

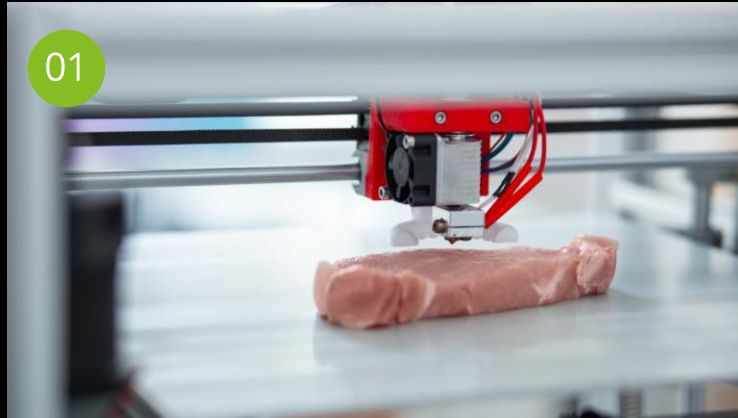


The Future of Food

Blog Compilation – Part Two



Contents



01

3D printed food: just because we can, doesn't always mean we should



02

In food we trust: the case for radical transparency



03

Innovation in food: the rise of start-ups, incubators and internal venture funds



04

Food as a medicine: the opportunity of DNA-based personalised nutrition



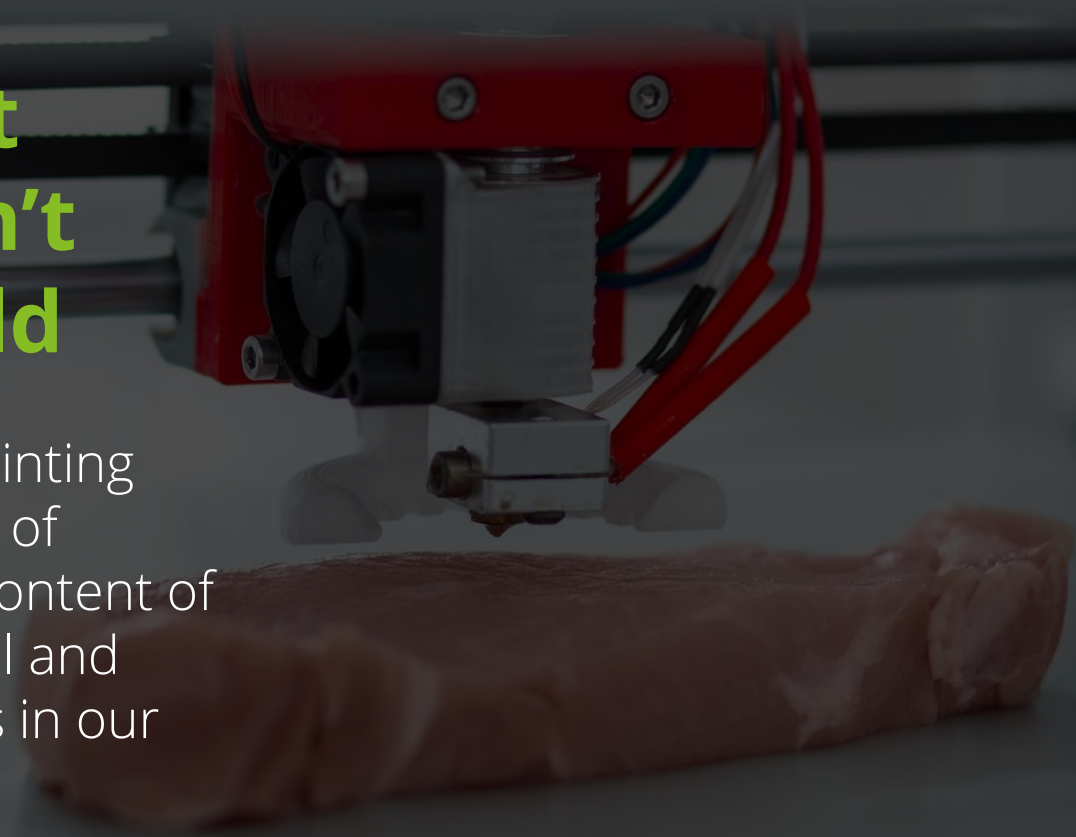
05

Australian food tax: ripe for a refresh?



1. 3D printed food: just because we can, doesn't always mean we should

Recent food technologies such as 3D printing have allowed us unprecedented control of flavour, colour, texture and nutritional content of food. However, what are the commercial and ethical implications of these innovations in our society?



The Future of Food

01 3D printed food: just because we can, doesn't always mean we should

Recent food technologies such as 3D printing have allowed us unprecedented control of flavour, colour, texture and nutritional content of food. Its adoption is evolving rapidly in the restaurant and baking scene and is now expanding into the health and aged care industry.

These innovations and technological advancements, however, require us to explore their implications on society and answer important commercial and ethical questions.

What is 3D printed food?

3D printing is a form of additive manufacturing. Initially focusing on plastic polymers for consumer and industrial applications, the focus has shifted to 3D printing of foods. This opens up a great deal of freedom for manufacturers, not only in the shape of the food, but in its composition - nutrients, colour, flavour and texture.

From 'immunity booster' and other health type juices and shots, through to whole meal substitutes, there is a trend towards a nutritionally engineered diet.

How is the technology being used and how may this evolve?

Nowadays restaurants exist that offer 3D printed five course meals. It is a step towards the technology no longer being seen as a conceptual, sci-fi pursuit, but potentially a viable future of food. There are two key uses which much of the 3D printing interest has centred around.

Firstly, there is interest from haute cuisine and artistic pastry chefs. The creative freedom afforded by 3D printing means especially creative and elaborate desserts and cakes can be constructed. Chefs at the cutting edge, who experiment with new edibles are interested in the ability to control the colour, flavours and texture of foods humans have not yet eaten for their dishes. Both of these uses centre on the artistic and creative exploration of the technology, to enhance the dining experience.



01

02

03

04

05



The Future of Food - 3D printed food: just because we can, doesn't always mean we should

The second focus has been in a health care context. As an example, Isala Hospital in the Netherlands partners with a food provider to develop 3D printed meals for their aged care patients. Printing of the foods allows for better control of texture and nutritional content, especially important for advanced age patients who may have difficulty chewing and with specific nutritional needs.

It is not hard to imagine the possibilities afforded by 3D printing technologies - ordinary pastas give way to elegantly printed shapes, cake decorations give way to printed cakes whilst meeting the growing trend of personalisation and customisation. Then, the ingredients can be tweaked - add B12, less sodium, substitute with an insect protein. Now, tweak the experience and taste - flavour it to taste like meat, or to my mood. The creative freedom in food composition and precise control of inputs opens a huge number of doors.

The ethical and societal implications

Human nutritional needs have been shaped and met by eating whole, natural foods. These contain trace elements, microbial flora and fauna we are continually discovering the significance of. This limited understanding means we may never be able to engineer a truly perfect food profile and brings with it a risk of specific deficiencies both of known and unknown substances. Research into the influence of intestinal flora has established links to conditions such as Parkinson's, Alzheimer's, depression and obesity. Probiotics have been successfully cultivated and administered for centuries now, but always in accompaniment with whole and raw food sources. If a large portion of diets were made up by 3D printing, the risk of unknown malnutrition may rise.

Food engineering and 3D printing could also have a profound impact on our meat consumption levels. The technology has the ability to use synthetic animal or insect proteins to create meat without the associated farming. The technology is only in its infancy, and it is not inconceivable that once advanced, could reduce our reliance on animal farming and have positive environmental impacts, as well as offer an ethical alternative to natural meat.

The recent surge in the craft movement across all types of food and drink has prompted the discussion about our cultural relationship with food and the loss of human agency in mass production and consumption. As a species, we've evolved to hunt and collect food as a social activity.



01

02

03

04

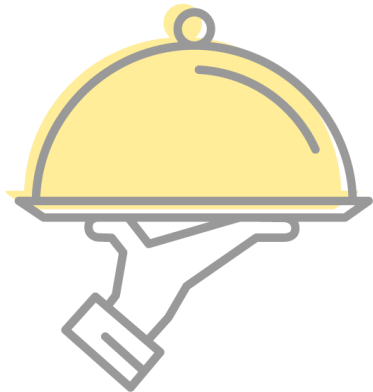
05



The Future of Food - 3D printed food: just because we can, doesn't always mean we should

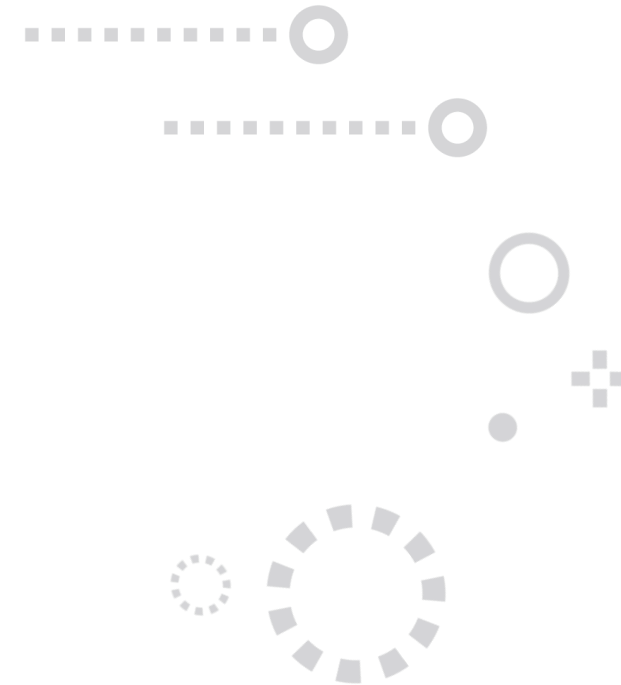
The recent surge in the craft movement across all types of food and drink has prompted the discussion about our cultural relationship with food and the loss of human agency in mass production and consumption. Humans evolved to hunt and collect food as a social activity.

In modern times, communal enjoyment of food is still a key part of our culture. Is the automation of our lives for convenience beneficial psychologically? Preparation and sharing of natural foods is so hardwired into us biologically, do we really know what the impact of removing this will have?



There are a number of forces acting on the food industry and the role which technology will play. The prevailing forces, with the most scale and applicability, will impact the lives of humankind on a multiple-times-per-day basis. As technology advancements in 3D printed food and nutrition open up new and exciting doors for us, the ethical trade-offs and choices we need to make will become more complex too.

The natural environment, humanist issues, nutritional risks and our very relationship with food are likely to change drastically as we play with the dynamics of this six million year relationship.



01

02

03

04

05





2. In food we trust: the case for radical transparency

We trust our retailers, brands and farmers to deliver on their promise when it comes to the quality of food. But consumer trust is fragile and is increasingly being challenged. We have seen an increased investment in product labelling and packaging, but is that enough?

The Future of Food

02 In food we trust: the case for radical transparency

We love our food. It is an emotional connection and we trust our retailers, brands and farmers to deliver on their promise when it comes to the authenticity and quality of food. But consumer trust is fragile and is increasingly being challenged.

Consider the recent food scares in Europe, the frequent reports of counterfeit products in Asia, and add to that the growing scepticism towards big brands and nervousness around genetically modified food.

The challenge is clear.

As a consequence, we have seen an increased investment in product labelling and packaging, but is that enough? When a statistic shows only 26% of us believe information on labels to be accurate¹, companies will need to start thinking more radically about transparency and how they engage with consumers.

Radical transparency and the role of technology

In their quest for transparency, companies and consumers are looking for technology to provide answers. As an example, consumers can now buy a kitchen scale which visually scans food to provide nutritional information². Italian nanobiologists recently developed a low-cost genetic test³ which provides a colourimetric result visible to the naked eye to help identify good from contaminated food. But perhaps the most promising technological advancement, often described as THE solution for transparency and consumer trust, is blockchain.

Blockchain, with its secure data platform and an immutable audit trail, has the potential to provide full product traceability and transparency. Product information, such as farm origination, processing data and logistics details, are digitally connected to food items and entered into the blockchain at every stage of the supply chain. It can record food miles, compliance with quality and food safety standards such as temperature and humidity levels and even labour conditions. All important to retailers and consumers.

Blockchain is still in its infancy, however it is encouraging to see so many consumer and agri companies investing in it. This could lead to a high paced evolution of the solution with exponential adoption rates. In fact, a Deloitte survey among executives knowledgeable of blockchain highlighted more than a quarter view it as a top-five investment priority⁴.



01

02

03

04

05



The Future of Food – In food we trust: the case for radical transparency

Walmart is one which has been running trials for traceability. A test using traditional methods to trace the exact farm origin of a package of mangoes, took them six days, 18 hours and 26 minutes compared to two seconds using blockchain⁵.

However, for this transparency to truly translate into consumer trust, companies must find ways for shoppers to access that data in moments that matter, either at point of purchase or consumption. QR codes or the use of Near Field Communication (NFC) technology could enable consumers to scan or read the product using their mobile phone and find the information relevant to them. Some retailers already have interactive food display tables and real-time data visualisation to provide consumers with relevant product information. It is not hard to imagine the power of displaying product details captured in blockchain in generating trust in the product.

The need to build trust beyond the product

But trust in the product is only part of the solution. Consumers seek the same level of transparency and trustworthiness of the company behind the product. They want to be assured that companies genuinely place consumers' interests ahead of their own. In its annual trust barometer Edelman explores why trust in business shifts. The common denominator is whether or not people believe business contributes or fails to contribute to the greater good⁶. This places an emphasis on the need for a clear purpose and a well-articulated social impact agenda.

Consumers want companies to become more personal. They want to see CEOs actively engaged in societal issues, requiring companies to intensify its dialogue with consumers and society on topics far beyond its product.

This fundamental redesign of consumer engagement will be critical to the future success of food businesses. Particularly now values-based purchasing decisions (considering health, safety and social impact) are rapidly gaining momentum⁷.

Our relationship with food and the trust we place in businesses and brands is clearly being disrupted. The way companies choose to engage with consumers, act on their broader social purpose as well as the pace at which technologies like blockchain will be embraced, will determine how our relationship and trust will evolve.



01

02

03

04

05



3. Innovation in food: the rise of start-ups, incubators and internal venture funds

Innovation in food is revolutionising the way we produce, process, sell and experience our food. What does all this mean for food businesses seeking growth through innovation?

The Future of Food

03 Innovation in food: the rise of start-ups, incubators and internal venture funds

The pace of innovation in food has never been higher. It is revolutionising the way we produce, process, sell and experience our food.

Innovations are coming from non-traditional places; through the rise of food start-ups, high levels of venture capital activity, and the widespread establishment of internal venture funds and incubators. With record levels of investments and high-profile investors such as Richard Branson and Bill Gates⁸ now backing innovative food companies, has food become the new tech?

What does all this mean for food businesses seeking growth through innovation? And how will increased investment in start-ups and venture funds impact traditional internal R&D functions? Is there a role for them going forward? And if so, how do we balance these investments?

What is driving innovation and where is it coming from?

This wave of innovation isn't happening by chance. It is being fuelled by [changing consumer preferences](#), [food sustainability concerns](#), regulatory changes, technology advancements and lower barriers to entry. These trends, coupled with the surge in investment, are spurring innovation across the [entire value chain](#), from supply chain innovation to reimagining the experience and providing new services and channels. Innovation is no longer just about new product formulation such as healthier versions, free-from, smaller pack and snack sizes.

At present, a key source of innovation is the start-up scene. Funding channelled to food and beverage start-ups is on track to hit a record high this year with hundreds of deals globally with a forecasted value of US\$2.2bn in 2017⁹.

This is in addition to global investment in 'food-tech' companies peaking at US\$5 billion in 2015¹⁰. This activity has been fuelled by the rise of food-focused venture funds such as Cavu Ventures and S2G Ventures¹¹ and Big Food companies such as General Mills, Kelloggs, Campbell Soup¹² and Unilever¹³ who have all launched their own venture funds or incubators.

General Mills' venture fund, for example, has anticipated that plant-based protein will be king, investing in a start-up producing dairy-free protein bars¹⁴. And meat producer, Tyson Foods, used its venture fund to take a stake in plant-based protein company Beyond Meat to diversify their portfolio and drive innovation¹⁵.



01

02

03

04

05



The Future of Food – Innovation in food: the rise of start-ups, incubators and internal venture funds

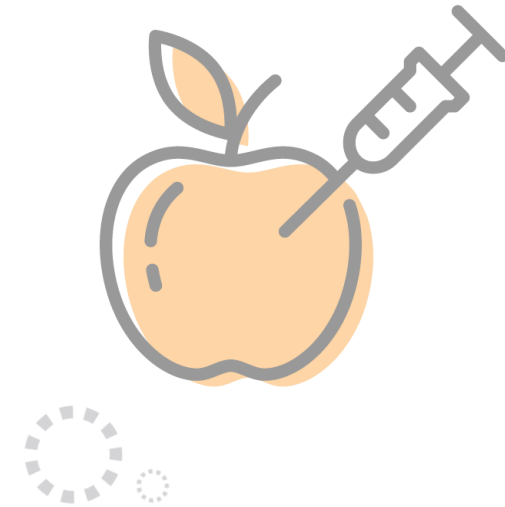
So what does the emergence of venture funds mean for businesses and their R&D departments?

Food and beverage companies increasingly feel the need to make choices on whether to invest in their R&D teams or into ventures and incubators. The challenge for traditional R&D is that it is often seen as biased towards growing the core and product innovation rather than new services and business models. And research has shown that companies who stretch innovation beyond product formulation are seeing disproportionate returns from their investment¹⁶.

So could these attractive returns, rapid change in consumer preferences and advancements technology, drive businesses to favour ventures and redirect their investment away from R&D? Will one model prevail or is there a place for both?

We believe companies should take a diversified approach to innovation and should resist placing too many eggs in their venture funds. Nurturing the core with disciplined R&D and new product formulations will remain critical to ensure growth is achieved in the short to medium-term and capital is available to make longer term investments. The key is finding the right balance. Successful businesses will find ways to build on the strength of their core and leverage their scale and access to capital to take measured risks on disruptive products, channels and business models.

It is clear that the rise of start-ups, incubators and internal venture funds is shifting the basis of competition. It is no longer just economies of scale. It is winning on diversity, differentiation and adaptability. Those who will embrace various types and sources of innovation will be best placed to thrive in this new world.



01

02

03

04

05



4. Food as a medicine: the opportunity of DNA-based personalised nutrition

Individual genes and gut bacteria play a critical role in how we process and react to food and nutrients. Knowledge in this domain is evolving rapidly and recent technological advancements are opening the way for personalised nutrition.

The Future of Food

04 Food as a medicine: the opportunity of DNA-based personalised nutrition

We know food has an impact on our health. It can cause or prevent illnesses. But nowadays consumers are inundated with advice on what is bad and what is good for us. Advice that is often confusing and contradicting.

Are asparagus fuelling cancer? How many eggs should you eat for breakfast? Is saturated fat ok or not? The answers are not always as straightforward and what is right for you might not be right for me.

Our individual genes and gut bacteria play a critical role in how we process and react to food and nutrients. Knowledge in this domain is evolving rapidly and recent technological advancements mean we are now able to read and monitor DNA, blood and microbiomes. This is opening the way for personalised nutrition. But how big is this opportunity for businesses and society and how far are we from being able to capture it?

Uniquely you

The way you process and react to food is complex. It is influenced by your genetic make-up and the unique composition of the trillions of bacteria in your gut (microbiome). These variations in genes and microbes explain some of the inconsistencies we see between individuals in their response to food.

They explain why certain people with similar dietary patterns gain weight, or develop diseases, where others do not. And the more we know, the more likely we can target interventions with tailored eating plans based on our unique genotype or genetic make-up.

The opportunity for business and society

Imagine a personalised diet and meal plan, configured to your dietary and digestive needs based on your DNA profile, derived from a DIY home test kit, delivered through a weekly subscription at your doorstep. Personalised nutrition is creating substantial opportunities for food manufacturers and retailers to offer new services, increase their relevance and deliver differentiated experiences.



01

02

03

04

05



The Future of Food – Food as a medicine: the opportunity of DNA-based personalised nutrition

Most of the companies trying to capitalise on the opportunity, such as DNAFit, Helix, Australian-based Nutrigenomix and Habit, offer DNA analyses and advice, but some expand into additional products and services. Habit, owned by food manufacturer Campbell's, is an example where DNA-based knowledge is coupled with meal services. This allows Campbell's to vertically integrate whilst increasing its relevance to consumers. More food businesses are looking to jump on the trend and growth is expected to continue. Mass consumption will give way to mass personalisation.

Barriers are lowering with the cost of personal DNA test kits rapidly dropping making the whole process more affordable than ever. Nowadays, the process is highly convenient as users conduct DIY tests at home with online access to detailed results. And we are increasingly more connected – with each other and with our products – leading to new opportunities and innovative ways of engagement for food companies and retailers.

The most significant opportunity however is for our society. Food can act as a medicine and can substantially reduce the healthcare costs associated with dietary-related diseases. For example, treating chronic conditions resulting from obesity accounts for about 7% of the total health expenditure, costing the Australian economy \$8.6 billion each year¹⁷.

Globally, this picture is no different with the worldwide prevalence of obesity having nearly tripled between 1975 and 2016¹⁸. The World Economic Forum¹⁹ has estimated that by 2039, the overweight population could be reduced by as much as 25-55 million people globally as a result of nutrigenics-based dietary choices. A significant social and economic benefit.

Capturing the potential

Personalised, precision nutrition has the potential to revolutionise the healthcare system and significantly improve the quality of our lives.

Although we are getting closer to this reality, some doubt exist that we will ever be able to reach that nirvana. Precision nutrition suggests it is possible to have sufficient quantitative understanding about the complex relationships between food components and the individual, their food consumption and their phenotype, which is at the heart of prevailing scepticism²⁰. We are not quite there yet, and the maturity of both the science and service offerings is still developing, but the potential value is significant and worth our attention.

Capturing the full opportunity will require deliberate investments from both the food and education sector and it will need much tighter regulations to control quality and protect consumers' health and data. But set up well, this could be a game changer in the emotional connection we have with our food, and could boost the relationship food brands and retailers have with consumers. After all, what could be more personal than something made 'just for you'?



01

02

03

04

05



5. Australian food tax: ripe for a refresh?

Our food industry has been subject to significant change over the past few years and we are seeing health-driven food innovations launched at a high pace. Are our current food tax regulations unintentionally creating barriers for healthier food options?

The Future of Food

05 Australian food tax: ripe for a refresh?

Access to nutritious food for all, irrespective of income, is an important social imperative. It's something the Federal Government originally intended to support by introducing new tax regulations, including GST exemptions on basic fresh food like fruit, vegetables, milk and water.

Now 20 years later, our food industry has been subject to significant change and we are seeing health driven food innovations launched at a high pace – innovations our food tax regulation may not have been designed to deal with.

This is triggering a key question – are these regulations unintentionally creating barriers for healthier food options and, as such, are our tax interventions still delivering on their social imperative?

'Better for you' food innovations

As consumers, our awareness of the impact of nutrition on our health has increased and, in response, consumer businesses are ramping up food innovations to increase their nutritional values, such as introducing additives such as vitamins in water and iron in milk. With our focus on obesity prevention, many consumer brands target sugar content reductions through product reformulations. Retailers are also embracing the health trend by introducing ready-to-eat meals and salads to make healthier habits a bit easier.

All are initiatives to tackle our growing health challenges but, unfortunately, many of today's 'better for you' innovations in food are entering the zone of taxation due to their increased level of processing which no longer allows them to be classified as 'basic foods'. These include, for example, individually packed drinks for kids which, over the years, have increased their water content to reduce the amount of sugars. On their own, natural water and 100% juice are GST-free, but when combined, they become subject to GST if the juice content is not at least 90%.

Is our food tax still delivering on its intent?

The intent behind the GST-free treatment of basic foods is 'equity'. It was considered inequitable to impose GST on basic foods as low income earners spend a larger percentage of their income on these foods compared to high-income earners.



01

02

03

04

05



The Future of Food – Australian food tax: ripe for a refresh?

But if the intent is to create 'equity' and enable affordable access to healthy foods, should basic product modifications and ready-to-eat salads and meals that are nutritional and healthy not be exempted from GST?

Is tax the best lever to improve access to healthy food?

In addition to the question on whether the Australian tax regulations, in this new world of 'better for you' food innovations, are still in line with their initial intent, the issues of cost effectiveness is also challenged.

There is an ongoing debate that looks to broaden the GST base and argues for the removal of all exemptions, including those on basic foods, on the basis of 'simplicity'. The administration costs of ensuring compliance to these exemptions are high, particularly for the 'grey areas'.

There is no doubt that with growing consumer awareness of the impact of food on our health and wellbeing, we will see the pace of innovations in food accelerate and with that the administrative tax burden.

Given the expected rise in administrative costs involved, is tax therefore still the most cost effective lever? Moreover, when we consider a broader base for taxation, further economic benefit would be obtained through increased tax funding. These additional funds and administrative cost savings could be redeployed to support our communities in others ways to access healthy and nutritious food.

The time is now

The need to enable access to healthy and nutritious food is more important than ever. With the alarming increase in dietary driven diseases like obesity and diabetes in our society, it is crucial we continue to reconsider the effectiveness of our government interventions.

Could it perhaps be more effective to redirect funds, for example, towards subsidies for highly nutritious crops and, in doing so, lower the price points of healthy foods? And especially when we try to combine this with social marketing campaigns to promote dietary diversity and the priorities of nutrient-rich food.

In this fast changing environment, and with limited government funding available, there truly has not been a better time to rethink our tax regulations and interventions to best support our people to live healthier and happier lives, now and in the future.



01

02

03

04

05



The Future of Food

Contact



Vanessa Matthijssen

Partner, Consulting
National Consumer Products Lead
Tel: +61 404 371 235
Email: VMatthijssen@deloitte.com.au

With more than 20 years' experience advising clients in the consumer products, agribusiness, FMCG and retail sector, Vanessa has a deep understanding of the industry dynamics, consumer and market trends and related growth opportunities. She combines her skills in corporate and commercial strategy, turnaround programs as well as the design and management of large transformations with her passion for food to drive positive commercial results with progressive societal outcomes.

Contributors

We wish to thank the following Deloitte team for their contributions to this blog compilation.

Abs Osseiran

Partner
Tax

Bram Den Hartog

Partner
Consulting

Eudora Lee

Director
Tax

Tina Northcott

Director
Consulting

Chris Deliopoulos

Senior Consultant
Consulting

Michael Goldman

Senior Consultant
Consulting

Alexia Combet

Consultant
Consulting



The Future of Food

Endnotes

1. IRI Shopper Panel Psychographics Research (2017)
2. [My Connected Well being](#). Terrallon (2017)
3. [DNA Barcoding Meets Nanotechnology: Development of a Universal Colorimetric Test for Food Authentication](#), Wiley Online Library (2017)
4. [Building up Blockchain](#), Deloitte (2016)
5. [IBM Forges Blockchain Collaboration With Nestle & Walmart in Global Food Safety](#), Forbes (2017)
6. [2017 Edelman Trust Barometer](#), Edelman (2017)
7. [Connected Products, Restoring brand value and reimagining consumer relationships](#), Deloitte (2017)
8. [Bill Gates and Richard Branson Are Investing in This Clean Meat Startup](#), Fortune (2017)
9. [Visualizing Where Food & Beverage Investment Is Going](#), CB Insights (2017)
10. [Has Food Tech Lost Its Flavor? Investors Dial Back On Funding Food-Focused Startups](#)_CB Insights (2016)
11. [Visualizing Where Food & Beverage Investment Is Going](#)_CB Insights (2017)
12. [Kellogg Launch VC Fund to Invest in Food Startups](#), Fortune (2016)
13. [Unilever Looks to Forge New Partnerships with Startups with the Launch of the Foundry](#)
14. [General Mills' Venture Fund Invests in 20-Year-Old's Startup](#), Fortune (2017)
15. [Why Tyson Foods is Investing in a Vegan Startup](#), Fortune (2016)
16. [Deep-dive on innovation in Consumer Products New insights on how innovation leaders are creating value despite industry headwinds](#), Deloitte (2016)
17. [A picture of overweight and obesity in Australia 2017](#), Australian Institute of Health and Welfare (2017)
18. [Obesity and overweight factsheet](#), World Health Organisation (2018)
19. http://www3.weforum.org/docs/WEF_Innovation_with_a_Purpose_VF-reduced.pdf, World Economic Forum, Innovation with a Purpose (2018)
20. [Personalised nutrition and health – Science and Politics of Nutrition](#), Jose Ordovas, The BMJ (2018)



01

02

03

04

05





This publication contains general information only, and none of Deloitte Touche Tohmatsu Limited, its member firms, or their related entities (collectively the “Deloitte Network”) is, by means of this publication, rendering professional advice or services. Before making any decision or taking any action that may affect your finances or your business, you should consult a qualified professional adviser. No entity in the Deloitte Network shall be responsible for any loss whatsoever sustained by any person who relies on this publication.

Deloitte refers to one or more of Deloitte Touche Tohmatsu Limited, a UK private company limited by guarantee, and its network of member firms, each of which is a legally separate and independent entity. Please see www.deloitte.com/au/about for a detailed description of the legal structure of Deloitte Touche Tohmatsu Limited and its member firms.

About Deloitte

Deloitte provides audit, tax, consulting, and financial advisory services to public and private clients spanning multiple industries. With a globally connected network of member firms in more than 150 countries, Deloitte brings world-class capabilities and high-quality service to clients, delivering the insights they need to address their most complex business challenges. Deloitte’s approximately 244,000 professionals are committed to becoming the standard of excellence.

About Deloitte Australia

In Australia, the member firm is the Australian partnership of Deloitte Touche Tohmatsu. As one of Australia’s leading professional services firms, Deloitte Touche Tohmatsu and its affiliates provide audit, tax, consulting, and financial advisory services through approximately 7,000 people across the country. Focused on the creation of value and growth, and known as an employer of choice for innovative human resources programs, we are dedicated to helping our clients and our people excel. For more information, please visit our web site at www.deloitte.com.au. Liability limited by a scheme approved under Professional Standards Legislation.

Member of Deloitte Touche Tohmatsu Limited.

