

Introduction

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The Association of South East Asian Nations “ASEAN” region is experiencing a period of rapid growth. It has the fastest rate of population growth globally and gross domestic product (GDP) is forecast to nearly double over the next decade. By 2030, ASEAN is forecast to be equivalent to the world’s fourth largest economy¹. In 2017, Australia’s trade with ASEAN countries grew by 9 percent over 2016 to reach \$105 billion, which is greater than Australia’s two way trade with Japan and the United States². ASEAN’s growth is fuelling increased demand for nutrition, protein sources, and bespoke food and beverage products.

As the population grows from 643.5 million in 2017 and affluence increases across ASEAN (GDP per capita rose 6.4 percent last year³), consumers are altering lifestyle decisions and the products they choose to purchase and consume. This includes increasing interest in the health and wellness category. Advances in technology and global dietary trends have also contributed to rising interest in health and wellness in the region.

Globally, Health and Wellness is also positioned as one of the fastest growing food and beverage categories, largely due to a sharp rise in chronic disease and illness linked to lifestyle and diet. Solution-driven action is being adopted by consumers, governments and organisations to curb chronic disease and illness, leading to more interest in health and wellness.

Foods for health present immediate and longer-term market opportunities in the ASEAN region. Investing in

both technology and in developing core strategies and partnerships to engage with the ASEAN region will be vital for governments, food and nutraceutical companies seeking to service the region. Progressive Australian businesses seeking to participate in the foods for health market are well positioned to align their value propositions to be locally-relevant, and actively engage with ASEAN’s individual and diverse markets.

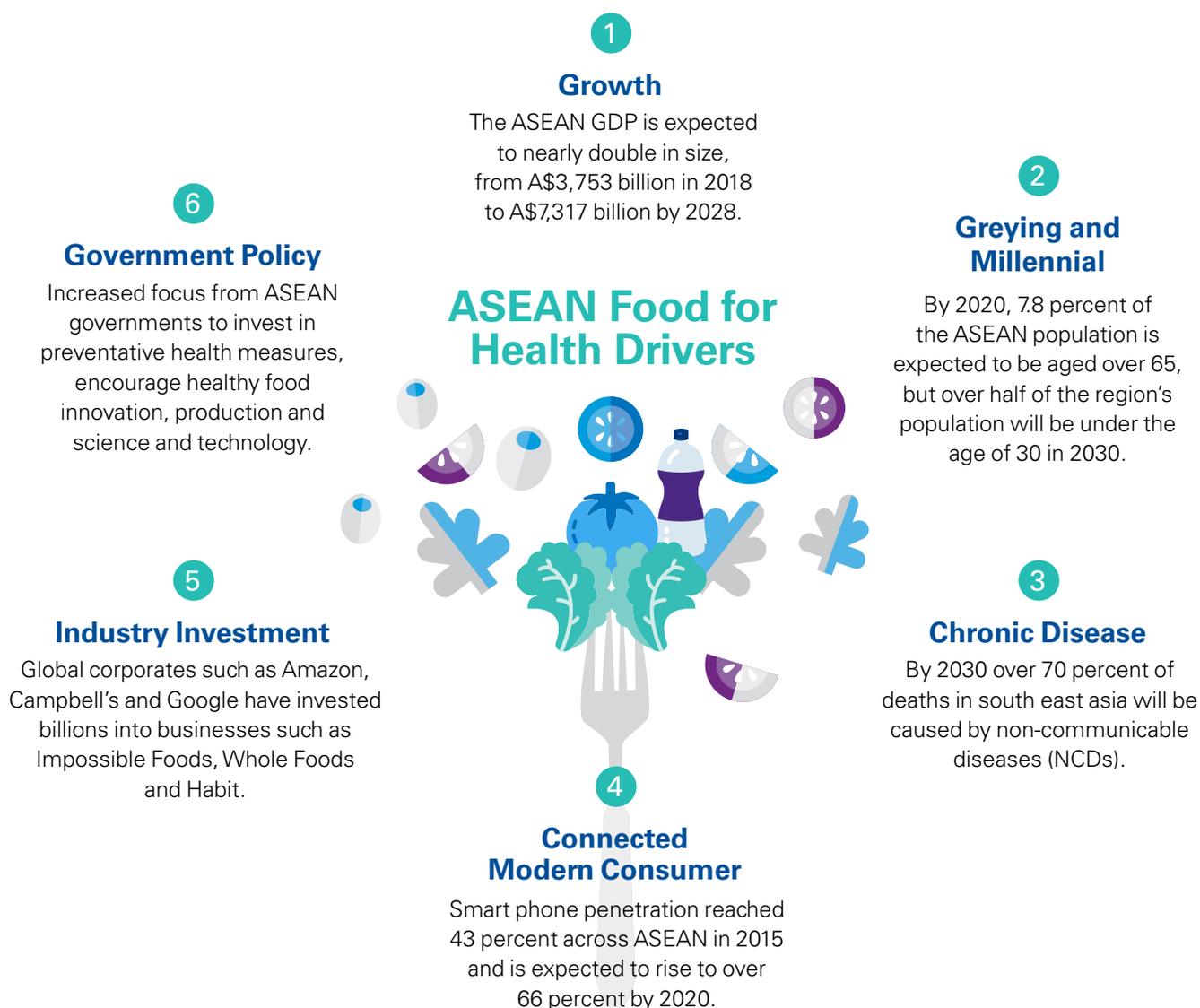
Recognising these trends, KPMG and CSIRO embarked on a collaborative research project to:

- identify key market trends in food for health in the ASEAN region;
- understand how our food producers are responding to rising demands for healthy foods and precision nutrition;
- identify how CSIRO can respond to these trends through innovation and aligning its current science and technology capability to the identified trends; and
- inform the Future Science Platform on Precision Health recently launched by CSIRO.

Through market analyses, industry interviews and an in-market workshop in Singapore in April 2018, four key market opportunities were identified: *health by stealth*, *alternative proteins*, *gut health* and *precision nutrition*.

This report, *Food for health* provides an overview of the research findings and presents insights into the market opportunities for food and nutraceutical companies.

1. https://www.industry.nsw.gov.au/_data/assets/pdf_file/0008/145979/ASEAN-strategy.pdf
2. <https://dfat.gov.au/about-us/publications/trade-investment/trade-at-a-glance/trade-investment-at-a-glance-2017/Documents/trade-investment-at-a-glance-2017.pdf>
3. <https://dfat.gov.au/international-relations/regional-architecture/asean/Pages/why-asean-matters-our-shared-prosperity.aspx>



Note: Chronic diseases are any disorder that persists over a long period (3 months or longer) and need to be managed/treated all the time.

Trend one: Health by stealth

Overview

A sharp rise in chronic disease and illness has positioned the Health and Wellness category as one of the fastest growing markets globally.

The Health and Wellness food and beverage category accounts for approximately 20 percent of the \$US 2,181 billion global packaged food market⁴.

Consumers, governments and organisations worldwide are taking action to decrease the consumption of harmful products, while at the same time increasing the take-up of beneficial and health-promoting products.

Governments are acknowledging the burden that disease and illness have on the public healthcare systems, resulting in policies and regulations aimed at pivoting health care systems from curative to preventative.

Creating policies that target food ingredients and formulations to promote health is a high growth area of focus in *health by stealth*.

The case for action is clear. The World Health Organisation estimates that about 80 percent of premature heart disease cases, strokes, type 2 diabetes and 40 percent of cancers could be avoided if major risk factors for non-communicable diseases, such as unhealthy diets, were eliminated⁵.

In the ASEAN region, many of the ten member nations are facing national health epidemics. The region is forecast to experience the highest number of deaths from non-communicable disease of any region in the world by 2020. Across the region there has been a rapid increase in obesity, type 2 diabetes, cardiovascular disease and cancer.

Concurrently with a rise in chronic illness, many ASEAN nations have aging populations. By 2020⁶, 78 percent of the ASEAN population is expected to be aged over 65⁷, creating the need to accommodate age related specific dietary and health requirements.

Asia Pacific consumers are already reducing their sugar and fat consumption in line with seeking out more healthy and nutritious foods. Sixty-eight percent of Asia Pacific consumers have cut down their intake of fats and 60 percent have reduced sugar consumption⁸.

4. Euromonitor Data - Packaged Food (24/4/2018)

5. http://www.who.int/chp/chronic_disease_report/part1/en/index11.html

6. http://www.who.int/chp/chronic_disease_report/part1/en/index11.html

7. Neilson Global Health & Wellness Survey, Q3 2014 Source

8. Nielsen Global Health & Wellness study 2015

Looking to key ASEAN nations, the Health and Wellness category is expected to grow significantly between 2017-22:



The likes of Mondelez International, one of the world's largest snack companies, view well-being as a major area to target as part of their growth strategy.

Rob Hargrove, Research, Development, Quality and Innovation leader, commented that 2017 had been their biggest year ever in the well-being space with unprecedented innovation and renovation of their portfolio¹⁰.

In May 2016, Nestlé announced a wide-ranging sodium reduction strategy and then asked consumers whether they would be more or less likely to buy Nestlé products as a result. Eighty-one percent said the change would not affect their purchases, 15 percent said they were likely to buy more, and only 4 percent said it would make purchases less likely.

Subtle, but impactful, changes to the formulation of products that historically have not featured health promoting ingredients is the essence of *health by stealth* offerings.

For organisations wanting to target the ASEAN market with *health by stealth* food solutions there are two main approaches to take.

1 Product Reformulation

This includes the reformulation of products to reduce their perception as being harmful to consumers (primarily due to sugar, salt and saturated fats).

CSIRO has created **The flavour model** which is a patented method utilising a unique software and hardware toolkit. The method reformulates products to reduce sugar and/or salt content without impacting the overall flavour intensity and perception. The use of 3D surface response maps alters taste and aroma concentrations to ensure maintenance or enhancement of flavours.

2 The introduction of functional ingredients and foods that increase the overall health benefits of the food

As part of its research into functional ingredients, CSIRO has developed BARLEYmax that specifically looks to grains with higher fibre content and enhanced nutritional benefits. Using conventional plant breeding techniques, CSIRO created a new type of barley with insoluble, soluble and resistant starch. As a natural wholegrain with enhanced nutritional benefits, it contains twice the dietary fibre of regular grains and four times the resistant starch of normal barley. It also has a low glycaemic index. Freedom Foods are selling products containing BARLEYmax in key ASEAN markets.



Global insights

Global food corporations active in the ASEAN region are adjusting their product portfolio and looking for unique ingredients

The Consumer Goods Forum reports that over 180,000 products were reformulated by its members since 2016¹¹.

“At PepsiCo, we recognise that consumers face numerous daily challenges in their efforts to eat better, and we believe we have a role to play in addressing those challenges. As part of our [Performance with Purpose](#) agenda, we are working to address this by making better- and good-for-you foods more accessible and reducing sugar, salt, and fat content across our product portfolio – without compromising on taste¹².

Well-being is a key power shift for a company like ours and an important part of our growth strategy. If you think about it, the well-being snack segment is a \$160 billion opportunity, split with 60 percent in developed and 40 percent in developing markets. That's a quite significant market! Our ambition is to be a global leader in well-being snacks. To get there, we're focusing on renovating our core portfolio as well as expanding our well-being brands by focusing our innovation on great tasting well-being snacks.”¹³

9. Euromonitor Health and Wellness Data 3/5/2018

10. <https://www.theconsumergoodsforum.com/one-good-cookie-how-mondelez-international-is-creating-healthier-snacks/>

11. <https://foodindustry.asia/new-report-shows-over-180000-consumer-goods-products-reformulated>

12. <http://www.pepsico.com/sustainability/performance-with-purpose/our-goals>

13. <https://www.theconsumergoodsforum.com/one-good-cookie-how-mondelez-international-is-creating-healthier-snacks/>

Stakeholder drivers

There is a strong opportunity for those wanting to target the Health and Wellness category via *health by stealth* given the fast-growing market demand for products in this category.

In ASEAN nations, there is market demand driven by a combination of higher levels of chronic disease and higher levels of affluence. Regions such as Singapore, Indonesia and Thailand are recognised as countries where premium health food products are gaining popularity.

As **governments** acknowledge the burden of costs on healthcare systems due to chronic diseases, preventative health care policies, such as sugar taxes, will become increasingly common. It is expected that over the next 5 years that there will be a sharp increase in preventative healthcare policies from governments.

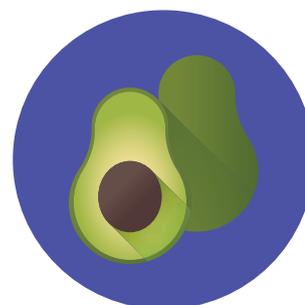
Awareness from **food corporations** will drive repositioning in the market. Organisations will look to pivot their business strategy to align with consumer demands, reducing disease-related ingredients and adding health-promoting elements.

Specifically, in ASEAN nations, corporations will seek out formulas that reduce sugars, salt and saturated fats. In line with this, many corporations are already making pledges to the Consumer Goods Forum as a way to ensure accountability. Progress is being tracked and reported globally.

While not as high as the global average, **consumers** across Asia Pacific will change their diet to increase products that promote good health and alleviate poor health.

ASEAN consumers will still demand specific flavour profiles in the region. Items that are high in salt and sodium such as soy, and high-carb items such as rice, are consumed on a daily basis in many ASEAN countries. Consumers will be unwilling to forgo foods that are viewed as being the backbone to their culture and diet. This also needs to be considered.

CSIRO have unique product reformulation techniques to support *Health by stealth* strategies. One of the techniques is 3D modelling that models a computational virtual mouth to simulate ingestion, mastication and swallowing. The model can simulate in-mouth food breakdown for example which can be used to understand how texture and flavour delivery to receptors can be related to the structure and composition of food. Benefits of the model include fast redesign of food for better in-mouth properties and better health outcomes (e.g. reduced fat/sugar/salt).



Challenges

While many consumers are aware of the risks from disease and chronic illness linked to harmful foods, many remain **unwilling to forgo the sensory elements experienced inherent in their daily foods**. Changing consumer behaviour is a barrier to providing solutions that require consumer buy-in on a long-term basis.

When it comes to eating habits, creating customer loyalty with food products will continue to challenge the food industry. The challenge at hand is the need to make a food healthy, without compromising on taste and texture that make certain food products a staple to many diets.

Matching commercial viability with consumer trends and nutritional science is a challenge that takes a collaborative effort. The introduction of new and novel product elements require involvement of multiple value chain participants. This can increase complexity across the supply chain and delay time to market. This approach requires the consolidation of a number of perspectives and the need for a holistic approach. KPMG have created a specialist Access Asia team that includes experienced food industry executives, supply chain, trade and customs and local channel specialists, to assist exporters navigate through the challenges and access collaborative partners.

In our work with food exporters into the ASEAN and the wider Asia region, our clients are finding as consumers become more educated about food and seeking out nutritional information, they are becoming sceptical of **food claims and labelling**. Consumers have increased interest in certification of product claims, particularly with regards to nutrition. Credibility and authenticity around claims are also critical, especially as technology is enabling fraudulent claims to be highlighted. Increasingly food claims will require verification.

CSIRO's science challenge enables the development of healthy and sustainable diets through partnership with relevant industries and organisations. CSIRO is assisting industry to bring value-added nutritional products with substantiated health benefits to market to help consumers make healthy food choices.

One area that can inform consumers to assist with healthier food choices is health claims on food labels and in advertising products. Health claims must comply with regulations, which differ by country. Claims need to be underpinned by the highest quality science so that consumers will receive factual, unambiguous information about the health benefits of the foods they buy.

Most food businesses do not have access to in-house expertise to scientifically substantiate the food-health relationship that is required by regulations. CSIRO can assist businesses in the development of value-added nutritional products and the substantiation of these products.

Available and relevant CSIRO technology

Opportunity

Health by stealth

Estimated addressable market

Health and Wellness food and beverage is one of the fastest growing food segments globally, accounting for approximately 20 percent of the \$US 2,181 billion global packaged food market. Forecast to grow by over 5 percent year on year between 2018 and 2022¹⁴.

ASEAN is a key growth market for this segment.

Relevant CSIRO technology

Functional Food:

- Elite grains fortified in minerals, vitamins and/or with increased resistant starch. (e.g. high amylose wheat and rice).
- Fermented food to improve gastrointestinal tract.
- High fibre, high protein vegetable powder (ingredient).
- Omega 3 canola oil.
- Gene editing to create natural sweeteners.

Processing technology:

- Formulation and structuring of food to meet key consumer segment requirements (e.g. increased viscosity, self lubrication, nutrient dense, availability of protein).
- Technology to lower GI of cane sugar.
- Drying techniques for structuring sugar particles to improve taste and lower calorific intake.
- Micro encapsulation.

Food design:

- Processing and sensory modelling to enable product reformulation to maintain flavour, texture and nutritional profile whilst reducing sugar, salt, saturated fats, artificial flavours and colours.
- Substantiation of food claims.

14. <https://www.statista.com/statistics/728117/global-market-for-personalized-medicine-by-product>

Trend two: Alternative proteins

Overview

By 2050, it is forecast that there are going to be more than 9 billion people to feed worldwide. The Food and Agriculture Organisation of the United Nations estimates that as global population increases, production of protein will need to increase by 46 percent between 2016 and 2050¹⁵.

The ASEAN region is identified as one of the fastest growing regions on a population basis. This growing population will result in a prompt increase in demand for protein. Looking at meat protein in isolation, there is expected to be an increase of 44 percent in beef consumed in Asia over the next decade¹⁶.

When comparing to a typical western diet, the ASEAN diet has a higher proportion of non-meat based protein sources. This includes tofu, eggs and peanuts, indicating that this market is more open to alternative protein sources than the typical western diet. Between 2016 and 2017 there was a notable increase in non-animal sources of protein consumed by both urban Thais and Indonesians¹⁷. Research has also confirmed more than half of Indonesians and Thais believe non-animal protein is a healthier option of protein¹⁸.

Globally, alternative proteins currently comprise around 5 percent of the total protein market and are forecast to make up 33 percent of the market by 2050¹⁹. In 2015, the sector has an estimated value of US\$3.8 billion and is forecast to increase to US\$5.2 billion by 2020²⁰.

15. http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf

16. <http://www.fao.org/3/a-BT089e.pdf>

17. <https://www.foodnavigator-asia.com/Article/2018/05/07/Plant-power-More-urban-Thais-and-Indonesians-consuming-non-meat-sources-of-protein>

18. <https://www.foodnavigator-asia.com/Article/2018/05/07/Plant-power-More-urban-Thais-and-Indonesians-consuming-non-meat-sources-of-protein>

19. <http://www.luxresearchinc.com/news-and-events/press-releases/read/alternative-proteins-claim-third-market-2054>

20. http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=11892329



Global insights

Major processors and suppliers are investing in alternative protein start ups

Meal replacement and dairy substitutes²¹:

- soylent, a soy-based meal replacement, disclosed US\$71 million from investors like Google Ventures amongst others.
- dairy substitutes are also gaining attention with companies like pea-protein milk producer Ripple Foods, and nut-based dairy producer Kite Hill selling in mainstream retail across the US.

Insect protein²²:

- many companies are using cricket flour or insects and worms for snacks, bars, and insect-enriched pasta. Exo produces cricket-based protein bars.

Meat free meat²³:

- plant-based burgers, chicken strips and beef crumble are some of the products from Impossible Foods and Beyond Meat.
- cost is significantly higher still. In 2017 ground beef retailed at around US\$3.54 on average, compared to Beyond Meat's plant-based burgers which cost around US\$12 per pound.

Lab based meat²⁴:

- Memphis Meats and JUST produce meat from self-reproducing cells. Memphis Meats debuted its first synthetic meatball in 2016.
- cost has been prohibitive in the past. A pound of lab-produced beef cost US\$1.2 million in 2013, however is now estimated by Meat and Livestock Australia to cost US\$2,400.

Algae protein²⁵:

- algae-based proteins are expected to continue to increase in prominence.

Seafood substitutes²⁶:

- Finless Foods, NewWave Foods and Sofia's Kitchen are all receiving media attention with products based on plants and cellular agriculture.

Pulses²⁷:

- pulses are increasing in demand due to their high protein and soluble fibre content. Australia's own The Lupin Company has repurposed lupins, traditionally used for animal feed, and is experiencing success in Asia by marketing the product on protein and fibre content at 40 percent and 37 percent respectively.

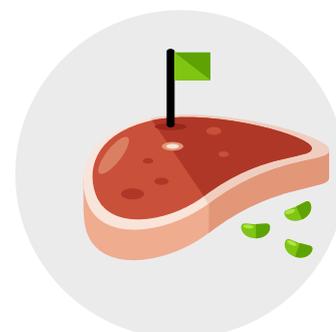
Stakeholder drivers

With an expanding **population** and a long cultural history of non-meat-based protein consumption, the Asian alternative protein market is ripe for growth.

There has been an increase in **daily protein consumption by 50 percent in ASEAN regions** in the past 3 decades, significantly outstripping the global average²⁸. This trend is expected to increase across all ASEAN markets, with countries such as Vietnam expected to consume up to 5.6 kilograms more meat per capita each year by 2026²⁹.

ASEAN consumers are seen as more **open to trying alternative protein sources** than their western counterparts, further supporting a growth market opportunity for alternative protein sources.

ASEAN consumers are also becoming increasingly focused on the way in which **sustainability and ethics** are incorporated into their food sources. This includes more focus on how protein is sourced as a way to alleviate controversial animal treatment.



21. CPG Insights, Future Proof Steak

22. CPG Insights, Future Proof Steak

23. CPG Insights, Future Proof Steak

24. CPG Insights, Future Proof Steak

25. CPG Insights, Future Proof Steak

26. CPG Insights, Future Proof Steak

27. <https://thelupinco.com.au>

28. Future Protein Supply and Demand: Strategies and Factors Influencing a Sustainable Equilibrium, MDPI Journal

29. <http://www.fao.org/3/a-i6583e.pdf>

Challenges

Consumer perception is a key challenge when it comes to alternative protein sources. Many consumers perceive alternative options to animal sources as inferior. In addition to this, there is a psychological barrier that many consumers face when it comes to eating meat that is genetically engineered or made in a lab.

Meat and Livestock Australia estimate that while 31.1 percent of consumers are willing to try lab-meat, only 7.2 percent would replace their traditional farmed meat with it³⁰.

A **lack of understanding** behind scientific processes and production assurance with genetically engineered meat holds a strong barrier for consumer take-up of alternative protein. While these types of proteins are created in a controlled environment that helps alleviate the risk of food safety breaches, a lack of transparency creates uncertainty for consumers around the safety.

The ability to create proteins that have the same **taste, texture, nutrition and digestibility** still needs to be enhanced. Many consumers compare animal proteins with alternative proteins and expect to experience the same sensory elements they would with traditional protein. This can often lead to dissatisfaction when directly comparing products because expectations are not met.

As with many new product innovations, consumers tend not to think of alternative protein products as an emerging food category in its own right, and consequently compare alternative protein products to meat.

The ability to scale production to meet a growing population requires more resources and the long standing environmental impact of scaling some of these products is still unclear. Even with the use of new and emerging technology, it is too early to clearly define the impact on the environment.

The processes for creating alternative proteins en-mass are perhaps less refined than they may be, leading to higher costs passed onto consumers. Food producers are working to alleviate this, and many are basing core strategy around minimising the environmental impact of their alternative protein sources.

Currently, there is a focus on creating meat replacement products, while alternative meat-based products are largely sold as mincemeat. However, mincemeat is not a traditional staple across ASEAN. Industry players are not currently harnessing significant protein content in pulses, and plants to create new products at scale in ASEAN.

As a response to some of the challenges in the alternative protein market CSIRO have been working on a number of initiatives to increase the efficiency of alternative proteins.

CSIRO has created several applications to enhance ingredients and provide healthier plant-based alternatives. These technologies can increase the levels of key nutritional properties, such as **Omega 3 canola oil**, as an alternative to saturated fats.

Extrusion Porosification

Technology (EPT) is a process that manufactures porous powders, such as dairy and plant proteins to enhance their functionality, using less energy. This technology can be used for numerous food processing applications and for the manufacturing of innovative alternative protein-based products.

Forward Osmosis is another technology that can assist. The low temperature and pressure concentration technology is based on water diffusion across a semi-permeable membrane. The process does not use heat so proteins remain intact and components such as vitamins, flavours and aromas are retained. As a consequence, food products can have better quality attributes. Examples of applications include concentrating bioactives and other biological components such as protein from fruit and vegetable juice, and forming dairy products as concentrates. This technology can also be used to concentrate proteins from sources such as algae and insect slurries.



30. <https://www.mla.com.au/prices-markets/market-news/is-lab-grown-meat-the-real-thing/>

Available and relevant CSIRO technology

Opportunity

Alternative proteins

Estimated addressable market

Daily protein consumption in ASEAN has grown by 50 percent over the past 3 decades, contributing to an alternative proteins market expected to be worth US\$5.2 billion by 2020³¹.

Relevant CSIRO technology

Ingredients:

- Elite grains with higher proportions of protein.
- Design plant genetics (and other protein sources) for specified personalised requirements.

Processing technology:

- Create textures and structures enhancing nutrients and bioavailability.
- Technology to create textures and structures enhancing nutrients and bioavailability.
- Technology to create new farming systems, creating lower levels of greenhouse gases.
- Utilise technology to monitor and quantify the environmental impact of farming systems.

Food design:

- Design plant genetics (and other protein sources) for specified personalised requirements.
- Substantiation of food claims.

31. http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=11892329

Trend three: Gut health

Overview

Research into gut health and how the microbiome is linked to overall health is translating into commercial opportunities and rapid growth in the probiotics markets. Consequently, businesses are increasing their focus on monitoring and/or producing solutions for gut health.

The global market for gut health products is estimated to grow by 7.4 percent per year to 2020 when it is forecast to be worth around US\$96 billion³². The market is dominated by probiotics products that represent 71.9 percent of the global market. Prebiotics comprise 21.3 percent of the market while food enzymes make up 6.8 percent³³.

Dietary fibres, such as those found in fruit and vegetables, are also linked with positive health effects. The interaction of dietary fibres with microbes may become increasingly important with regards to gut health promotion. The beneficial

properties of fibre are also now being recognised and will continue to be integrated into various product types.

CSIRO in conjunction with Hort Innovation Australia have recently developed capability to process vegetables into a high-fibre high-protein powder. Using this process, two teaspoons of broccoli powder equate to approximately one serve of broccoli.

Asia is a key growth market for gut health products. It is anticipated to account for around 40 percent of the world's market for speciality food products in the next

5 years³⁴. This growth is a result of growing consumer awareness, rising chronic disease rates, and an ability to purchase products traditionally seen as luxury items.

ASEAN's demographic shifts points towards an opportunity for growth in probiotics. In the ASEAN region, 7.8 percent of the population is expected to be aged over 65 by 2020³⁵. Probiotics can be particularly beneficial in elderly people and infants who require a greater need for the key functional benefits found in probiotics.

32. <https://www.nutraingredients-asia.com/Article/2018/02/26/Moving-beyond-gut-health-Chr.-Hansen-probiotic-gets-South-Korean-immunity-patent>

33. <https://www.nutraingredients.com/Article/2018/01/11/Nestle-to-license-breast-milk-probiotic-strain-from-Biosearch-Life>

34. Nutraingredients, Kerry Group acquires probiotic player Ganeden to complement existing portfolio, October 2017

35. AFR, Investment report, January

These consumers are less able to filter and process nutrients as efficiently as younger consumers due to the functionality of their digestive tracts.

Dairy has been the driver of the growth in probiotics given it is already engrained in regional diets. Looking ahead though, it is expected that **non-dairy products will be one of the fastest growing probiotic categories**, with a forecast CAGR of 9.6 percent from 2017 to 2022³⁶. Non-beverage items are expected to follow.

Probiotics drinks have led the growth with a 30 percent rise globally since 2016. This includes yoghurts, juices, waters, teas and coffees.³⁷

Gut health strongly relates to diet, which itself is linked to location, demographics and income. This can lead to the need for probiotics to vary between national markets. For example, in Laos and Vietnam, consumers have the highest rice consumption as a proportion of total food, at around 61 percent and 51.4 percent respectively³⁸. Differing consumption of refined carbohydrates such as rice means these consumers will have different gut health requirements to other ASEAN markets.

Through its elite grain breeding program, CSIRO has created several grain varieties with higher levels of resistance starch to assist gut health. Ingredients have been developed that have high levels of key nutritional properties. These included soluble fiber, resistant starch and omega 3. Barleymax is a prominent example of a natural, high fibre wholegrain that has high levels of resistant starch. Work is also underway to create a rice with high levels of resistant starch.



Global insights

Increasing commercialisation of gut health research

Patents are being secured for probiotics products and new strains are under constant development. For example, Chr. Hansen's BB12 probiotic was granted a patent in South Korea with flu-prevention claims.³⁹

Licensing agreements are being established between patent holders and product producers forming a path to commercialisation and patented strains are being licensed to major producers. In January 2018, Biosearch SA's *Lactobacillus fermentum* LC40 strain was licensed to Nestle, who will market and utilise the strain across 41 countries, particularly targeting breastfeeding women⁴⁰.

Production facilities are expanding, with market players investing based on consumer demand. Larger multinational corporations (MNCs) and local players have significantly grown production capacity in the probiotics space. New facilities are utilising technologies to drive efficiency, such as high volume fermenters, and include Yakult's 50 percent production expansion in 2017 to over 300,000 bottles per day⁴¹.

There have been notable acquisitions in this space in recent years and businesses are acquiring gut health leaders as part of their broader product portfolios. Kerry Group purchased Ganeden in 2017 and Wellmune in 2018, who produce GanedenBC30 and a beta-glucan immune potentiator, respectively⁴². Australia's Life-Space Group was acquired by China's BY-HEALTH Group in February 2018 at a valuation of \$690 million⁴³. Demand for dietary fibres with positive health effects is expected to increase as the industry grows.

Stakeholder drivers

Given the market for probiotics is emerging, **patents are still being secured** for probiotics products. As more consumers seek out products with specific attributes to support their health, verification of claims will be required.

Paths to commercialisation are being created through licensing agreements that's opening up opportunities. These are being established between patent holders and product producers.



36. Transparency Market Research, Probiotics market report, January 2016

37. Global Industry Analysts, Probiotics Market Trends

38. Transparency Market Research, Probiotics market report, January 2016

39. Polaris Research, Speciality food ingredients

40. CSIRO and Data 61, Sunrise Industries Report, 2018

41. Asia Microbiota Bank, SCMP Article, March 2017

42. Dairy Reporter

43. <http://www.worldbank.org/en/country/laos/publication/laos-pdre-rice-policy-study>

Challenges

Consumer education and awareness around gut health are still in development. There is a low understanding across ASEAN of the benefits of probiotics and the definition of probiotics products. Many consumers perceive food along taste profiles or simple functional claims, rather than acknowledging the science.

With scientific claims, come the requirement for **high regulation**. Increased regulatory processes slow the time to market as health claims need to go through stringent verification before such claims can be made.

For instance, Yakult, in Europe, were forced to remove claims of products helping to cure respiratory illness. Dannon (Danone) were also made to remove claims that Actimel could boost the immune system. However, ASEAN authorities are now looking at probiotics labelling more proactively⁴⁴.

Through a suite of services including laboratory-based models, expert systematic reviews and high-quality human trials, food industry players can partner with CSIRO to evaluate the potential health impacts of their products at an early or late-stage of health claim substantiation.

Given the scientific component involved in validating claims, there is much research still being done with regards to probiotics.

Scientific validation needs to be confirmed. Links of specific bacteria and the diversity that constitutes the optimal gut health is still being determined. Without

further understanding of the ideal gut condition, recommendations cannot be made to consumers as to how to specifically improve their gut health.

CSIRO have leading industry gut health testing that is easy and fast, enabling results within 24 hours. Gut related health issues, such as leaky gut, can be addressed through diagnostic tools that are increasingly being utilised due to quicker testing and results leading to enhanced health and quality of life. Tests can be completed in a clinic or medical practitioner's office. It can also be leveraged and embedded into a personalised dietary plan, repairing gut health, improving health and enhancing quality of life.

CSIRO offers **technology that enables modelling of digestive systems**. This tracks gut health related disease and enables healthcare providers to diagnose these cases more effectively. As they continue to develop science that links gut microbiome to specific health outcomes they are optimising the microbiome and how consumers can actively address their gut health.

CSIRO's scientific team also comprises research scientists with particular expertise. Gut health is one of their focuses. Gut health, physiology, and microbiology are also included in research and clinical trials. Relevant members of CSIRO teams have undertaken training and accreditation in *Good Clinical Practice* that complies with the *International Conference on Harmonisation (ICH)* guidelines.

Available and relevant CSIRO technology

Opportunity

Gut health

Estimated addressable market

The market for probiotics is growing by 7.1 percent per year in the region, with the overall market value in 2020 expected to reach US\$96 billion⁴⁵.

The overall gut health market is predicted to be much larger. Noting the total gut health market is bigger than probiotics.

Relevant CSIRO technology

Diagnostic capability:

- Colvera diagnostics tool for colorectal cancers.
- Diagnostics tools in leaky gut.
- Microbiome platform data.
- Large intestinal fermentation modelling.

Functional Food:

- Elite grains fortified in minerals, vitamins and/or with increased resistant starch (e.g. high amylose wheat and rice).
- Fermented food to improve gastrointestinal tract of aging population.
- High fibre, high protein vegetable powder and snacks.

Substantiation of health claims:

- Substantiation of food claims.
- Evaluation of the health benefits of products or ingredients at an early or late stage in the health claims substantiation pathway.

44. Karina Bray, *Microbes under the microscope*, May 2018

45. Transparency Market Research, *Probiotics market report*, January 2016

Trend four: Precision nutrition

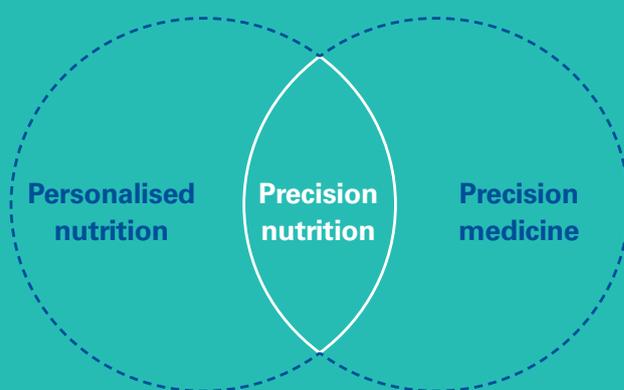
Overview

As consumers' desire increases for a personalised health intervention, they are seeking solutions specific to their individual requirements. The precision nutrition market is difficult to size given the relatively early stage in the lifecycle. There are many players across the food and health value chain that are investing and facilitating growth and developing capability in this space.

Nutritional advice is evolving from largely static mass market advice to real time and personalised solutions. Precision nutrition will enable the convergence of medicine and nutrition, with an aim to prevent and manage chronic disease. The global personalised medicine market is forecast to grow at an 11.8 percent CAGR between 2014 and 2022⁴⁶.

The precision medicine market comprises 4 subcategories:

- precision medicine diagnostics
- precision medicine therapeutics
- personalised medical care
- personalised health and wellness⁴⁷.



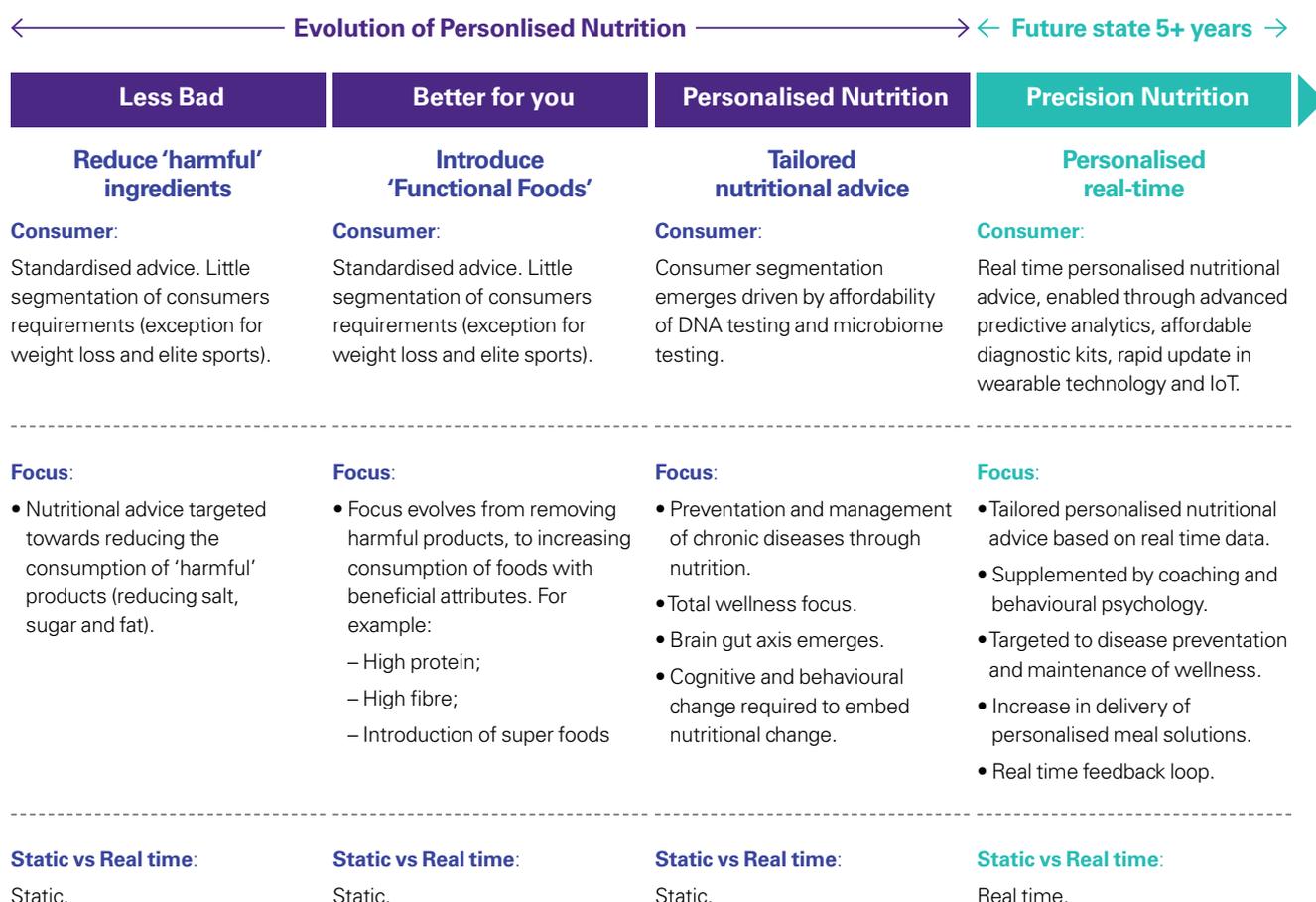
46. <https://www.statista.com/statistics/728117/global-market-for-personalized-medicine-by-product>
47. <https://www.statista.com/statistics/728117/global-market-for-personalized-medicine-by-product>

The market value for precision medicine is expected to reach US\$2,452 billion by 2022⁴⁸. Personalised health and wellness is the largest market segment and is forecast to reach US\$1,640 billion by 2022 when it will account for 66 percent of the market⁴⁹. The market opportunity is clear from the flow of investment into personalised nutrition and medicine technology. While this segment is still early in development, there

is market pull to create technology to provide solutions and capability in this space. Thirty-two million dollars was invested into “Habit”, a personalised diet technology based on DNA from Campbell’s⁵⁰. Nestle and Samsung are also collaborating to create a digital health platform. Partnerships with platforms such as Amazon, eBay, Alibaba and JD.com are likely to become more common to enable access to data and provide personalisation.

Within the ASEAN market, there is strong consumer awareness and demand for nutrition with a personalised approach. A recent survey by Herbalife revealed **33 percent of Asian consumers were interested in personalised nutrition plans**⁵¹. Personalised nutrition has been identified as one of the top 4 trends across the ASEAN region.

Precision Nutrition Evolution Pathway



48. <https://www.statista.com/statistics/728117/global-market-for-personalized-medicine-by-product>

49. <https://www.statista.com/statistics/728117/global-market-for-personalized-medicine-by-product>

50. <https://agfundernews.com/agtech-funding-sheet-eaze-raises-13m-series-b-habit-raises-32m-from-campbells-soup-for-dna-testing-nutrition-kit-more.html>

51. Herbalife Balanced Nutrition Survey



The market is dominated by startups, supported by investment from major players.

Personalised nutrition across Asia

Partnership with J&J and others: this provides diagnostics for gut biome and blood and receives personalised nutrition advice, particularly around the management of blood sugar through an app. This partnership is Asia-based.

Nutrino: partnership with Medtronic, DEXCOM, Welltock, Abbott and IBM Watson. This is primarily focussed on data analytics for B2B plays. Entry into Asia on addressing diabetes.

Nutrition: Herbalife Nutrition launched Gene Start in South Korea. This offers a portable genetic testing kit to analyse individual's genetic makeup, lifestyle pattern and dietary habits. It enables Herbalife to provide highly personalised nutrition plans and promote suitable products from its own portfolio.

DNAFit: collaboration between Spoon Gurus and BASF. This involves DNA testing through a saliva swab taken at home and then provides personalised nutrition advice to focus on Fitness and Diet, Sports or Wellness.

Imagene Labs: Launched in Singapore last year and now has a presence in countries including Malaysia, Thailand and Vietnam. It is focussed on developing B2B partnerships with gyms, day spas, and insurance firms.

Personalised nutrition globally

Habit: disclosed investors: \$32 million by Campbell's⁵². This involves an at-home bio sample being analysed in the Habit lab. Customers receive personalised diet advice.

Arivale: personalised diagnostics, nutritional advice supplemented by virtual coaching.

Nestle and Samsung collaboration: research to explore the potential of nutrition science and digital sensor technologies to create a digital health platform enabling recommendations around nutrition, lifestyle and fitness.

Waitrose: in-store DNA testing to advise shoppers on what products to buy to improve health.

Precision medicine

Quest Diagnostics: American based personalised diagnostic and cancer management.

Siemens Healthcare Diagnostics: introduction of BioMatrix Technology to enable personalised radiology and MRI scans.



52. <https://agfundernews.com/agtech-funding-sheet-eaze-raises-13m-series-b-habit-raises-32m-from-campbells-soup-for-dna-testing-nutrition-kit-more.html>

Stakeholder drivers

Consumers are increasingly aware of the food they consume and how this impacts their holistic health.

As **affluence increases**, consumers have the ability to invest in diagnostic services and premium food products to meet their expectations.

CSIRO has the ability to provide targeted nutritional advice to support DNA health through its diagnostic capabilities. The use of Nutrigenomics can prolong health through identifying, or reversing, DNA deterioration.

Rising levels of **chronic disease** paired with consumers and insurers seeking to manage and prevent disease through targeted nutrition interventions, are creating opportunities in the market for new products.

A shift in demographics means **aging populations** are increasingly seeking solutions to maintain health and wellness and prevent age related chronic disease.

Given the range of factors that influence human health, CSIRO has formed a partnership with Singapore's Nanyang Technology University (NTU) to investigate the link between healthy aging and a healthy gut. The project connects a suite of current projects between CSIRO and NTU. The outcome is to develop targeted solutions to educate on how diet and lifestyle interventions can lead to a healthy gut microbiota. This, in turn, may reduce the risk of developing a chronic disease.

As the **cost of health care raises**, consumers are looking to preventative measures to avoid these costs.

ASEAN consumers have one of the highest adoption rates for **wearable technology**. Creating a platform that enables real-time monitoring of activity levels and calorie consumption offers a clear path to incorporate complementary offerings with precision nutrition programs.

ASEAN consumers expect higher levels of personalisation in health and wellness categories than western consumers due to their **cultural history of personalisation**.

Online and digital enablement

is increasing the prominence of online delivery platforms. This creates opportunity for direct customisation and personalisation enabled by digital devices.

Health insurers and the

government will play a key role in the evolution of the market. Insurers have a desire to reduce insurance claims and will look to support solutions that enable preventative measures to avoid payouts. The **medical community** will increasingly look for innovative ways to prevent and manage chronic disease through nutrition and wellness.

As the rate of chronic illness increase, the government is acknowledging the **burden on health care systems**. Consequently, they are expected to transition away from curative to preventative healthcare solutions. There is also forecast to be an uptake of commercial applications of precision nutrition in institutional settings such as aged care, elite armed forces and elite sports academies.

Big data will remain at the core of the industry as large e-commerce and internet giants become major players in the space. As the amount of data collected increases, predictive analytics will be utilised to estimate consumer susceptibility to disease and recommend preventative solutions.

Challenges

Precision nutrition science and nutrition personalisation is still an **emerging area of science**. Predictive analytics will only be fully enabled once large-scale data collection takes place.

CSIRO has developed a platform with ability to use big data to support the creation of **predictive personalised nutrition algorithms**, leveraging their unique “Data61” capability. Data61 has a focus on systems with increased trust and resilience in a world with more digitally integrated systems.

Health and wellness data is sensitive, thus creating a **data and privacy** challenge that needs to be regulated. Past breaches of public health systems have challenged consumer trust, which needs to be regained. Consumer views on sharing data and privacy limits access providers can have to their personal details. This will create a trade off as solutions are required to the need for access to personal information.

There is **little evidence of scaled profitable businesses** in precision nutrition given it is a new market segment. From a food manufacturing perspective, precision nutrition requires an operating model that is based on individualisation rather than mass scale.

For consumers, precision nutrition and personalised options have been identified as initially appealing, but **long term commitment** remains a challenge. Initial uptake peaks with adoption and then slowly deteriorates. Solutions that pair precision nutrition with coaches, trainers and doctors will provide further consumer support.

Precision nutrition presents a disruptive risk to **existing distribution channels** as consumers integrate personal dietary needs with direct ordering through suppliers or e-commerce platforms.

Available and relevant CSIRO technology

Opportunity

Precision nutrition

Estimated addressable market

The global market for precision medicine will be worth up to US\$2,452 billion by 2022, with personalised health and wellness contributing to 67 percent of this market at US\$1,640 billion⁵³.

Over a third of ASEAN’s consumers now demand personalised nutrition solutions.

Available technology

Diagnostic and diet planning capability:

- CSIRO diagnostic kit and services.
- CSIRO diet plan.
- Advanced cognitive analytics capability.
- Nutrigenomics to identify DNA/epigenetic markers for DNA deterioration. Provide targeted nutritional advice to support DNA health.

Functional Food – personalised for individual health requirements:

- Elite grains fortified in minerals, vitamins and/or with increased resistant starch (e.g. high amylose wheat and rice).
- Fermented food to improve gastrointestinal tract of aging population.
- High fibre, high protein vegetable powder and snacks.
- Omega 3 Canola oil.
- Gene editing to create natural sweeteners.
- Substantiation of food claims.

53. <https://www.statista.com/statistics/728117/global-market-for-personalized-medicine-by-product>

Concluding remarks

The ASEAN region is emerging as an international growth hub for premium foods and the Health and Wellness industry as ASEAN GDP doubles in the next 10 years. With the region facing a critical challenge to alleviate disease and illness, opportunities abound for innovative and forward-thinking organisations to promote health.

Key trends include growth in **health by stealth, alternative proteins, gut health, and precision nutrition** market segments as ASEAN consumers seek out products that are beneficial to health.

Australian businesses and researchers are known for their strengths in these areas and can apply expertise and creative development to form products and business models that meet the complex needs of the ASEAN consumer.

Across these industry categories, both in their current forms and in their future state horizons, Australian health and wellness stakeholders

have significant opportunities to engage with the ASEAN region and form long-term partnerships to drive mutual growth.

Australian food, health and wellness businesses are well-placed for success in ASEAN. However, there is work to be done to finesse market entry approaches and ensure alignment to the complex region and its dynamic base of consumers.

We hold the view that there are three core approaches when considering entry to the ASEAN market in health and wellness products:

1

Personalising to local consumption preferences in specific markets

ASEAN's diversity across its ten member nations means that there are many opportunities across the health and wellness continuum. Strongly influenced by cultural and religious diets, and specific flavour profile preference means producers need to ensure they meet the specific local needs relevant to preferences in a specific market. Incorporating popular Asian ingredients, marketing and branding products in a tailored way, and utilising emerging channels to market, such as e-commerce, will enable food producers and exporters seeking to succeed in the changing ASEAN markets.

2

Leveraging increasing consumer awareness of health and wellness and rising affluence

As ASEAN consumers become more aware of the impact their evolving diets and calorific intake is having on their health and wellness they will increasingly seek better-for-you products. They also have an increasing ability to pay for premium products, demanding healthier options that meet the needs of modern lifestyles. The healthy foods segment is significant and growing, presenting opportunities for stakeholders that can build targeted food solutions with health and wellness at the core.

3

Partnering for success

Global players across industries are recognising the region's potential for premium health and wellness products. Collaboration of investments by internationally-recognised technology businesses, prominent investment funds, and existing food manufacturers indicate the benefits of partnering with in-market players close to the consumer. In doing so, they are able to gain rich consumer insights, understand local regulations, and create instant integration into established distribution channels. Australia has a strong reputation across ASEAN as a trusted and competent business partner.

Need help accessing Asian/ASEAN markets?

Through our Access Asia trade consulting services initiative, KPMG is working with many medium-sized Australian companies across a wide range of industries – including agriculture, food & beverage and branded consumables.

We work with small cap listed and private companies to develop Asian and international market entry and growth strategies, to find the right supply chain and distribution partners in-market, to take advantage of various government grants and incentives on offer and to make the best use of Free Trade Agreements (FTAs) for lower foreign taxes and greater market access.

We regularly assist small and medium enterprise (SME) businesses to understand how

to engage effectively with Asian export markets. Our consistent experience is that SMEs rush to perceived opportunities without doing their homework. They require comprehensive market-entry and then growth strategies which consider the wider regulatory, local market and non-tariff hurdles to market success, including the benefits of FTAs and how best to access them.

KPMG's Access Asia team consists of supply chain, market entry, trade and customs, transaction services and taxation specialists who have in-market experience and established networks across the ASEAN region.

KPMG and CSIRO are collaborating to connect food producers with new markets in foods for health.

Appendix

**Available and relevant
CSIRO technology**

Opportunity

Health by stealth

Estimated addressable market

Health and Wellness food and beverage is one of the fastest growing food segments globally, accounting for approximately 20 percent of the \$US 2,181 billion global packaged food market. Forecast to grow by over 5 percent year on year between 2018 and 2022⁵⁴.

ASEAN is a key growth market for this segment.

Relevant CSIRO technology

Functional Food:

- Elite grains fortified in minerals, vitamins and/or with increased resistant starch. (e.g. high amylose wheat and rice).
- Fermented food to improve gastrointestinal tract.
- High fibre, high protein vegetable powder (ingredient).
- Omega 3 canola oil.
- Gene editing to create natural sweeteners.

Processing technology:

- Formulation and structuring of food to meet key consumer segment requirements (e.g. increased viscosity, self lubrication, nutrient dense, availability of protein).
- Technology to lower GI of cane sugar.
- Drying techniques for structuring sugar particles to improve taste and lower calorific intake.
- Micro encapsulation.

Food design:

- Processing and sensory modelling to enable product reformulation to maintain flavour, texture and nutritional profile whilst reducing sugar, salt, saturated fats, artificial flavours and colours.
- Substantiation of food claims.

Opportunity

Alternative proteins

Estimated addressable market

Daily protein consumption in ASEAN has grown by 50 percent over the past 3 decades, contributing to an alternative proteins market expected to be worth US\$5.2 billion by 2020⁵⁵.

Relevant CSIRO technology

Ingredients:

- Elite grains with higher proportions of protein.
- Design plant genetics (and other protein sources) for specified personalised requirements.

Processing technology:

- Create textures and structures enhancing nutrients and bioavailability.
- Technology to create textures and structures enhancing nutrients and bioavailability.
- Technology to create new farming systems, creating lower levels of greenhouse gases.
- Utilise technology to monitor and quantify the environmental impact of farming systems.

Food design:

- Design plant genetics (and other protein sources) for specified personalised requirements.
- Substantiation of food claims.

54. <https://www.statista.com/statistics/728117/global-market-for-personalized-medicine-by-product>

55. http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=11892329

Opportunity

Gut health

Estimated addressable market

The market for probiotics is growing by 7.1 percent per year in the region, with the overall market value in 2020 expected to reach US\$96 billion⁵⁶.

The overall gut health market is predicted to be much larger. Noting the total gut health market is bigger than probiotics.

Relevant CSIRO technology

Diagnostic capability:

- Colvera diagnostics tool for colorectal cancers.
- Diagnostics tools in leaky gut.
- Microbiome platform data.
- Large intestinal fermentation modelling.

Functional Food:

- Elite grains fortified in minerals, vitamins and/or with increased resistant starch. (e.g. high amylose wheat and rice).
- Fermented food to improve gastrointestinal tract of aging population.
- High fibre, high protein vegetable powder and snacks.

Substantiation of health claims:

- Substantiation of food claims.
- Evaluation of the health benefits of products or ingredients at an early or late stage in the health claims substantiation pathway.

Opportunity

Precision nutrition

Estimated addressable market

The global market for precision medicine will be worth up to US\$2,452 billion by 2022, with personalised health and wellness contributing to 67 percent of this market at US\$1,640 billion⁵⁷.

Over a third of ASEAN's consumers now demand personalised nutrition solutions.

Relevant CSIRO technology

Diagnostic and diet planning capability:

- CSIRO diagnostic kit and services.
- CSIRO diet plan.
- Advanced cognitive analytics capability.
- Nutrigenomics to identify DNA/epigenetic markers for DNA deterioration. Provide targeted nutritional advice to support DNA health.

Functional Food – personalised for individual health requirements:

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- Fermented food to improve gastrointestinal tract of aging population.
- High fibre, high protein vegetable powder and snacks.
- Omega 3 Canola oil.
- Gene editing to create natural sweeteners.
- Substantiation of food claims.

56. Transparency Market Research, Probiotics market report, January 2016

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