	-	1	3
0306	Crustaceans	-	73	218
0307	Molluscs (excluding mussels below)	-	17	52
	0307.31 Mussels	-	2	-
	0307.39 Mussels	-	246	-
0401	Milk and cream, not concentrated, not sweetened	-	-	250
0402	Milk and cream, concentrated or sweetened (excluding powders below)	-	-	1
	040210 Dairy produce; milk and cream, concentrated or containing added sugar or other sweetening matter, in powder, granules or other solid forms, of a fat content not exceeding 1.5% (by weight)	-	1,900	-
	040221 Dairy produce; milk and cream, concentrated, not containing added sugar or other sweetening matter, in powder, granules or other solid forms, of a fat content exceeding 1.5% (by weight)	-	7,248	-
	040229 Dairy produce; milk and cream, containing added sugar or other sweetening matter, in powder, granules or other solid forms, of a fat	-	-	46

HS code	Description	Proven claims	General health claims	Especially nutritious
	content exceeding 1.5% (by weight)			
0403	Buttermilk, curdled milk and cream, yoghurt	-	-	212
0404	Whey and products consisting of natural milk constituents	-	-	726
0405	Butter and other fats	-	-	2,586
0407	Birds eggs in shell	-	-	12
0409	Honey, natural	-	157	45
0702	Tomatoes; fresh or chilled	-	9	-
0703	Onions	-	-	99
0704	Cabbages, cauliflower, broccoli, kale	-	-	2
0709	Vegetables (not elsewhere included, e.g. spinach)	-	-	82
0710	Vegetables, frozen	-	-	128
0804	Dates, figs, pineapples, avocados, guavas, mangoes and mangosteen, fresh or dried	-	-	0
	0804.40 fruit, edible; avocados, fresh or dried	-	-	119
0805	Citrus fruit, fresh or dried	-	-	11
0808	Apples, pears and quinces, fresh (excluding apples, fresh)	-	-	11
	0808.10 Apples	-	-	512
0810	Fruit, fresh, not elsewhere included (excluding berries and kiwifruit below)	-	-	21
	0810.20 Blackberries, fresh	-	-	0
	0810.40 Cranberries, fresh	-	-	23
	0810.50 Kiwifruit, fresh	565	437	-
0811	Fruits and Nuts, uncooked or cooked	-	-	18
1004	Oats	-	-	0
1504	Fats and Oil and their fractions of fish and marine mammals (excluding fish oil below)	-	6	-
	1504.10 Oils of fish	-	3	-
1509	Olive oil and its fractions (excluding olive oil below)	-	-	0
	1509.10 Vegetable oils, olive oil, virgin	-	-	0
1512	Sunflower seed	-	-	1
1517	Margarine (excluding liquid margarine below)	-	-	1
	1517.10 Margarine, liquid margarine	-	-	7
1605	Crustaceans, prepared or preserved (excluding mussels below)	-	9	28
	1605.53 Mussels, prepared or	-	1	4

HS code	Description	Proven claims	General health claims	Especially nutritious
	preserved			
1904	Prepared foods obtained by swelling or roasting cereals or cereal products (e.g. cornflakes) cereals in grain form of in the form of flakes or other worked grains, pre-cooked or otherwise prepared, n.e.c.	-	-	31
1905	Bread, pastry, cakes, biscuits, other bakers wares	-	-	131
2002	Tomatoes, prepared or preserved	-	3	-
2008	Fruits, nuts, not elsewhere included, preparations (excluding cherries and cranberries)	-	-	25
	2008.60 Fruit, cherries, prepared or preserved	-	-	0
	2008.93 Fruit, cranberries, prepared or preserved	-	-	0
2009	Fruit juices and vegetable juices	-	-	71
2106	Food preparations, not elsewhere specified or included (excluding codes below)	-	-	-
	2106.10 Protein, concentrates and textured protein substances	-	-	2
	2106.90 Food preparations; n.e.c. in item no. 2106.10	-	-	556
Total		565	10,300	12,075

Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations.

Note: Totals may be subject to rounding error.

Table 13 High-value nutrition export revenue for 2014, all selected product categories (percentage attribution of each product category)

HS code	Description	Proven claims	General health claims	Especially nutritious
0201	Meat of bovine animals	-	-	100%
0202	Meat of bovine animals; frozen (frozen beef meat)	-	-	100%
0204	Meat of sheep or goats	-	-	100%
0302	Fish, fresh (excluding Pacific Salmon below)	-	25%	75%
	0302.13 Pacific salmon, fresh	-	25%	75%
0303	Fish, frozen (excluding Pacific Salmon below)	-	25%	75%
	0303.11 Salmon, frozen	-	25%	75%
	0303.12 Salmon, frozen	-	25%	75%
0304	Fish fillets (excluding Pacific Salmon below)	-	25%	75%
	0304.41 Salmon fillets, fresh	-	25%	75%
	0304.81 Salmon fillets, frozen	-	25%	75%
0305	Fish, dried salted in brine smoked (excluding Pacific Salmon below)	-	25%	75%
	0305.41 Salmon, smoked	-	25%	75%
0306	Crustaceans	-	25%	75%
0307	Molluscs (excluding mussels below)	-	25%	75%
	0307.31 Mussels	-	100%	-
	0307.39 Mussels	-	100%	-
0401	Milk and cream, not concentrated, not sweetened	-	-	100%
0402	Milk and cream, concentrated or sweetened (excluding powders below)	-	-	100%
	040210 Dairy produce; milk and cream, concentrated or containing added sugar or other sweetening matter, in powder, granules or other solid forms, of a fat content not exceeding 1.5% (by weight)	-	100%	-
	040221 Dairy produce; milk and cream, concentrated, not containing added sugar or other sweetening matter, in powder, granules or other solid forms, of a fat content exceeding 1.5% (by weight)	-	100%	-
	040229 Dairy produce; milk and cream, containing added sugar or other sweetening matter, in powder, granules or other solid forms, of a fat content exceeding 1.5% (by weight)	-	-	100%
0403	Buttermilk, curdled milk and cream, yoghurt	-	-	100%

HS code	Description	Proven claims	General health claims	Especially nutritious
0404	Whey and products consisting of natural milk constituents	-	-	100%
0405	Butter and other fats	-	-	100%
0407	Birds eggs in shell	-	-	100%
0409	Honey, natural	-	78%	23%
0702	Tomatoes; fresh or chilled	-	100%	-
0703	Onions	-	-	100%
0704	Cabbages, cauliflower, broccoli, kale	-	-	100%
0709	Vegetables (not elsewhere included, e.g. spinach)	-	-	100%
0710	Vegetables, frozen	-	-	100%
0804	Dates, figs, pineapples, avocados, guavas, mangoes and mangosteen, fresh or dried	-	-	100%
	0804.40 fruit, edible; avocados, fresh or dried	-	-	100%
0805	Citrus fruit, fresh or dried	-	-	100%
0808	Apples, pears and quinces, fresh (excluding apples, fresh)	-	-	100%
	0808.10 Apples	-	-	100%
0810	Fruit, fresh, not elsewhere included (excluding berries and kiwifruit below)	-	-	100%
	0810.20 Blackberries, fresh	-	-	100%
	0810.40 Cranberries, fresh	-	-	100%
	0810.50 Kiwifruit, fresh	56%	44%	-
0811	Fruits and Nuts, uncooked or cooked	-	-	100%
1004	Oats	-	-	100%
1504	Fats and Oil and their fractions of fish and marine mammals (excluding fish oil below)	-	100%	-
	1504.10 Oils of fish	-	100%	-
1509	Olive oil and its fractions (excluding olive oil below)	-	-	100%
	1509.10 Vegetable oils, olive oil, virgin	-	-	100%
1512	Sunflower seed	-	-	100%
1517	Margarine (excluding liquid margarine below)	-	-	100%
	1517.10 Margarine, liquid margarine	-	-	100%
1605	Crustaceans, prepared or preserved (excluding mussels below)	-	25%	75%
	1605.53 Mussels, prepared or preserved	-	25%	75%
1904	Prepared foods obtained by swelling or roasting cereals or cereal products (e.g. cornflakes) cereals in grain form	-	-	100%

HS code	Description	Proven claims	General health claims	Especially nutritious
	of in the form of flakes or other worked grains, pre-cooked or otherwise prepared, n.e.c.			
1905	Bread, pastry, cakes, biscuits, other bakers wares	-	-	100%
2002	Tomatoes, prepared or preserved	-	100%	-
2008	Fruits, nuts, not elsewhere included, preparations (excluding cherries and cranberries)	-	-	100%
	2008.60 Fruit, cherries, prepared or preserved	-	-	100%
	2008.93 Fruit, cranberries, prepared or preserved	-	-	100%
2009	Fruit juices and vegetable juices	-	-	100%
2106	Food preparations, not elsewhere specified or included (excluding codes below)	-	-	100%
	2106.10 Protein, concentrates and textured protein substances	-	-	100%
	2106.90 Food preparations; n.e.c. in item no. 2106.10	-	-	100%

Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations.

Note: Percentage totals may be subject to rounding error.

Appendix D – 2015 exports

Table 14 High-value nutrition export revenue for 2015, all selected product categories (NZ\$ million)

HS code	Description	Proven claims	General health claims	Especially nutritious
0201	Meat of bovine animals	-	-	338
0202	Meat of bovine animals; frozen (frozen beef meat)	-	-	2,930
0204	Meat of sheep or goats	-	-	3,061
0302	Fish, fresh (excluding Pacific Salmon below)	-	23	69
	0302.13 Pacific salmon, fresh	-	10	29
0303	Fish, frozen (excluding Pacific Salmon below)	-	103	308
	0303.11 Salmon, frozen	-	0	0
	0303.12 Salmon, frozen	-	2	6
0304	Fish fillets (excluding Pacific Salmon below)	-	63	189
	0304.41 Salmon fillets, fresh	-	0	1
	0304.81 Salmon fillets, frozen	-	2	6
0305	Fish, dried salted in brine smoked (excluding Pacific Salmon below)	-	1	3
	0305.41 Salmon, smoked	-	1	4
0306	Crustaceans	-	83	249
0307	Molluscs (excluding mussels below)	-	19	57
	0307.31 Mussels	-	2	-
	0307.39 Mussels	-	216	-
0401	Milk and cream, not concentrated, not sweetened	-	-	310
0402	Milk and cream, concentrated or sweetened (excluding powders below)	-	-	0
	040210 Dairy produce; milk and cream, concentrated or containing added sugar or other sweetening matter, in powder, granules or other solid forms, of a fat content not exceeding 1.5% (by weight)	-	1,362	-
	040221 Dairy produce; milk and cream, concentrated, not containing added sugar or other sweetening matter, in powder, granules or other solid forms, of a fat content exceeding 1.5% (by weight)	-	4,941	-
	040229 Dairy produce; milk and cream, containing added sugar or other sweetening matter, in powder, granules or other solid forms, of a fat	-	-	57

HS code	Description	Proven claims	General health claims	Especially nutritious
	content exceeding 1.5% (by weight)			
0403	Buttermilk, curdled milk and cream, yoghurt	-	-	173
0404	Whey and products consisting of natural milk constituents	-	-	682
0405	Butter and other fats	-	-	2,333
0407	Birds eggs in shell	-	-	14
0409	Honey, natural	-	221	64
0702	Tomatoes; fresh or chilled	-	10	-
0703	Onions	-	-	82
0704	Cabbages, cauliflower, broccoli, kale	-	-	2
0709	Vegetables (not elsewhere included, e.g. spinach)	-	-	94
0710	Vegetables, frozen	-	-	126
0804	Dates, figs, pineapples, avocados, guavas, mangoes and mangosteen, fresh or dried	-	-	0
	0804.40 fruit, edible; avocados, fresh or dried	-	-	90
0805	Citrus fruit, fresh or dried	-	-	9
0808	Apples, pears and quinces, fresh (excluding apples, fresh)	-	-	9
	0808.10 Apples	-	-	619
0810	Fruit, fresh, not elsewhere included (excluding berries and kiwifruit below)	-	-	23
	0810.20 Blackberries, fresh	-	-	0
	0810.40 Cranberries, fresh	-	-	24
	0810.50 Kiwifruit, fresh	1,032	404	-
0811	Fruits and Nuts, uncooked or cooked	-	-	23
1004	Oats	-	-	0
1504	Fats and Oil and their fractions of fish and marine mammals (excluding fish oil below)	-	8	-
	1504.10 Oils of fish	-	1	-
1509	Olive oil and its fractions (excluding olive oil below)	-	-	0
	1509.10 Vegetable oils, olive oil, virgin	-	-	0
1512	Sunflower seed	-	-	0
1517	Margarine (excluding liquid margarine below)	-	-	1
	1517.10 Margarine, liquid margarine	-	-	7
1605	Crustaceans, prepared or preserved (excluding mussels below)	-	9	27
	1605.53 Mussels, prepared or	-	1	4

HS code	Description	Proven claims	General health claims	Especially nutritious
	preserved			
1904	Prepared foods obtained by swelling or roasting cereals or cereal products (e.g. cornflakes) cereals in grain form of in the form of flakes or other worked grains, pre-cooked or otherwise prepared, n.e.c.	-	-	34
1905	Bread, pastry, cakes, biscuits, other bakers wares	-	-	144
2002	Tomatoes, prepared or preserved	-	4	-
2008	Fruits, nuts, not elsewhere included, preparations (excluding cherries and cranberries)	-	-	23
	2008.60 Fruit, cherries, prepared or preserved	-	-	0
	2008.93 Fruit, cranberries, prepared or preserved	-	-	0
2009	Fruit juices and vegetable juices	-	-	72
2106	Food preparations, not elsewhere specified or included (excluding codes below)	-	-	-
	2106.10 Protein, concentrates and textured protein substances	-	-	5
	2106.90 Food preparations; n.e.c. in item no. 2106.10	-	-	792
Total		1,032	7,486	13,097

Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations.

Note: Totals may be subject to rounding error.

Table 15 High-value nutrition export revenue for 2015, all selected product categories (percentage attribution of each product category)

HS code	Description	Proven claims	General health claims	Especially nutritious
0201	Meat of bovine animals	-	-	100%
0202	Meat of bovine animals; frozen (frozen beef meat)	-	-	100%
0204	Meat of sheep or goats	-	-	100%
0302	Fish, fresh (excluding Pacific Salmon below)	-	25%	75%
	0302.13 Pacific salmon, fresh	-	25%	75%
0303	Fish, frozen (excluding Pacific Salmon below)	-	25%	75%
	0303.11 Salmon, frozen	-	25%	75%
	0303.12 Salmon, frozen	-	25%	75%
0304	Fish fillets (excluding Pacific Salmon below)	-	25%	75%
	0304.41 Salmon fillets, fresh	-	25%	75%
	0304.81 Salmon fillets, frozen	-	25%	75%
0305	Fish, dried salted in brine smoked (excluding Pacific Salmon below)	-	25%	75%
	0305.41 Salmon, smoked	-	25%	75%
0306	Crustaceans	-	25%	75%
0307	Molluscs (excluding mussels below)	-	25%	75%
	0307.31 Mussels	-	100%	-
	0307.39 Mussels	-	100%	-
0401	Milk and cream, not concentrated, not sweetened	-	-	100%
0402	Milk and cream, concentrated or sweetened (excluding powders below)	-	-	100%
	040210 Dairy produce; milk and cream, concentrated or containing added sugar or other sweetening matter, in powder, granules or other solid forms, of a fat content not exceeding 1.5% (by weight)	-	100%	-
	040221 Dairy produce; milk and cream, concentrated, not containing added sugar or other sweetening matter, in powder, granules or other solid forms, of a fat content exceeding 1.5% (by weight)	-	100%	-
	040229 Dairy produce; milk and cream, containing added sugar or other sweetening matter, in powder, granules or other solid forms, of a fat content exceeding 1.5% (by weight)	-	-	100%
0403	Buttermilk, curdled milk and cream, yoghurt	-	-	100%

HS code	Description	Proven claims	General health claims	Especially nutritious
0404	Whey and products consisting of natural milk constituents	-	-	100%
0405	Butter and other fats	-	-	100%
0407	Birds eggs in shell	-	-	100%
0409	Honey, natural	-	78%	23%
0702	Tomatoes; fresh or chilled	-	100%	-
0703	Onions	-	-	100%
0704	Cabbages, cauliflower, broccoli, kale	-	-	100%
0709	Vegetables (not elsewhere included, e.g. spinach)	-	-	100%
0710	Vegetables, frozen	-	-	100%
0804	Dates, figs, pineapples, avocados, guavas, mangoes and mangosteen, fresh or dried	-	-	100%
	0804.40 fruit, edible; avocados, fresh or dried	-	-	100%
0805	Citrus fruit, fresh or dried	-	-	100%
0808	Apples, pears and quinces, fresh (excluding apples, fresh)	-	-	100%
	0808.10 Apples	-	-	100%
0810	Fruit, fresh, not elsewhere included (excluding berries and kiwifruit below)	-	-	100%
	0810.20 Blackberries, fresh	-	-	100%
	0810.40 Cranberries, fresh	-	-	100%
	0810.50 Kiwifruit, fresh	72%	28%	-
0811	Fruits and Nuts, uncooked or cooked	-	-	100%
1004	Oats	-	-	100%
1504	Fats and Oil and their fractions of fish and marine mammals (excluding fish oil below)	-	100%	-
	1504.10 Oils of fish	-	100%	-
1509	Olive oil and its fractions (excluding olive oil below)	-	-	100%
	1509.10 Vegetable oils, olive oil, virgin	-	-	100%
1512	Sunflower seed	-	-	100%
1517	Margarine (excluding liquid margarine below)	-	-	100%
	1517.10 Margarine, liquid margarine	-	-	100%
1605	Crustaceans, prepared or preserved (excluding mussels below)	-	25%	75%
	1605.53 Mussels, prepared or preserved	-	25%	75%
1904	Prepared foods obtained by swelling or roasting cereals or cereal products (e.g. cornflakes) cereals in grain form	-	-	100%

HS code	Description	Proven claims	General health claims	Especially nutritious
	of in the form of flakes or other worked grains, pre-cooked or otherwise prepared, n.e.c.			
1905	Bread, pastry, cakes, biscuits, other bakers wares	-	-	100%
2002	Tomatoes, prepared or preserved	-	100%	-
2008	Fruits, nuts, not elsewhere included, preparations (excluding cherries and cranberries)	-	-	100%
	2008.60 Fruit, cherries, prepared or preserved	-	-	100%
	2008.93 Fruit, cranberries, prepared or preserved	-	-	100%
2009	Fruit juices and vegetable juices	-	-	100%
2106	Food preparations, not elsewhere specified or included (excluding codes below)	-	-	100%
	2106.10 Protein, concentrates and textured protein substances	-	-	100%
	2106.90 Food preparations; n.e.c. in item no. 2106.10	-	-	100%

Source: Statistics New Zealand (Several years) Infoshare: Imports and exports, and PwC calculations.

Note: Percentage totals may be subject to rounding error.

Appendix E – Restrictions

This Report has been prepared solely for the purposes stated herein and should not be relied upon for any other purpose. We accept no liability to any party should it be used for any purpose other than that for which it was prepared.

To the fullest extent permitted by law, PwC accepts no duty of care to any third party in connection with the provision of this Report and/or any related information or explanation (together, the Information). Accordingly, regardless of the form of action, whether in contract, tort (including without limitation, negligence) or otherwise, and to the extent permitted by applicable law, PwC accepts no liability of any kind to any third party and disclaims all responsibility for the consequences of any third party acting or refraining to act in reliance on the Information.

We have not independently verified the accuracy of information provided to us, and have not conducted any form of audit in respect of the organisation for which work is completed. Accordingly, we express no opinion on the reliability, accuracy, or completeness of the information provided to us and upon which we have relied.

The statements and opinions expressed herein have been made in good faith, and on the basis that all information relied upon is true and accurate in all material respects, and not misleading by reason of omission or otherwise.

The statements and opinions expressed in this Report are based on information available as at the date of the Report.

We reserve the right, but will be under no obligation, to review or amend our Report, if any additional information, which was in existence on the date of this Report, was not brought to our attention, or subsequently comes to light.

This Report is issued pursuant to the terms and conditions set out in our contract with the University of Auckland dated 29 June 2016.