NEW ZEALAND ECONOMICS
ANZ AGRI FOCUS

TO INFINITY AND BEYOND

FEATURE ARTICLE: SYNTHETIC FOODS
Synthetic food is being marketed as more ethical, environmentally sustainable, stable, safe, healthier and diverse than the traditional products they are looking to imitate. Some have already reached the marketplace with success. Others remain in the ‘proof of concept’ stage. While many of the potential advantages make sense, it is still very early days. Many benefits are not likely to be as large as claimed and there could be unintended consequences and trade-offs that will only reveal themselves over time and with more research. Synthetic foods face four key barriers to further progress: commercial scalability; technicalities of creating equivalent imitations; regulation related to the labelling of food and its safety; and consumer response/acceptance.

THE MONTH IN REVIEW
Wet and cool conditions, especially in the North Island, have curtailed early-season livestock production. Marlborough’s viticulture sector has some earthquake damage to deal with. Green kiwifruit supplies will be lower in 2017 due to substantially reduced bud break, but Gold will increase again as canopies mature.

RURAL PROPERTY MARKET
Recent sales have seen surprisingly solid prices struck. Anecdotally there appears to be a large number of properties being marketed this year and vendor price expectations remain high. But there has been some concern expressed about whether there are enough buyers. An improved dairy outlook could potentially break the deadlock, or vendors may well decide to hold out with better returns on offer. Time will tell. In the horticulture space prices remain hot.

KEY COMMODITIES AND FINANCIAL MARKET VARIABLES
A stronger USD is helping cap the NZD/USD, improving farm-gate prospects. The cyclical upswing in global soft commodities has strengthened in recent months.

BORROWING STRATEGY
Rural lending rates are generally higher with rises in short-end rates exceeding falls in long-end rates. While the steeper borrowing curve does make it more expensive to fix for longer, the relative differences between short and long-term rates are not large by historical standards, and outright rates remain low.

ECONOMIC BACKDROP
Strong economic momentum is being maintained, but we see growth moderating from 3½-4% toward 3% as capacity constraints kick in.

EDUCATION CORNER: TOURISM AND ITS CONNECTION TO NEW ZEALAND’S COUNTRYSIDE
The booming influx in international tourists to New Zealand presents both challenges and opportunities to the farming sector. Challenges include a lower correlation between commodity prices and the NZD as tourism becomes an larger proportion of domestic economic activity; heightened competition for labour resources; biosecurity risks; and environmental tensions. We prefer to see the influx of international tourists as an opportunity for the farming and broader food and beverage sector though. The two sectors complement one another. There are multiple angles. These range from the direct selling of products to tourists through to providing unique authentic farming experiences, accommodation, education on where food comes from, creating new business relationships and even tourists providing short-term labour resources.
**SUMMARY**

A new innovation in food production is synthetic food products. Synthetic food is being marketed as more ethical, environmentally sustainable, stable, safe, healthier and diverse than the traditional products they are looking to imitate. Some have already reached the marketplace with success. Others remain in the ‘proof of concept’ stage.

While many of the potential advantages make sense, it is still very early days. Many benefits are not likely to be as large as claimed and there could be unintended consequences and trade-offs that will only reveal themselves over time and with more research.

Synthetic foods face four key barriers to further progress: commercial scalability; technicalities of creating equivalent imitations; regulation related to the labelling of food and its safety; and consumer response/acceptance.

For New Zealand food and beverage companies there will always be a marketplace for natural products that are produced in a sustainable manner. To defend against new forms of competition (innovation) New Zealand will need to tell this story for every product sold. This requires producing quality products with unique attributes compared with synthetic products, as well as trademarked intellectual property. Other areas of focus are a need to continually strengthen sectors’ claims and credentials around animal welfare, environmental sustainability and food safety with appropriate policy and quality assurance programs.

**INTRODUCTION**

There have been many innovations throughout history that have changed the paradigm of many businesses and society. Some are show-stoppers – the wheel, the internal combustion engine, electricity, railroads, and more recently, computers and the internet. Others have been more subtle but equally important; think about what the creation of spectacles/contact lenses meant for the productivity of some members of society. These innovations created new businesses and opportunities that expanded the production possibility frontier of society (and have driven efficiencies), and often forced incumbents to radically change their own business models. The rate of change across a number of areas these days is staggering and hard to keep up with. Some of the new innovations offer opportunities; others introduce new forms of competition; and some do both.

**FEATURE ARTICLE: SYNTHETIC FOODS**

Reading the daily headlines on the business of food highlights an increasing number of companies looking to produce a range of synthetic, or artificial, foods. The motivations are varied, but all are trying to disrupt, or create new forms of competition to the ‘traditional’ way of producing food, especially in the livestock sectors. For some nations with limited natural resources, alternative (low cost) food sources are an economic imperative. Many of the livestock examples are looking to create the same products as are served up in any restaurant, or as a home-cooked meal, but without the need for an animal to be involved. But the livestock sector is not the only target, with one recent project beginning to investigate the feasibility of producing synthetic wood too.

Such innovations create a mix of feelings ranging from fascination and intrigue through to dread. Where one might sit on this spectrum probably depends on whether you are a consumer, producer, or venture capitalist searching for the next big thing. For the consumer feelings could be mixed too, depending on social beliefs and cultural attachments to food.

At first blush, if such innovations make it to market at scale they could well sit in the ‘show-stopper’ category for the New Zealand economy and primary producer businesses. The primary sectors account for 74% of the country’s goods exports and some 15-18% of GDP. This means there is much at stake, not just for a number of individual businesses, but the entire economy. If the ‘traditional’ way of producing food is going to be consigned to history – as the car did to the horse and carriage – then some radical change is forthcoming.

Agricultural innovation and the need for the economy and businesses to adapt are not new. Take wool as an example. Back in the 1950s it used to account for 37% of New Zealand’s exports, and sheep farming was a significant proportion of economic activity. Today wool and woollen products account for around 2% of total exports and sheep farming is a much smaller proportion of economic activity. One of the biggest changes through this period has been the inexorable rise of synthetic substitutes at the expense of natural fibres (mainly cotton & wool). Since the 1960s the market share of synthetic fibres has risen from 10% of total consumption to nearly 70% today. Wool’s market share has declined from 10% of total consumption to about 1%. While wool is different to food (i.e. worn as opposed to eaten) it is still an interesting case study for what synthetic food could mean.
So we thought it would be worthwhile taking a look at what the emerging field of synthetic/artificial food might mean and the propositions of an increasing number of start-up companies that are attracting a flurry of venture capital.

At the outset there are no certainties, given the emerging nature of different innovations and the wide range of biotechnology techniques looking to mimic, or completely recreate, a range of existing food products. Many complexities, a certain amount of extravagant marketing and a number of unknowns mean one is left with more questions than answers. But in many ways that is the nature of the beast when discussing innovation – it never stops and often takes a different direction from first intentions.

What we have endeavoured to do is provide some context to some of the questions that pop up when discussing synthetic food. We offer some thoughts on what it might mean for the New Zealand primary sectors and the potential strategies that might be required to fend off a new form of competition.

WHAT IS SYNTHETIC OR ARTIFICIAL FOOD?

A simple definition of synthetic food is: a product that has been produced by biotechnological methods from particular nutritive substances, such as proteins or their component amino acids, carbohydrates, fats, vitamins, and trace elements. The end result is a product that looks to imitate natural food products by recreating appearance, colour, flavour, aroma, texture, nutrition profile and palatability.

Reading the headlines one would be forgiven for thinking only burger patties and a few other animal products are being developed. But dig a little deeper and it seems nothing is off limits. Synthetic products under development include: steak chips, burger patties, meatballs, hotdogs, sausages, meatless ‘chicken’ strips, mayonnaise and cookie dough without eggs, scrambled egg replacement, bacon, milk, cheese, yoghurt, ice cream, popcorn, shrimp and cultured leather. Some of the products using plant-extracted nutrients, and/or acellular production methods are already on supermarket shelves offshore. Just about all the products include a mixture of ingredients (both natural and synthetically produced) to be able to adequately imitate key features such as texture, flavour and colour.

The technologies being used to create such products cover a number of different scientific disciplines, from medical through to food science fields. Broadly, there seem to be three main approaches being investigated/used to produce the components (i.e. proteins, carbohydrates, fats, vitamins and trace elements) to create such products. Once the components have been created further traditional food manufacturing processes are applied to produce a final product.

The three main approaches are: cellular production, acellular production and extraction from plant or animal-based materials. Both cellular and acellular production is about synthesizing food substances. The components, some of which are synthesised together, are then combined with other nutrients to imitate the desired product. This can include recombination with other naturally occurring substances.

Cellular production methods in their most basic form are about taking a number of cells and proliferating them in a nutrient-rich medium. The production methods have different variations. Figure 1 shows the main steps when producing cultured meat, for example. This process involves taking a number of cells from a particular animal and proliferating them in a nutrient-rich medium. After the cells are multiplied, they are attached to a sponge-like ‘scaffold’ and soaked with further nutrients to allow additional growth to form muscle fibres. They may also be mechanically stretched to increase their size and protein content. Additional components may be added to provide other important nutrients or aspects. The result can then be harvested, seasoned and cooked as a boneless or processed meat, such as a sausage, hamburger, or chicken nuggets.

Acellular production is slightly different in that it uses micro-organisms, such as bacteria or yeasts, to synthesise a range of different nutrients. Essentially, different types of bacteria or yeast are grown on a food (sugar etc) or non-food (petroleum hydrocarbons) medium and through excretion or fermentation different nutrients are created. This process has been used to make substitute products for the likes of egg whites, gelatine and milk proteins. It’s essentially the same process that is used to obtain insulin and is similar to brewing beer.
Muscle sample taken from a suitable animal
(Usually taken under local anaesthesia by biopsy)

Separation of stem cells from all other muscle components
(Skeletal muscle stem cells are termed myosatellite cells)

Induce cells (myoblasts) to grow and proliferate
(Choice of conditions (temperature, oxygen, etc) and culture medium composition with nutrients and growth factors, etc, is critical)

Induce cells to merge to form multinuclear myotubes
(Nuclei within myotubes can no longer divide so growth is limited by the extent of merging of further myoblasts)

Further growth by continued merging of new myoblasts and differentiation of myotubes to form muscle fibres
(Growth and differentiation is enhanced by the scaffold and by nerve-like stimulation and resistance)

Ensure continued growth as the system is scaled up to a commercially viable operation
(Environmental, nutrient and growth-factor inputs remain critical)

Introduce other components found in in vivo muscle & meat
(Adipocytes provide the lipids that are important to some aspects of palatability)

Provide some framework/scaffold to facilitate forming of muscle fibres
(Collagen-based frameworks match those found in muscle)

Cells other than those from muscle may be used
(Induced pluripotent stem cells may be programmed to form myoblasts)

Process the resulting product into a product that mimics meat
(Processed meat products are likely to be easier to mimic than intact muscle items)


The example from the company Perfect Day that has been used to create milk proteins provides some further insight into the process. They took a standard yeast and placed DNA from a cow into it with 3D printing. With the yeast's new DNA 'blueprint' it is then grown on a special mix of plant-based sugars, fats and minerals. This sees the yeast ferment the sugars and create milk proteins in a process similar to craft beer brewing. The final product is then filtered and purified of all yeast.

While the process uses genetic engineering, or a genetically modified organism (GMO) in the form of the yeast to make the milk proteins, the final process removes this material, essentially making it a non-GMO food. However, the end product isn’t an exact replica of milk, rather the proteins contained within milk. The proteins are then combined with plant-based (lactose-free) sugar, fats, vitamins, and minerals to form the final product.

The third process used is the extracting and isolating of different nutrients from a variety of plants and animal foodstuffs. Nothing seems to be off limits, but common plants being used include soybeans, peanuts, sunflower seeds, cottonseed, sesame, rapeseed, oil cake, peas, wheat gluten, and other green material from plants. Animal protein extracts are being derived from casein, fish, krill, and other marine sources. To identify suitable nutrients to imitate a certain food product the basic biochemistry of each is first studied to understand their characteristics and possible applications. The promising ones are then tested in a variety of recipes (or formulations) to see how they perform.

An example is Hampton Creek, which has analysed more than 7,000 plant samples and identified 16 proteins that might prove useful in food applications. Several are already being used in its commercial food products, including a type of Canadian yellow pea in its mayonnaise instead of eggs. The company has been looking for proteins with functional properties such as foaming, gelling and moisture retention. Mayonnaise, for example, requires a substance that binds the right amount of oil with water to create a stable emulsion. For its version in stores the company tested more than 1,500 different formulations. Advances in profiling technology are lowering the cost and allowing a much wider range of extracts to be tested more quickly and cheaply.

While all three approaches have produced trial products, the latter two are producing commercially available products already. In reality, acellular production and extraction, followed by recombination of ingredients, have both been used to create traditional foods/beverages, medicines and other health products for some time. But it now seems these techniques are being adapted/expanded with other new technological developments (such as 3D printing of DNA into yeast) to produce a wider range of nutrients that can then be recombined, including with natural products, to imitate and create a whole new range of food products.
WHAT’S THE COMMON PITCH?
You name it and the new start-up companies in the synthetic food space are looking to claim it. There are numerous claims that the new synthetic products are more ethical, sustainable, stable, safe, healthier and diverse than the traditional foe they are looking to replace. We discuss five key areas that are often focused on.

Environmental sustainability
Producing a more environmentally-friendly product seems to be one of the main motivations advocates cite for the development of synthetic livestock and seafood products. The common pitch is that livestock sectors use a vast amount of land, water and fertiliser as well as producing a large proportion of the world’s greenhouse gases and other environmental externalities (i.e. eutrophication of waterways etc). Seafood developments are driven by declining wildlife stocks from over-fishing and pollution. This is leading to a rise in aquaculture to fulfil demand, but this is perceived as resource intensive. With demand for products from both sectors expected to increase over the coming decades ahead driven by population growth, westernisation of diets and income growth in emerging economies, it’s assumed the world’s natural resources won’t be able to cope.

Animal welfare and ethics
The main processes used to produce synthetic food primarily use no animals and therefore avoid animal welfare (and other ethical) concerns associated with consuming livestock products. Cultured meat requires only the harvest of stem cells, which would affect only a small number of animals and can be done in a humane manner. This means there are no animal welfare issues a consumer needs to be concerned about.

Of course consumers already have access to a number of products under the vegetarian, or vegan categories that avoid unethical concerns. What is different with the majority of synthetic food start-up companies is they are not targeting the small number of people who live largely on a plant-based diet already. They are after consumers who love meat, seafood and dairy products, and that means replicating the meaty, cheesy or creamy flavours and textures that they crave while enabling them to not feel guilty about the exploitation of animals.

Healthiness
As synthetic products are being created from ‘the ground up’ the nutritional profile can be tailored to deliver health benefits. This means any product’s macro (protein, fat, carbohydrates) and micro (vitamins, minerals, iron etc) nutrients can be altered to deliver a consumer’s exact nutritional preferences determined by factors such as demographics, physical activity, health requirements, gender etc. This makes synthetic food potentially healthier than conventional products where the nutritional profile can be less easily changed and often has much more variability (i.e. fat content of different animals).

Safe
With synthetic food being created in a controlled environment there is said to be a reduced risk of various pathogens/diseases (e.g. E.coli) contaminating food. When animals are not used there is also no risk of antibiotics, hormones, arsenics and vaccines associated with conventional livestock production systems entering the food chain. The overuse of antibiotics in animal production stems primarily from their regular use in intensive housed production systems where it is required to control infectious diseases that are associated with keeping animals in confined spaces. So it is less of an issue for New Zealand sourced product.

Creation of new types of food
Some suggest the new synthetic foods of the future will create new flavours, textures and sensual experiences that conventional food cannot. This will open up a whole new world of different food experiences.

WHAT ARE SOME OF THE COUNTERPOINTS?
There is a lot to admire in some of the start-up companies’ marketing efforts to attract new venture capital to their businesses. Many New Zealand companies could no doubt learn a thing or two. But if one actually scratches below the surface of the marketing and media hype it becomes much more complex, with a number of counterpoints and trade-offs that are often not acknowledged.

Environmental trade-offs
Many of the environmental sustainability arguments make intuitive sense. On a very primitive level conventional livestock production requires nutrients and energy for biological structures to live, move and reproduce. This includes growing bones, the respiratory system and digestive systems, skin, and the nervous system. Thus if you don’t need to use nutrients, or energy for all these biological structures to produce meat, seafood or milk, then the alternative process should be less resource-intensive
(or more resource efficient, depending on your point of view).

In the United States, producing 1kg of animal live weight typically requires 10kg of feed for beef, 5kg for pork and 2.5kg for poultry. Translating this into the final product that is bought at the supermarket multiplies these numbers further (i.e. live weight to retail weight). Using cellular or acellular production methods that use sugars, bacteria and other inputs to produce synthetic replacements – well certain components at least – should theoretically be more efficient.

It’s the same with plant-extracted nutrients. One study\(^2\) estimated 45% of the world’s grain harvest is diverted to meat production. If current crop production used for animal feed and other non-food uses (including biofuels) were targeted instead for direct consumption, some 70% more calories would become available. This would potentially provide enough calories to meet the basic needs of an additional 4 billion people. Obviously not everyone wants to eat such a diet and from a nutritional point of view livestock and seafood products can provide a number of important nutrients; hence the focus on synthesising, extracting and recombining to make imitations with similar nutritional profiles.

But much remains hypothetical in nature and not well backed up with comprehensive evidence, or commercially proven models that can then be scaled and compared with the livestock sectors in their entirety. Often the global livestock sector’s entire environmental footprint is quoted with little other context provided alongside, such as what the entire footprint of replacing this might look like, other potential environmental externalities created, and potential trade-offs. This is in part due to the emerging nature of the different innovations.

One study\(^3\) quoted many times in various stories and research suggested growing meat in factories – or, one day, in your home – is estimated to use up to 45% less energy, 99% less land and 96% less water than traditional farming practices, as well as produce 78-96% fewer greenhouse gases. However, the research used a hypothetical example of just one technique (cyanobacteria as the source of nutrients and energy) being investigated to produce cultured meat. The full scope of the lifecycle analysis also appears somewhat limited and it wasn’t overly clear if like-for-like was being compared. For example it didn’t appear to include the inputs of key pieces of equipment such as the bioreactor, concrete ponds used to grow cyanobacteria and other important equipment, in its lifecycle analysis. The reason given was the possibility to recycle much of the equipment for other purposes when the plant was decommissioned. But to us these are key inputs and therefore at the very least a depreciated element of the inputs required to construct a commercial operation should be attributed to producing cultured meat, as this is the primary use of such investment.

The analysis also only went up to the factory or farm gate and therefore doesn’t cover the whole life cycle of end products. The complete coverage of the supply chain in lifecycle analysis is very important when comparing between different products and markets. This is highlighted by the initial food miles debate New Zealand exporters faced in the United Kingdom market that was subsequently debunked when full lifecycle analysis of the entire supply chain was undertaken.

**FIGURE 2: CUTS FROM A BEEF CARCASS**

In the case of an animal there is a range of end products from steaks, chops, offal products, skins, hides etc that are produced. In the case of this study an assumption was applied that the entire animal is rendered to its base components (i.e. protein, fats etc) for comparison. The reality is actually completely different. It’s likely that the cultured meat would need other macro and micro nutrients blended with it to imitate the real deal too. So there appear to remain a number of unknowns and the need for further research on the lifecycle of such innovations – something acknowledged by the authors of the study itself, but often lost in the headlines of news stories.

---

\(^2\) “Leverage points for improving global food security and the environment.” *Science* 2014

\(^3\) “Environmental Impacts of Culture Meat Production” by Hanna L Tuomisto and M. Joost Teixeira de Mattos. 2011.
Intuitively it seems less land would be used by the three main techniques to produce synthetic food, but in many cases the difference is unlikely to be as great as some suggest. This is due to the need to extract and/or source a range of other nutrients that are then recombined with the synthetically produced components. There is also the need for a biomass to grow synthetically produced components. This means most land that is currently planted with various crops would likely continue to remain in production if these processes are scaled up. The land could be farmed under a potentially different range of crops, depending on their potential use and fit with locally specific factors, such as soil type, topography, rainfall, climate and disease pressures.

In the case of livestock farming that occurs on more marginal grassland areas (i.e. beef and sheep), this is often the most efficient use of this land as it isn’t suitable for producing crops. Indeed the growth in the global area of arable land has slowed recently, suggesting losses from urbanisation and environmental degradation concerns (i.e. further deforestation) are offsetting the push into more marginal growing areas. This means grassland areas will still be a critical part of the overall food production equation moving forward.

FIGURE 3: GLOBAL AREA OF AGRICULTURAL LAND

While there would be some obvious biodiversity and eutrophication benefits of reverting grassland areas to a more natural state, or using it for other environmental services (i.e. carbon sequestration), the overall gain and other trade-offs can’t be completely ignored either.

From a biodiversity point of view the conversion of grasslands to a more natural state might benefit some species, whereas others may suffer (depending on the area). Using forestry for carbon sequestration provides different trade-offs too. Biodiversity under non-native forestry when compared with a natural state can have a similar impact to using the land for livestock. Forestry can also cause sedimentation during harvesting and the early stages of re-establishment.

The other aspect of letting land revert to a more natural state in some areas is the deep cultural identities many farming communities derive from their landscapes. While many of these landscapes are entirely artificial when compared with their natural state, some have been this way for hundreds or even thousands of years. Changing this would have a big impact on these communities’ cultural identities and employment.

Crusaders for synthetic food often try to target industrialised food production systems, but the creation of economically competitive alternatives would likely have a larger impact on subsistence farmers. It has to be remembered food production continues to employ the largest proportion of the globe’s population. Indeed some 2.5 billion people (36% of world’s population) are recognised by the FAO as deriving a living from agriculture. Emerging countries account for a significant proportion of this and, from a global livestock production point of view, they are often recognised as operating at the least efficient end of the scale. So potentially they could face the greatest economic and social risks from synthetic foods.

There are other areas of challenge too, for the likes of water usage, nutrient loss and greenhouse gases. The debate around each is complex when you examine the intersection of environmental science, policy and economics.

Take water usage/footprints as an example. A properly prepared water footprint will include green water (rain feed), blue water (abstracted) and grey water (dilution or disposal), and should include the water footprint of brought-in feed, wherever it is sourced from. Green water includes all the natural rainfall on land used for livestock production. In areas of high natural rainfall and run-off it’s debatable to what extent all this should be incorporated into lifecycle analysis as no matter what the land use, it’s still likely to be available and in excess supply. Of course this is regionally specific, as forestry and vegetation can change climate patterns, but in the case of New Zealand, made up of relatively small islands in the Southern Pacific Ocean, our weather pattern is much less dependent on such things.

In reality the use of freshwater and its quality are locally specific matters. This means local regulation plays the most important role in ensuring fair allocation of freshwater between priority...
uses and adequate quality outcomes for future generations. This philosophy was embedded in New Zealand’s National Policy Statement for Freshwater Management in 2014. Various regional councils are now at different stages of implementing the changes.

So making global comparisons of the lifecycle of water for different products seems rather meaningless from both an environmental and consumer point of view. Where it makes more sense is greenhouse gases – this is a global issue. Under the current global framework for carbon accounting, livestock production accounts for a significant proportion of total greenhouse gases. But even this is more complex than first meets the eye, due to the treatment of methane gas (a significant proportion of the livestock sector’s contribution to total greenhouse gases) under the current framework, and other carbon accounting quirks (such as the role carbon sequestration in soils can play).

FIGURE 4: ILLUSTRATIVE CARBON CYCLE ON-FARM

Source: ANZ, AgResearch

In brief, methane has a higher warming factor attached to it than carbon dioxide, but it is also a relatively short-lived greenhouse gas (i.e. it breaks down quickly in the atmosphere). That means if you change the policy timeframe, and focus on the long-term impact methane has in addressing peak warming, its impact is overstated. Unless carbon dioxide emissions are reduced rapidly in coming decades, addressing methane emissions will have little impact on the overall magnitude of warming.

Of course such dynamics depend on policy views, because it’s the reverse (i.e. methane has a larger impact) if you want to address climate change more quickly. Given its importance to New Zealand’s international climate change commitments under the Paris agreement this is currently an area of further research.

The main point for the environmental debate is that any land-use activity that is man-made (i.e. not its natural state) will have some associated environmental externalities, be it biodiversity, nutrient loss etc. Often plant-based crops are held up as a better alternative to livestock. But this doesn’t acknowledge that some grazing land isn’t suitable for crop production due to soil type, topography, rainfall, climate etc. Additionally, all the various crops farmers grow around the globe each produce their own environmental externalities. In many cases these can be just as damaging, if not worse (i.e. pesticides), than livestock grazing on extensive pasturlands. This is highlighted by the comparisons of different environmental externalities produced by various US biofuel crops in Table 1 on the next page.

So while emerging synthetic food techniques intuitively feel like they could be more environmentally efficient than traditional production systems, it’s not as straightforward as the headlines might suggest, nor are the gains likely as large. It’s more likely to involve different trade-offs and other unintended consequences that wouldn’t be seen until something is expanding and operating at scale (e.g. palm oil).

Safety

The other area of debate is around whether synthetic foods are actually safer and healthier when the technology and science to produce them is often at the more extreme edge of manipulating nature. In reality many things man-made are a manipulation of the natural environment to solve human ills and improve lifestyles. It’s just a matter of how far this is taken and the potential trade-offs that might exist as you move along the continuum.

The reality of the science and technology being explored means without more research and testing it’s impossible to say what the health and food safety outcomes might be. Often, it takes a while when introducing changes to food sources for problems to show up. When scientists talk about cultured meat allowing the biochemical composition of meat to be changed, for instance, by increasing the content of polyunsaturated fatty acids
to make it a healthier or a specialised diet product, this raises a number of questions. Could this create new pathogens, superbugs, and/or resistance to certain medicines? What could consuming such an unnatural product over a long period of time mean for overall health (i.e. would there be other unknown longer-term side effects)?

As one study\(^4\) pointed out, the process of cell culture can never be perfectly controlled and some unexpected biological outcomes could occur. For instance, epigenetic\(^5\) modifications could occur during the culture process with unknown potential effects on the resulting product (i.e. muscles in the case of cultured meat) – and human health when consumed.

This same question raises its head for other synthetic foods that are produced by a genetically modified organism, or have an unnatural nutritional profile. To answer these questions and alleviate both consumers’ and regulators’ fears of the unknown it will take a lot of research and rigorous testing – similar to the introduction of a new medicine. The reality is that until this occurs for an extended period of time – some might say a lifetime, given humans’ different needs and developmental stages as we grow and then age – consumers and society are likely to remain sceptical.

Not all nutrients are created equal, raising the question of true direct comparability between synthetic foods and the traditional food they are looking to imitate. For example, in the case of plant-extracted imitations, not all foods contain the same type of protein or iron. Meat, eggs and dairy products are considered complete in high-quality sources of protein that provide the full package of essential amino acids needed to stimulate muscle growth and improve weight management. Plant proteins such as grains, legumes, nuts and seeds are incomplete proteins, in that they do not provide sufficient amounts of essential amino acids. In fact, research indicates that increasing consumption of

---

**FEATURE ARTICLE: SYNTHETIC FOODS**

**TABLE 1: ENVIRONMENTAL EXTERNALITIES FROM DIFFERENT US BIOFUEL CROPS**

<table>
<thead>
<tr>
<th>Fuel Sources</th>
<th>Used to produce</th>
<th>Greenhouse gas emissions*</th>
<th>Use of resources during growing, harvesting and refining of fuel</th>
<th>% of existing US crop land needed to produce enough fuel to meet half of US demand</th>
<th>Pros and cons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Kilograms of carbon dioxide created per mega joule of energy produced</td>
<td>Water</td>
<td>Fertilizer</td>
<td>Pesticide</td>
</tr>
<tr>
<td>Corn</td>
<td>Ethanol</td>
<td>81-85</td>
<td>high</td>
<td>high</td>
<td>high</td>
</tr>
<tr>
<td>Sugar cane</td>
<td>Ethanol</td>
<td>4-12</td>
<td>high</td>
<td>high</td>
<td>med</td>
</tr>
<tr>
<td>Switch grass</td>
<td>Ethanol</td>
<td>-24</td>
<td>med-low</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>Wood residue</td>
<td>Ethanol, biodiesel</td>
<td>N/A</td>
<td>med</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>Soybeans</td>
<td>Biodiesel</td>
<td>49</td>
<td>high</td>
<td>low-med</td>
<td>med</td>
</tr>
<tr>
<td>Rapeseed, canola</td>
<td>Biodiesel</td>
<td>37</td>
<td>high</td>
<td>med</td>
<td>med</td>
</tr>
<tr>
<td>Algae</td>
<td>Biodiesel</td>
<td>-183</td>
<td>med</td>
<td>low</td>
<td>low</td>
</tr>
</tbody>
</table>

*Emissions produced during the growing, harvesting, refining and burning of fuel. Gasoline is 94, diesel is 83.

Source: Martha Groom, University of Washington; Elizabeth Gray, The Nature Conservancy; Patricia Townsend, University of Washington; as published in Conservation Biology

---

\(^4\) “Educated consumers don’t believe artificial meat is the solution to the problems with the meat industry.” Journal of Integrative Agriculture. 2015.

\(^5\) Epigenetics studies genetic effects not encoded in the DNA sequence of an organism. Such effects on cellular and physiological phenotypic traits may result from external or environmental factors that switch genes on and off and affect how cells express genes.
high-quality complete proteins may optimise muscle strength and metabolism, and ultimately improve overall health.

Lean meats also contain heme iron, which is much more easily absorbed by the body than non-heme iron found in plant foods. Heme iron is an important dietary component for promoting cognitive health, including memory, the ability to learn and reasoning. It is particularly beneficial for growing children because research indicates that some toddlers are at higher risk of iron deficiency, and childhood iron-deficiency anaemia is associated with behavioural and cognitive delays. Yet other studies have also shown heme iron can cause DNA damage and induce N-nitroso compounds, some of which are potent carcinogens with a link to colon cancer.

Other studies have begun to show all the various supplements that are available in any health shop are much less important if a balanced diet can be eaten. Many of the supplements are providing too high a dosage of their main ingredients and the body hasn’t evolved to be able to absorb more concentrated doses that those that occur in traditional food (i.e. staples eaten over many generations).

**In the case of food safety, more often than not, single studies contradict one another — such as research on foods that cause or prevent cancer.** A recent study\(^6\) demonstrated this by taking 50 randomly selected ingredients from a cook book and seeing what link each has with cancer. Most of the ingredients had research claims of both positive and negative links to cancer. This highlights the sense in the motto ‘everything in moderation’.

**FIGURE 5: EVERYTHING WE EAT BOTH CAUSES AND PREVENTS CANCER**

- Wine
- Tomatoes
- Tea
- Milk
- Eggs
- Corn
- Coffee
- Butter
- Beef

![Relative risk of cancer](image)

Source: Is everything we eat associated with cancer? A systematic cookbook review.

This highlights that the truth is usually found somewhere in the totality of the research, instead of the flip-flopping headlines generated from individual pieces of research, or a company touting the next big thing. Such a body of research on the proposed health and safety benefits of synthetic food will take some time to build. Until then we are likely to see a cautious approach from both regulators and consumers on the proposed health and food safety benefits of such products.

**WHAT ARE SOME OF THE KEY BARRIERS?**

Getting beyond the sales pitches of the various proponents of synthetic foods, **there are some key barriers faced to widespread adoption**, especially for products that use cellular or acellular production techniques. These centre around commercial scalability; technicalities of creating equivalent imitations; regulation related to the labelling of food and its safety; and consumer response/acceptance.

**Commercial scalability**

Quality information on this area was very sparse and tightly held, for obvious commercial reasons. The consensus seems to be that new technologies that use cellular or acellular production techniques to produce meat and dairy imitations are mostly still in the ‘proof of concept’ stage. A few of the leaders appear to have completed the ‘proof of concept’, but now need to prove they are commercially scalable, the end product is comparable with the traditional equivalent, and there is an actual market.

This means the commercial viability of such technologies is not yet clear. The headlines from various companies suggest rapid improvement is being made, but academic research suggests many barriers remain. The truth is likely to lie somewhere in the middle with the academic research likely only just catching up with commercial reality.

It might very well be that the decrease in costs of resources, labour, and land is offset by the extra costs of a stricter hygiene regime, stricter control, computer management, extra research/development costs and capital costs to develop a large enough bioreactor and other required equipment. Ultimately its looks like we will have to wait and see.

**Further along the continuum of commercially viable products are plant extracts.** This was highlighted by the recent launch of the Impossible Foods burger and Hampton Foods mayonnaise that

---

doesn’t use eggs. The release of the Impossible Foods burger has been tightly controlled to select restaurants to ensure the product is prepared properly (correct preparation is critical to the product’s ability to replicate a traditional burger’s appearance, flavour, aroma, texture and palatability). The complexities of the different elements that have to be bought together for the Impossible Foods burger mean it is priced at the premium end of the market, whereas the Hampton Foods mayonnaise is more mid-market as the complexities beyond finding the right formulation to replace eggs in mayonnaise are less.

It seems companies are currently targeting products where there is a mix of components used to form the final product. This is for two main reasons:

- The technology has not yet been discovered to completely reproduce identical livestock products such as milk in its entirety, or specific cuts of meat.
- The synthetic/substitute components currently being produced need to be mixed with a range of other ingredients to replicate consumers’ familiar sensory experiences with a particular product (i.e. the same creamy taste of mayonnaise).

Other barriers aside, this highlights near-term competitive pressure from such technology changes are initially likely to be for specific ingredients and food categories. At the moment most products are being pitched at the premium end of their respective food categories. This implies a higher cost of production for those that are market-ready. Many of the categories being targeted are ultimately more mass market in nature though.

**FIGURE 6: THEORETICAL COST OF PRODUCTION CURVE AND IMPACT ON MARKET POSITIONING**

Putting aside other barriers, how quickly and successfully these products gain market share will be a function of new innovations, technological advance, and supply chain/process improvements to reduce their cost of production and move them toward the mass market of the targeted food category. While you could draw parallels with what has happened with shale oil becoming the marginal producer in the oil sector, the technology involved and the vast and diverse nature of the food market means this comparison is not so relevant (i.e. the food market currently offers a great deal of choice, meaning consumers can already more easily substitute between goods for whatever reason).

**Technicalities**

Completely reproducing an existing product’s appearance, colour, flavour, aroma, texture, nutrition profile and palatability from synthetic components is challenging for a range of reasons. But as highlighted already, some specific ingredients and products have already reached the marketplace. Some of the innovation used to produce these products is not particularly new though. Food manufacturers have long changed the ingredients in their recipes to adapt to different markets, health research findings, regulation and changing societal eating habits. The current advances suggest manufacturers will have more choice moving forward, which would increase their flexibility and provide more competition in the food ingredients part of the supply chain. But this isn’t particularly new with the likes of vegetable oils regularly substituted for milkfat for certain products (especially in Asia). Equally there could be new forms of competition in specific food categories too, such as manufacturing-type meat.

But where the rubber really hits the road is the ability to fully replicate a product from synthetic components. This remains some way off with a number of unknowns as to what might actually be feasible.

The likes of cultured meat production face a number of challenges, such as:

1. Identifying the best source of seed cells;
2. Optimising culture media for efficiency and effectiveness;
3. Developing a suitable framework for the cells to efficiently grow and differentiate on;
4. Developing the ‘tissue engineering’ aspects;
5. Scaling up of procedures to an industrial level; and
6. Ensuring that nutritional value, health-promoting properties and consumer acceptance is at least equivalent to conventional meat.

All these steps have a number of complications. For example, further manipulation of nutritional components involves trade-offs. If too much fat is removed the meat will lose juiciness and texture. If heme iron is removed the meat won’t be red, but yellow – the colour of the beef grown in labs. If too much omega-3 fatty acids are added then there will be a fishy flavour. So the technicalities of actually changing the composition of meat to deliver additional health benefits has a number of potential trade-offs.

Regulation

Regulatory regimes are often one of the most important influences in determining the course of technological innovation. Synthetic foods face two major regulatory hurdles in the form of food safety standards and labelling requirements. Both are complex with overlapping features and there is substantial variation between countries. For some of the emerging technologies, governing legalisation doesn’t even exist yet, or there are effectively blanket bans (i.e. genetically modified organisms). In some cases there is a gap between actual market practices and regulation too. All these dynamics suggesting regulators will need to play catch-up at some point.

For example in the US, where they seem to have a more liberal approach to synthetic food developments, there are blurred lines of oversight for food labelling and proving a product is safe for human consumption. The USDA regulates meat, poultry and eggs, whereas the Food and Drug Administration (FDA) oversees safety and security of food additives.

One example given of the challenges faced is the ‘milk’ product to be produced by Perfect Day. To get safety approval the company could show that their product is similar to an existing product that testing has already shown is safe. That’s the approach already taken by companies that use microbes and other biotechnologies to produce enzymes and proteins that are added to foods. Because milk proteins, caseins and whey are already recognised as safe, and Perfect Day are looking to create identical replicas, then approval could be feasible. Where it perhaps gets murkier is the use of genetically modified yeasts to produce the milk proteins. In the US this is likely to get approval as they already have genetically modified crops in the food chain. But in other countries, such as Europe, or even China, this is much less likely under present regulatory regimes.

Labelling of the product as ‘milk’ is also an area of dispute. Under the FDA rules such a product can’t legally be called milk as standards stipulate it has to be specifically produced from lacteal secretions from an animal. Hampton Creeks Just Mayo was facing a similar dispute with Unilever who filed a lawsuit against the company’s product in 2014 claiming it couldn’t be labelled as mayonnaise. This was due to the FDA’s legal definition of the condiment saying it should contain eggs. The lawsuit was subsequently dropped amid a consumer backlash with Unilever launching their own ‘Hellmann’s Carefully Crafted Dressing & Sandwich Spread’. It seems targeted at the type of consumer who might otherwise be buying Just Mayo. Unilever touts the fact that it’s an eggless spread and is free from artificial colours, artificial flavours and genetically-modified ingredients.

In this regard regulation is evolving, with the US now developing a national disclosure standard for bioengineered foods. This is anticipated to give food and beverage manufacturers options in disclosing whether a product contains bioengineered ingredients/genetically modified organisms. The form of a disclosure may be a ‘text, symbol, or electronic or digital link’ according to the initial bill. Companies would have the option of using quick-response (QR) codes, phone numbers or web sites instead of on-pack labelling. But the changes look set to be challenged, with some advocates saying the proposals fall short of what consumers actually expect: a simple at-a-glance disclosure on the package. Time will tell, but such developments will be influential in determining market impact.

While we have focused on labelling and food safety requirements, there are other regulatory hurdles in the development of synthetic food technologies that sit at the more extreme end of manipulating nature. This includes the likes of trial and licensing requirements for the use of genetically modified organisms. It’s understood the European Union has somewhat of a de facto ban on genetically-modified organisms. The US has not banned genetically modified animals from entering the food chain, but is yet to approve any such products for human consumption. So in short, how regulatory regimes progress on a number of fronts will be critical in determining the development of synthetic food and its place in the food market.

Consumer reaction

The consumer response is the ultimate test. Research and surveys on the topic seemed to vary substantially between finding there is limited appeal through to unlimited opportunity! Until more products
are in the marketplace it will be difficult to judge how consumers might actually respond.

The main consumer barriers seem to centre around four factors:

1. Perceived ‘unnaturalness’ of synthetic foods;
2. Initial reaction of “eww yuck”, or the ‘frankenfood’ perception;
3. Safety/health concerns; and

Both the perceived ‘unnaturalness’ and initial reaction are somewhat intertwined. The synthetic production process could put consumers off if it is seen as manipulating and messing too much with nature. This obviously depends on the technology being utilised, with the likes of genetic modification at the more extreme end and plant extracts at the milder end. Some surveys suggest consumers have an initial “eww yuck” reaction, but once more information is provided on a product there is at least a willingness to try it. But even if consumers are willing to try a synthetic-based product this does not reveal much about the likelihood of repeat purchase or a sustained change in eating habits.

Whether consumers can overcome the initial reaction and follow through to a more sustained change is likely to depend on a range of factors relating to affordability, safety concerns, healthiness, cultural drivers of food consumption and a product’s performance in recreating what is being imitated. As one study noted, it’s likely consumers would take a very cautious approach to new synthetic foods that have not been validated or assessed for their effects on human health. Acceptance would depend on the progressive unveiling of the advantages and/or disadvantages of the product together with guarantees from trustworthy public authorities (i.e. health institutions and professionals) and market participants (e.g. high-profile chefs). Issues such as how safety controls are performed and guaranteed, how credible and transparent the information is, and how regulatory structures and procedures are set up are major challenges in this respect.

Equally there are very strong cultural drivers of food consumption patterns in many markets. Even though the modern food market certainly has a fashion element to it, replacing the Sunday roast, or not using a particular ingredient from Grandma’s secret recipe, has often taken generations to change. People have been eating livestock and having meals together for thousands of years. Livestock products in particular are not only prized for taste but also perceived as a force of vitality, strength and health. So while certain products might gain a foothold in specific categories or as a certain ingredient substitute, it’s difficult to see synthetic food becoming the new norm any time soon given what has occurred since the dawn of man.

**HOW CAN NEW ZEALAND’S PRIMARY SECTORS BEST POSITION THEMSELVES?**

The mentality of New Zealand ‘feeding the world’ in the early 2000s has slowly changed to targeting markets and discerning consumers willing to pay a premium for quality food. Some companies and sectors are further along this journey than others. But the direction is fairly clear when you eye the strategies and investment activity of many of New Zealand’s major food and beverage companies.

The food market today is vast, with a huge range of choice. Categories such as natural, grass-fed, pasture-raised, organic and wholefoods will always exist and provide a market that synthetic food can’t directly compete in. This means if synthetic food does navigate some of the key barriers outlined above and penetrate the mass market, New Zealand’s food and beverage companies will need to pivot further toward our unique points of difference. In the case of the livestock sector this includes naturalness of the product through to the sustainability of the production system used to raise livestock. Seafood this includes similar aspects, including a world-leading quota management system that ensures the sustainability of local fish stocks through the control of harvest levels for each species and area. Telling the story of New Zealand’s sustainable production system and naturalness for every product sold would be critical in a world of increased competition from synthetic foods.

Other areas of focus need to be strengthening sectors’ claims and credentials around animal welfare, environmental sustainability and food safety. Put simply, if synthetic food companies are using claims in these areas as points of differences to conventionally produced product then New Zealand products need to be world class in all of them to

---

provide consumers with peace of mind. This will require robust quality assurance systems for each facet.

**Lastly, producing quality products with unique attributes and trademarked intellectual property will also be crucial.** This is what the kiwifruit sector has done with Sungold; the pipfruit sector has achieved with new ‘club’ varietals that have eating qualities desired by Asian markets; and what Marlborough Sauvignon Blanc represents. Each of these sectors has created a unique trademarked product, and combined with the application of best-practice management from orchard through to end customer this is delivering premium returns in many market segments and versus direct competitors. Similar results, albeit not to the same extent, can be seen for products that have more commodity characteristics like green kiwifruit too. Some of the other sectors have a way to go. For the likes of the meat sector, and especially beef where manufacturing product accounts for some 60% of sales (a key target for synthetic products), there might be a need to look at alternative cuts (i.e. bone-in) and products that can’t be so easily replicated with synthetic technologies.

As Charles Darwin said, “it is not the strongest that survive, nor the most intelligent, but the ones most responsive to change”. New Zealand food and beverage companies have many unique points of difference that can be leveraged to defend against synthetic substitutes. There will always be a market for natural products, particularly in a world where the population is ageing and becoming more health conscious, but companies can’t solely rely on this to deliver sustainable returns. Keeping ahead of the competition requires constant innovation and reinvestment into product development, marketing, production efficiencies, food safety, animal welfare and environmental sustainability.
SUMMARY
Wet and cool conditions, especially in the North Island, have curtailed early-season livestock production. Peak milk production has been well below normal (-5.5%) leading to a reduction in forecast 2016/17 supply. Early-season livestock turnoff has been slow due to the unfavourable conditions. Meat production could be lower than currently anticipated if there are higher retentions of young breeding stock. Marlborough’s viticulture sector has some earthquake damage to deal with. Green kiwifruit supplies will be lower in 2017 due to substantially reduced bud break. However, pipfruit exports are on track to increase again.

MOTHER NATURE
Spring delivered wet and cool conditions to many parts of New Zealand. In the North Island soil conditions were saturated for much of spring and pasture quality poor (i.e. energy content & utilisation rates). Additionally, the low sunshine hours caused animal health issues, saw slow weight gain for finishing stock, and delayed planting of crops. The South Island has had a better run with conditions not quite so wet and sunshine hours more normal. In many cases (Otago and Southland), extra supplementary feed has been made from surpluses.

DAIRY
Peak milk production has been well below normal (-5.5% nationwide and -8.0% for Fonterra) leading to a reduction in forecast supply for 2016/17. North Island milk production, which accounts for 60% of total supply, has generally struggled due to widespread wet and cool conditions. The main regions in the South Island have had a better run with year-to-date production currently ahead of last year.

Fonterra now anticipates its own milk supply to be back 6.8% in 2016/17. This follows a 3% decline the year before. However, accounting for a loss of market share, the forecast implies national supply is set to drop 5-5.5% in 2016/17. While it is realistic to recognise that the milk lost during the seasonal peak won’t be recouped, the forecast implies significant underperformance continuing over the remainder of the season. To us this seems less likely as summer seasonal conditions are likely to be better than last year – remember El Niño concerns last year. Additionally, the improved outlook for farm-gate prices brings brought-in supplementary feed (i.e. grain and palm kernel) back into the equation. This could be used to extend milking days later in the season and fill any feed deficits that occur during the summer. So we see some upside.

MEAT AND FIBRE
Just how low meat supply is, and the timing of turning off livestock are going to be the two key questions for meat processors and markets in 2016/17.

Current lamb production forecasts are factoring in a slight reduction in export supply to 19.35m head (-2.7%). While scanning rates were lower and there were fewer ewes lambing this spring (-3.1%), survival rates were better, lifting tailing results. Early season lamb turn-off has run well behind the usual schedule due to the wet/cool weather conditions across the earlier lambing regions in the North Island. This suggests a catch-up at some point. But equally, lower stocking rates and better summer seasonal conditions could see higher hogget retentions and mating. This could reduce export supply toward the 19m head level – similar to the lows of 2011/12. The slight offset could be heaver weights as farmers seek to add more weight to boost returns.

The supply of dairy beef will be key into May. The culling that occurred over the last two years and the recent improvement in farm-gate returns are expected to significantly tighten culling in 2016/17. The recent lift in dairy heifer and cow prices suggests a shortage has already emerged. This indicates there is a lot of downside to current industry production forecasts for manufacturing beef. Elsewhere, prime and manufacturing bull beef supply has been tight due to lower weight gain through the winter and spring period in the North Island (earlier-finishing areas). This suggests there could be a rush at some point, but overall prime beef supply is expected to remain constrained by lower cow numbers in recent years and potential for higher heifer retentions.

HORTICULTURE
Kiwifruit growers are observing lower bud break, particularly for the conventional green variety. With official figures of this year’s bud numbers forthcoming, the industry is preparing for a considerable reduction in the average yield for green orchards. Bud break for the gold variety appears less variable and with more orchard canopies reaching maturity, gold production is on track for another strong year.

The Marlborough viticulture sector has seen some wine loss and infrastructure damage from the recent earthquakes. The wine spillage is expected to be below 2% of the total 2016 crop and proactive management is expected to see infrastructure issues (i.e. storage tanks) addressed before the 2017 vintage arrives for processing. Unscientific estimates of the 2017 vintage range from average to slightly below as flowering is awaited to get a better idea.

A very large export pipfruit crop of 360,000 tonnes is expected in 2017. There has been less hail than the past two years with good pollination and fruit set, especially in the Hawke’s Bay. In addition new higher-yielding varieties are coming into production.
SUMMARY

The main sales period has started for livestock-aligned property. Early sales have seen surprisingly solid prices struck given low sector earnings and the ongoing implementation of new regulation to address water-quality issues. Anecdotally there appears to be a large number of properties being marketed this year and vendor price expectations remain high. But there has been some concern expressed regarding whether there are enough buyers. The improved dairy outlook could potentially break the deadlock, or vendors may well decide to hold out with better returns on offer. Time will tell. In the horticulture space, prices remain hot for existing operations, suitable bareland conversions and lifestyle options. Cash income prospects, more corporate-type investment, a diminishing area of suitable land in key regions, migration out of expensive urban areas and low interest rates are all supporting valuations.

The latest REINZ data paints a picture of relative calm at an aggregate level. Total turnover has pushed above the 10-year average in 2016/17 with an increase in the number of dairy and horticulture-aligned land sales. Average prices have continued to trade in a $26,000 to $28,000/ha range that extends back some two years if you exclude a slight blip above this during the first half of 2015.

The high-level aggregates hide some new underlying cross-currents. One is the improved turnover and prices for dairy-aligned properties. Part of the lift in average prices is compositional (i.e. the regional split), but it also backs up other information suggesting prices remain robust. This contrasts with a drop-off in grazing property turnover and average prices. This suggests sector earnings prospects still have a say. In contrast, horticulture-aligned property prices have stepped up further in some of the main regions such as Bay of Plenty (kiwifruit), Nelson (hops/pipfruit), Hawke’s Bay (pipfruit/viticulture) and Marlborough (viticulture). Strong cash income prospects, more corporate-type investment, a diminishing area of suitable land in key regions listed above, migration out of expensive urban areas and low interest rates are all supporting valuations.

<table>
<thead>
<tr>
<th>FARM SALES BY FARM TYPE</th>
<th>3-Month Seasonally Adjusted</th>
<th>Current Period</th>
<th>Previous Period</th>
<th>Last Year</th>
<th>10-Year Average</th>
<th>Chg. P/P</th>
<th>Chg. Y/Y</th>
<th>Chg. P/10yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy</td>
<td>Number of Sales</td>
<td>48</td>
<td>41</td>
<td>52</td>
<td>61</td>
<td>↑</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td>Median Price ($ per ha)</td>
<td>40,900</td>
<td>39,300</td>
<td>31,900</td>
<td>33,600</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Livestock – Finishing</td>
<td>Number of Sales</td>
<td>99</td>
<td>98</td>
<td>93</td>
<td>69</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td></td>
<td>Median Price ($ per ha)</td>
<td>24,300</td>
<td>24,100</td>
<td>23,100</td>
<td>17,900</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Livestock – Grazing</td>
<td>Number of Sales</td>
<td>178</td>
<td>193</td>
<td>192</td>
<td>190</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td>Median Price ($ per ha)</td>
<td>14,400</td>
<td>15,100</td>
<td>18,000</td>
<td>15,700</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Horticulture</td>
<td>Number of Sales</td>
<td>62</td>
<td>82</td>
<td>65</td>
<td>43</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td>Median Price ($ per ha)</td>
<td>203,100</td>
<td>211,600</td>
<td>188,100</td>
<td>160,900</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Arable</td>
<td>Number of Sales</td>
<td>35</td>
<td>35</td>
<td>37</td>
<td>22</td>
<td>←→</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td>Median Price ($ per ha)</td>
<td>48,700</td>
<td>53,700</td>
<td>32,000</td>
<td>33,100</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>All Farms ex. Lifestyle</td>
<td>Number of Sales</td>
<td>463</td>
<td>503</td>
<td>472</td>
<td>416</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td>Median Price ($ per ha)</td>
<td>25,800</td>
<td>27,600</td>
<td>27,300</td>
<td>22,600</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Lifestyle</td>
<td>Number of Sales</td>
<td>2,246</td>
<td>2,315</td>
<td>2,197</td>
<td>1,567</td>
<td>↓</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td></td>
<td>Median Price</td>
<td>563,000</td>
<td>549,000</td>
<td>542,000</td>
<td>474,000</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
</tbody>
</table>

**FIGURE 1. FARM SALES, MEDIAN PRICE**

Source: ANZ, REINZ

**FIGURE 2. FARM SALES, MEDIAN PRICE**

Source: ANZ, REINZ
The proposed Plan change for the Waikato and Waipa river catchments is now capturing the headlines regarding what it might mean for land values in the area. As we’ve previously highlighted, Waikato land values are some of the more expensive in the country – dairy valuations have averaged around $47/kg MS in recent years, finishing property $1,300/su and grazing property above $1,000/su.

While until policy details are finalised it’s a little too early to say exactly what the impact will be, anything that impacts on a business’s productive/financial capacity and ability to change land use will have some effect. With current valuations high and cash returns structurally low (in comparison to other businesses with similar risks) both highlight that a high amenity value is already attached to land in the area. This would seem to make the potential downside for land prices greater if a piece of land’s productive/financial capacity is adjusted too far or quickly through the introduction of new regulation.

However, given farming is a long-term investment for most, it’s not just the chosen policies, but the timeframes involved to implement change and adapt/innovate that matter too. It’s very clear that current farming practices and technology can’t achieve the Plan changes envisioned today. That’s why an 80-year time horizon, with policy phasing, has been adopted to allow for new technology and farm management practices to enable change.

Due to space constraints we won’t go into detail, but there will be winners and losers according to chosen policies. The first cut of case studies on the financial impacts of proposed changes are showing relatively low direct costs for existing dairy farms, but much higher costs for dry-stock operations. This seems largely due to the requirement to fence livestock (excluding sheep) out of waterways. This is a cost the dairy industry has already worn, but given the larger areas involved for grazing properties, it is generally more substantial anyway.

But the more important aspect for land prices is the long-term ‘productive and financial capacity’ of land. Both these and the ability to change land use are key support anchors for land values and banks’ credit-rating models. Modelling of these impacts is much more complex due to the range of moving parts and assumptions one can apply. But under present proposals and farming practices the upfront hit to the productive and financial capacity of land from the plan change looks to be for dry-stock properties.

This is due to the proposal to grandparent existing nitrogen leaching to the highest level in 2014/15, or 2015/16. Those in the top quartile are then required to reduce nitrogen losses to the 75th percentile by 2026. Given the presence of dairy in the catchments just about all the reduction in the top quartile will be for dairy operations. But for dry-stock farmers the proposals effectively cap current low levels of nitrogen leaching, reducing the ability to marginally intensify, or change land use (notwithstanding the need for resource consent to change land use also). This has been a key driver of higher valuation multiples for both finishing and grazing properties in the catchments for some time.

The other challenge is that waterways up to 25 degrees (quite steep) need to be fenced off to minimise phosphate and silt run-off. To pay for this fencing, many hill country farms would need to marginally intensify their good areas with current farming practices, yet the scope for this is limited by the nitrogen grandparenting, despite having a low nitrate leaching level.

All up it seems likely dry-stock land prices could bear the initial brunt of policy changes in their current form. Further out, how quickly dairy farms are required to reduce nitrogen leaching, their ability to do this and general market conditions will be important for land valuations too. Interestingly, dairy land prices could be initially supported with the effective moratorium on land-use change in the catchments and requirement to reduce to the 75th percentile for nitrate leaching both effectively increasing scarcity value. Time will tell.

Turning to the indicators for land prices (page 15):

Turnover and average prices for dairy properties have picked up from their lows in early 2016. A big part of the lift in prices is compositional, with a high proportion of sales in the Waikato/Auckland area. In the three months to September, 12 dairy farms were sold at a median sale value of $33,100/ha, or $43/kg MS. The median farm size was 112 hectares and production/ha was 770/kg MS. In the three months to October, 17 dairy farms were sold with an average sale price of $40,700/ha, or $35/kg MS. The median farm size was 108 hectares and production/ha was 1,175/kg MS.

Finishing property turnover has lifted notably since the start of 2016. Current turnover is now running nearly 50% above the 10-year average. Prices largely continue to trade in a narrow range of $24,000-$26,000/ha, as they have since mid-2014. In contrast, grazing property prices have weakened in recent months. Part of this is likely to be compositional in nature with a higher proportion of sales in Northland. But the earnings outlook for the meat and fibre sector has generally looked tougher, affecting sentiment and total turnover has reduced too. Both suggest there is some substance to the softening price trend.
‘US dollar strength’ is the main new theme that has emerged in currency markets in the wake of President-elect Donald Trump’s victory and the subsequent upbeat rhetoric around fiscal expansion, less regulation, lower taxes and infrastructure investment. In some ways this theme is an extension of the ‘transition from monetary easing to fiscal easing’ theme (fewer buyers of bonds and more issuers = higher rates), albeit with a super-charged emphasis on the US. Markets have placed the US at the ‘top’ of the monetary-fiscal transition ladder, and having taken Trump’s rhetoric at face value, are anticipating fiscal easing and monetary tightening. That’s lifted global interest rates.

New Zealand sits roughly in the middle, with no more monetary easing expected, but ample room for fiscal easing should it be needed (or desired going into an election year). By contrast, the ECB and BoJ have limited fiscal headroom, remain committed to ultra-easy monetary policy, and appear to be comfortable with the recent sharp depreciation in the EUR and JPY respectively (versus the USD).

In addition, New Zealand’s relatively strong growth credentials still need to be respected, and mean that the NZD is likely to hold up better than most currencies, but we do expect it to weaken gradually against the USD. While NZD/USD is likely to move through, and remain below 0.70 over coming quarters, the TWI is expected to hold up as EUR, JPY and Asian currencies weaken by more against the USD.

We expect short-end interest rates to hold steady over coming quarters as the RBNZ leaves the OCR on hold. Further OCR cuts are unlikely given the strength of the domestic economy, reduced deflation risks and improved prospects for inflation to return towards the RBNZ’s 2% target. But OCR hikes are equally unlikely in the foreseeable future, with growth on track to moderate somewhat over 2017 and financial conditions already on a tightening trajectory courtesy of already-observed rises in long-term interest rates.

Longer-term interest rates have responded to a different policy mix (less central bank buying of bonds and more government issuance) and risen. Recovering oil and other commodity prices has lessened deflation fears. The ‘Trump thump’ has exacerbated the move as expectations of reflation courtesy of fiscal pump-priming take hold. As US yields go higher, we expect New Zealand yields to also move gradually higher, steepening the yield curve.
ANZ Agri Focus / December 2016 / 19 of 37

ECONOMIC INDICATORS

Domestic and global inflation signals are turning up. A key reason has been lifts in commodity prices (notably oil) and expectations of reflation in the likes of the US economy. A more inward-focused economic agenda replacing a globalised one (which the anger vote is endorsing via election results) also means lower productivity and that will add to inflation.

Global commodity prices have been in a cyclical upswing since the start of 2016, but there are wide divergences between them. Much of the improvement has been driven by China through credit stimulus aimed at infrastructure projects and the closure of inefficient domestic supply in certain sectors. There is speculation the move could extend further in 2017 for certain hard commodities with the US set to spend up large on infrastructure too. But equally it has to be remembered this is likely to take some time to flow through to actual demand (i.e. a reaching of agreement within the Republican party, planning/resource consent of new infrastructure etc).

This is not a world though where inflation becomes rampant. Core inflation measures in many markets remain fairly steady with low productivity gains, low growth, technology shifts, high debt levels and excess spare capacity (i.e. in labour markets) still wide spread, all suggesting little risk of a sustained lift. The world has huge amounts of debt and economic issues to work through: that's deflationary.

Domestic generated inflation is set to rise as the RBNZ lets things run hot. Skilled labour shortages are bound to start generating more wage inflation in 2017. This will place upward pressure on cost structures in labour-intense sectors.

For the dairy sector one of the biggest challenges over the next 18 months will be maintaining the extra cost efficiencies that were put in place during the downturn. There will be some natural unwind from extreme lows, but there is a risk that if it is completely unwound profitability will remain elusive even with the lift in the milk price. There is a close relationship between the milk price and the costs of grazing, supplementary feed, cows, a range of services and fertiliser. Where this is the case farmers will need to think carefully about ways to lock these and other costs in that swing with the milk price.

For the September quarter net PPI margins expanded 8.5%. Dairy jumped 29% q/q due to a 28% increase for output prices. Movements for the other sectors were fairly tame. Meat and fibre saw a 2.9% q/q increase, forestry a -2.2% q/q fall and seafood a -3.2% q/q decline.
The cyclical upswing in global soft commodities has strengthened in recent months. Much of the improvement has been driven by supply corrections (due to weather and earlier low returns) helping to balance out market fundamentals. An increase in Chinese imports for certain products has also helped.

The biggest focal point going into 2017 might not be growing or demand conditions, but trade relationships between the two heavyweights of soft commodity markets: China and the US. There are a number of possible outcomes, from a tit-for-tat trade war and general trade recession, which would be negative for all commodity prices, through to improved opportunities and less competition for a range of NZ products into China and the broader Asian region. Any developments will be a must watch.

Current market indicators are pointing towards a $6.40–$6.50/kg MS milk price in 2016/17. This assumes recent GDT prices can hold through the remainder of the season. We have a slightly more conservative view of $6.25/kg MS based on some moderation in prices in the New Year period. The leap higher in international prices was driven by tightening global milk supply and continued demand from China. Indeed the last several months has seen one of the biggest supply contractions across the major exporters in the last 10 years. Buyers who had been anticipating higher seasonal volumes from NZ have had to react more aggressively to secure product with the seasonal peak in NZ milk supply failing spectacularly.

We believe supply conditions will start to improve in the New Year with higher global farm-gate prices, the onset of warmer conditions in NZ and European seasonality. The other challenge is that NZ-sourced product, especially SMP, is now less competitively priced compared with Europe and the US. This will make it more attractive for the likes of the US to export more product once again with milk supply growth currently accelerating (+2.7%). The European Commission has also announced it plans to start tendering some of its 420,000mt SMP stockpile in December (equivalent to nearly 90% of NZ’s annual exports). This is likely to temper sentiment even though it will trade at a discount to fresh product. On the buy side, demand has been steady, but a lot of support for GDT pricing has centred around China. China remains a swing buyer according to local supply conditions. Anecdotally, this demand is likely to moderate from now on with recent buying activity plugging a short-fall in local supply that had opened up. Local supply is now set to seasonally increase and the FTA window has closed for this year too. Elsewhere, concern remains over the health of demand from oil-dependent countries (despite recent agreement) and geopolitical ructions in the Middle East/North African region.

All up, tight supply dynamics remain price supportive both here and abroad. But we expect supply dynamics to improve in the New Year period. Combined with demand moderation from China (part seasonally driven), New Zealand powders being more expensive than those of other origins, the European Commission beginning to sell down some of its stockpile in December and USD/emerging market strength, these are together expected to take some heat out of prices sometime in the New Year.

### KEY COMMODITIES: OVERALL INDEX AND DAIRY

<table>
<thead>
<tr>
<th>Soft Commodity Price Indices</th>
<th>Current Month</th>
<th>3 Mth Trend</th>
<th>Last Year</th>
<th>Chg. M/3M</th>
<th>Chg. Y/Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANZ NZD Index</td>
<td>127</td>
<td>120</td>
<td>124</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>ANZ World Index</td>
<td>205</td>
<td>195</td>
<td>181</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>FAO World Food Index</td>
<td>187</td>
<td>181</td>
<td>172</td>
<td>↑</td>
<td>↑</td>
</tr>
</tbody>
</table>

Source: ANZ, FAO

### SOFT COMMODITY PRICE INDEXES

![Index Chart](chart.png)

Source: ANZ, FAO

### OCEANIA DAIRY PRICE INDICATORS

<table>
<thead>
<tr>
<th>Dairy Products</th>
<th>Current Month</th>
<th>3 Mth Trend</th>
<th>Last Year</th>
<th>Chg. M/3M</th>
<th>Chg. Y/Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk Price YTD ($ per MS)</td>
<td>5.55</td>
<td>5.10</td>
<td>4.00</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Milk Price Forecast ($ per MS)</td>
<td>5.75-6.00</td>
<td>4.90</td>
<td>4.60</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Whole Milk Powder</td>
<td>3,370</td>
<td>2,663</td>
<td>2,300</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Skim Milk Powder</td>
<td>2,446</td>
<td>2,154</td>
<td>1,935</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Butter</td>
<td>4,170</td>
<td>3,613</td>
<td>2,642</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Anhydrous Milk Fat</td>
<td>5,247</td>
<td>4,612</td>
<td>3,538</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Butter Milk Powder</td>
<td>2,436</td>
<td>2,164</td>
<td>1,835</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Cheese</td>
<td>3,515</td>
<td>3,287</td>
<td>2,931</td>
<td>↑</td>
<td>↑</td>
</tr>
</tbody>
</table>

Source: ANZ, GlobalDairyTrade

### DAIRY PRODUCTS – NZ EXPORT MARKET PRICES

![Prices Chart](chart.png)

Source: ANZ, GlobalDairyTrade

---

**Soft Commodity Price Indexes**

- **ANZ NZD Index**: 127 (↑↑)
- **ANZ World Index**: 205 (↑↑)
- **FAO World Food Index**: 187 (↑↑)

**ANZ NZD Index**

- **Current Month**: 127
- **3 Mth Trend**: 124
- **Last Year**: 124
- **Chg. M/3M**: ↑
- **Chg. Y/Y**: ↑

**ANZ World Index**

- **Current Month**: 205
- **3 Mth Trend**: 195
- **Last Year**: 181
- **Chg. M/3M**: ↑
- **Chg. Y/Y**: ↑

**FAO World Food Index**

- **Current Month**: 187
- **3 Mth Trend**: 181
- **Last Year**: 172
- **Chg. M/3M**: ↑
- **Chg. Y/Y**: ↑

---

**Oceania Dairy Price Indicators**

<table>
<thead>
<tr>
<th>Dairy Product</th>
<th>Current Month</th>
<th>3 Mth Trend</th>
<th>Last Year</th>
<th>Chg. M/3M</th>
<th>Chg. Y/Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk Price YTD ($ per MS)</td>
<td>5.55</td>
<td>5.10</td>
<td>4.00</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Milk Price Forecast ($ per MS)</td>
<td>5.75-6.00</td>
<td>4.90</td>
<td>4.60</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Whole Milk Powder</td>
<td>3,370</td>
<td>2,663</td>
<td>2,300</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Skim Milk Powder</td>
<td>2,446</td>
<td>2,154</td>
<td>1,935</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Butter</td>
<td>4,170</td>
<td>3,613</td>
<td>2,642</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Anhydrous Milk Fat</td>
<td>5,247</td>
<td>4,612</td>
<td>3,538</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Butter Milk Powder</td>
<td>2,436</td>
<td>2,164</td>
<td>1,835</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Cheese</td>
<td>3,515</td>
<td>3,287</td>
<td>2,931</td>
<td>↑</td>
<td>↑</td>
</tr>
</tbody>
</table>

Source: ANZ, GlobalDairyTrade

---

**Dairy Products – NZ Export Market Prices**

- **Milk Price YTD ($ per MS)**: 5.55 (↑↑)
- **Milk Price Forecast ($ per MS)**: 5.75-6.00 (↑↑)
- **Whole Milk Powder**: 3,370 (↑↑)
- **Skim Milk Powder**: 2,446 (↑↑)
- **Butter**: 4,170 (↑↑)
- **Anhydrous Milk Fat**: 5,247 (↑↑)
- **Butter Milk Powder**: 2,436 (↑↑)
- **Cheese**: 3,515 (↑↑)

Source: ANZ, GlobalDairyTrade

---

**Soft Commodity Price Indexes**

- **ANZ NZD Index**: 127 (↑↑)
- **ANZ World Index**: 205 (↑↑)
- **FAO World Food Index**: 187 (↑↑)

**ANZ NZD Index**

- **Current Month**: 127
- **3 Mth Trend**: 124
- **Last Year**: 124
- **Chg. M/3M**: ↑
- **Chg. Y/Y**: ↑

**ANZ World Index**

- **Current Month**: 205
- **3 Mth Trend**: 195
- **Last Year**: 181
- **Chg. M/3M**: ↑
- **Chg. Y/Y**: ↑

**FAO World Food Index**

- **Current Month**: 187
- **3 Mth Trend**: 181
- **Last Year**: 172
- **Chg. M/3M**: ↑
- **Chg. Y/Y**: ↑

---

**Oceania Dairy Price Indicators**

<table>
<thead>
<tr>
<th>Dairy Product</th>
<th>Current Month</th>
<th>3 Mth Trend</th>
<th>Last Year</th>
<th>Chg. M/3M</th>
<th>Chg. Y/Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk Price YTD ($ per MS)</td>
<td>5.55</td>
<td>5.10</td>
<td>4.00</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Milk Price Forecast ($ per MS)</td>
<td>5.75-6.00</td>
<td>4.90</td>
<td>4.60</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Whole Milk Powder</td>
<td>3,370</td>
<td>2,663</td>
<td>2,300</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Skim Milk Powder</td>
<td>2,446</td>
<td>2,154</td>
<td>1,935</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Butter</td>
<td>4,170</td>
<td>3,613</td>
<td>2,642</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Anhydrous Milk Fat</td>
<td>5,247</td>
<td>4,612</td>
<td>3,538</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Butter Milk Powder</td>
<td>2,436</td>
<td>2,164</td>
<td>1,835</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Cheese</td>
<td>3,515</td>
<td>3,287</td>
<td>2,931</td>
<td>↑</td>
<td>↑</td>
</tr>
</tbody>
</table>

Source: ANZ, GlobalDairyTrade

---

**Dairy Products – NZ Export Market Prices**

- **Milk Price YTD ($ per MS)**: 5.55 (↑↑)
- **Milk Price Forecast ($ per MS)**: 5.75-6.00 (↑↑)
- **Whole Milk Powder**: 3,370 (↑↑)
- **Skim Milk Powder**: 2,446 (↑↑)
- **Butter**: 4,170 (↑↑)
- **Anhydrous Milk Fat**: 5,247 (↑↑)
- **Butter Milk Powder**: 2,436 (↑↑)
- **Cheese**: 3,515 (↑↑)

Source: ANZ, GlobalDairyTrade
We continue to think NZ farm-gate beef prices will be similar, or even slightly better, than the last two years into mid-2017. This is despite the moderation in record US manufacturing beef prices due to improved domestic supplies.

Prime beef prices are set to outperform manufacturing beef. This is due to tight domestic supply lifting procurement pressure; lower Australian supply reducing competition in key Asian markets; and strong local foodservice demand for prime cuts (tourism and locally driven).

Manufacturing beef prices are set to benefit from similar trends too. Dairy cull cow throughput is set to moderate from the last two years; bull beef will likely lift a touch providing a slight offset. A capped NZD/USD will also help out. Indeed while US beef supply is lifting quickly, overall supply in 2017 is only set to go back to the levels seen in the 2009 to 2013 period. Looking at the US manufacturing beef price (left), it looks to have already adjusted for this. Combined with the US economy being in better shape it’s difficult to see a further material fall over the first half of 2017. The late 2010 to mid-2015 period was also characterised by a NZD/USD that generally sat above the mid-0.70s (and well above in some cases). So a capped NZD below this is a key reason current farm-gate schedule prices are set to sit 15-20% above this period.

Longer-term, while the US market remains important, there will be increased focus on Asia. This has already started to occur with a drop in US prices and less Australian supply. But equally, trade access and increased foreign ownership/joint ventures with Asian interests will support a more sustained change in market mix.

The base price for lamb schedules into mid-2017 looks to be in the high $4/kg range. Upside will be driven by procurement premiums, especially around the key speciality occasion windows of Chinese New Year and Easter. The North Island could see more procurement pressure compared with the South Island. This is due to an anticipated 7% drop in North Island lamb supply, compared with a 1.7% increase in the South Island.

While there seems to be much pessimism based around the outlook for UK exports, other indicators look more optimistic. These include: tighter supply from other exporters, especially Australia; lower frozen inventory levels heading into the seasonal peak; lifting demand and prices from China; and fairly steady demand elsewhere.

While the UK market is undoubtedly important, it has to be kept in context that it only directly accounts for 21% of total returns. While anecdotally UK retailers are not looking to discount NZ-sourced product to the same extent as usual during the Christmas period – potentially reducing sale volumes – even reasonably solid sales through this period combined with the other more positive market indicators could easily buoy market sentiment in the New Year period.
Strategies to diversify markets are lessening the impact of the weak euro on the farm-gate venison price. In particular there has been increased focus on increasing exports to the USA to capitalise on trends of increasing demand for natural and exotic premium meat offers, and to reduce reliance on the Euro zone. Venison exports to the Euro zone dropped from 70% of total in 2012 to 50% in 2016. The US market share has grown from 9% to 20% of total exports over same period.

The immediate prospects for venison prices appear positive. US demand for both table cuts for the restaurant trade, and trim and manufacturing items for ingredients in the burger trade and further processed food items continues to increase. Demand in the traditional European markets is strong with inventory levels lower than recent years too. Combined with NZ venison production remaining tight due to lower weaner numbers coming into 2016/17, and the retention of breeding stock to rebuild herds, farm-gate prices should remain firm. A lot of supply is also contracted at prices materially above spot rates too.

Velvet sales have some uncertainty hanging over them due to regulatory changes in China for the importation of ingredients used for traditional medicine and an audit of processing facilities by ofcials. While all sectors have faced similar challenges, these generally have been resolved in time. However, in the short-term the changes are creating market uncertainty, which will likely weigh on prices.

Wool prices have come under considerable pressure since the start of the 2016/17 season. The main reason has been a lack of interest from China, which accounted for 50% of exports in 2015/16. There have been numerous suggestions why Chinese demand has been weaker ranging from: lower-end product demand in Europe/UK, weaker RMB, changed sourcing patterns to cheaper product from UK and Mongolia, liquidation of local cotton stocks and general high prices last year leading to fibre substitution and changed local fashion trends. With little data to substantiate the exact drivers, it’s difficult to say with any certainty what factors are more important. Whatever the main driver, a 55% fall in year-to-date Chinese exports is telling. Some of the slack is being picked up by other export destinations, but prices could well be biased lower yet until China returns.

Fine crossbred wool has faced the brunt of the price downturn with Chinese fashion trends moving away from wool. Stronger crossbred wool has seen more steady demand from Europe, US and Australia. Buyer activity in the coming months is expected to be focussed on high quality wool in terms of colour, fineness and vegetable matter. Those that fail to meet quality specifications are likely to be heavily discounted. This is already being seen in the marketplace, with strong crossbread wool with high seed content reportedly trading at a $1.20/kg discount to the same type with low contaminants. Last year the premium was just $0.30/kg.

Source: ANZ, Agrifax

![VENISON INDICATOR PRICES](image1.png)

Source: ANZ, Agrifax

![CLEAN WOOL INDICATOR PRICES](image2.png)

Source: ANZ, Beef + Lamb NZ, Wool Services International

---

1 (60kg Stag AP grade), (50kg Hind AP grade)
Local grain prices have improved with a lift in demand from dairy farmers. Improved demand has been driven by the wet/cool conditions in the North Island leading to more supplement being fed to cows to make up for the low energy content of grass. The lift in the milk price has also helped. This has lowered inventory levels from the start of the 2016/17 season.

Indeed the AIMI survey showed that the volume of unsold grain stored on-farm as at 10 October was down 15% against last year. The reduction was driven by more feed barley being sold. There was 38,024t of unsold feed barley remaining at 10 October, 37% less than the same time last year, and a 44% reduction from 1 July 2016. There is 13% more feed wheat remaining on farm than there was at the same time last year. Stock levels are expected to have reduced further since October, as there has been some reasonable demand for grain since then, particularly for barley.

With the late establishment of crops in the North Island, lower inventory levels and earthquake disruptions to the North-South logistics flow (higher transport costs), there is potential for a short-term squeeze in feed grain prices until this year’s harvests hit the soils/feed pits. To what extent this might occur will depend on how summer conditions evolve.

That said low international feed grain prices continue to hang over local prices, meaning any short-term price squeeze will be short-lived. In this regard the size of the US corn crop has been revised up and is expected to be a record. This is primarily due to a record yield of 175.3 bushels per acre. Total supply available in the US, which includes stocks carried over from the previous season plus this year’s harvest, is calculated to be 17 billion bushels, 1.6 billion bushels (+10%) larger than last year.

Market attention will now turn to what extent demand can absorb this extra supply. Ethanol production is expected to absorb an additional 94 million bushels, mostly as more ethanol is exported and also due to incremental increase in domestic gasoline demand. This leaves feed demand and exports to absorb much of the rest. A strong USD and high inventory levels in China are two key headwinds for exports. As for feed demand this is estimated to increase by 520 million bushels (+10%) with the expansion in livestock and poultry numbers.

The PKE market appears to have been trading a $210 to $240/t range in recent months. More recently prices have moved up with the lift in local demand, as lower Indonesian rupiah and Malaysian ringgit, and seasonality as monsoon season approaches. Prices appear biased higher yet, but the extent will depend on how summer conditions evolve.
Anecdotally a number of kiwifruit growers have observed lower bud break, particularly for the conventional green variety. Official figures of this year’s bud numbers are forthcoming, but the industry is preparing for a considerable reduction in average yield for green orchards. Bud break for the gold variety appears less variable and with more gold canopies reaching full maturity, production is on track for another lift in 2017. Although reduced yield potential is in the pipeline for green orchards, this follows two years of record high yields which ultimately meant that crop management was needed to maintain price premiums, and importantly, a sub-optimal dry matter profile resulting in consumer markets reporting less than ideal taste. The attention of growers and grower services now turns to achieving high dry matter to maximise returns through effective orchard management practice. This also aligns with the Hayward Taste Review changes set to take effect for 2017.

A substantially smaller green kiwifruit crop in 2017 and other changes to improve the taste profile raises price prospects back into the mid-$5 to $6/tray range next season. For Gold, higher volumes will further test the strength of developing markets and the industry’s target to keep pricing above $8/tray. We take being able to maintain pricing at $8.27/tray for the 2016 crop with the substantial step-up in supply as a good indicator.

The Marlborough viticulture sector has seen some wine loss and infrastructure damage from the latest series of earthquakes. The wine spillage is expected to be below 2% of the total 2016 crop and proactive management is expected to see infrastructure issues (i.e. storage tanks) addressed before the 2017 vintage arrives for processing. Let’s just hope there isn’t another one at the wrong time of season. Unscientific estimates of the 2017 vintage range from average to slightly below as flowering is awaited to get a better idea.

Market wise there has been a strong start to 2016/17 season with the volume of export sales up 15% y/y. The North American market continues to perform strongly with prices and volumes both continuing to grow. Interestingly there has been a surge in UK exports, but average prices are back 20% due to a higher proportion of bulk wine exports and NZD/GBP strength. Australian volumes are up 4% too, but overall export revenue is 6% lower due to a 10% fall in average prices. All up the four major export markets have seen volumes increase 13%, but average prices have only fallen 4%.

A very large export pipfruit crop of 360,000 tonnes is expected in 2017, but early indications are prices should remain fairly solid.
Despite differences between members, OPEC finally reached an agreement to cut production and alleviate the glut of crude oil on the global market. The agreement goes beyond the expectations of the market, with specific cuts by individual producers. Non-OPEC member Russia also agreed to reduce output. This will help soothe concerns that non-members would just fill the void left by OPEC.

The oil group will reduce output by 1.2mb/d to 32.5mb/d, starting in January 2017. Importantly, Iran is allowed to increase production to 3.9mb/d, while Saudi Arabia and Iraq do the heavy lifting with regards to cuts. Non-OPEC members Russia, Oman and Mexico have also indicated they will reduce production by 600kb/d. The cuts will go a long way toward accelerating the drawdown in global inventories of oil in 2017. We estimate the market will move into a deficit in Q1 2017 and could stay this way for the entire year. Demand is also set to play a part with global PMIs rebounding and refinery margins having improved in recent months.

The market will be watching closely the adherence to the agreement. OPEC has set up a formal committee to monitor each member’s observance to new production quotas. But the fact that they have stipulated specific cuts and what production levels they are based off gives more confidence there will be follow through.

In the short term, we expect prices to break new highs for the year (~USD53/bbl). However, how the US shale oil industry reacts will dictate whether prices can be sustained above USD60/bbl in 2017. But even if US output starts increasing and prices come under renewed downward pressure, under the OPEC agreement the new quota can be extended another six months to mop up current excesses.

Farm-gate fertiliser prices remain well below the same time last year. This is primarily driven by lower international prices. However, urea prices have lifted recently. Seasonal purchasing activity has picked up in South America and Europe, while supply has contracted as Chinese exporters withdraw from the market. If sustained, there could be an increase in farm-gate urea prices. For phosphate nutrients there has been little change. Some plants continue to run at reduced capacity to keep market fundamentals in balance with sluggish demand from key importers.
The NZ forestry sector is experiencing one of its best stretches in at least 20 years. Both key international and domestic forestry price benchmarks continue to trend up. Pricing trends are expected to remain positive into Q1 2017 before stabilising.

Chinese demand remains firm. Low port-level inventories indicate that any downward movement in CFR pricing through into Q1 2017 is unlikely. Actual port inventory figures reported have varied. However, quoted figures have trended down with a 2.1-2.3 million tonnes range commonly quoted for port stocks, at an offtake of around 55,000 tonne per day.

Longer-term demand is looking more robust with an increasing number of bans on harvesting native hardwood forests. A lot of the hardwood logs coming out of the Solomon Islands are not sustainable, which will make it increasingly difficult for China and India to get hold of, particularly as governments clamp down on illegal harvesting. In addition, China’s latest five-year plan includes a logging quota for 2016-2020 that is 6.3% lower than China’s already-reduced domestic timber harvesting quota. It also provides for the expansion of an existing ban on all commercial logging in certain states in the northeast region, broadening it to include virtually all of China’s last remaining natural forests by 2017. While radiata pine doesn’t directly substitute for hardwood species that are used in flooring, furniture and plywood, some substitution is expected. Such policy changes are seeing renewed Chinese interest in the cutting rights of smaller NZ woodlots coming due to be harvested.

Domestically, the booming construction sector is continuing to see strong demand for structural logs and lumber. This is expected to continue to be the case into 2017 with the number of new dwelling consented at the highest level since early 2004 in trend terms. Beyond this we are mindful that capacity constraints and associated cost increases will limit the construction sector’s ability to grow strongly from here, capping domestic demand.

Roundwood is still finding firm demand, and the outlook is for more of the same. This is driven by continued horticulture expansion and the need to fence waterways on meat & fibre farms.

The US housing market continues to lift and could get a further boost from the change in government. This should lift lumber exports too.
SUMMARY
Indicative rural lending rates are generally higher, with rises in long-end rates exceeding falls in short-term rates. While the steeper borrowing curve does make it more expensive to fix for longer, the relative differences between short and long-term rates are not large by historic comparison, and outright interest rates remain low. We noted in our last edition that we saw merit in extending fixed to include longer terms. Recent moves have validated this sentiment. With the OCR now likely at its low for the cycle, and global (and by implication – New Zealand) long-term interest rates biased higher yet, we continue to see merit in terming out interest rate fixes.

OUR VIEW
Indicative rural rates have moved a touch lower at the short end, but this has been offset by larger moves at the long end. As a consequence, the erstwhile familiar ‘tick-shape’ has disappeared, giving way to a steeper yield curve (figure 1).

Having observed recent changes, two questions are now pertinent. First – is there scope for short-end interest rates to move lower still? And if not, is there scope for long-end rates to continue grinding higher? We say this because if the answer to both questions is “yes”, then that implies a more neutral outlook (at least the short end will provide some relief if that was the case). Similarly, if the answer to both questions is “no”, then that also suggests there is no urgency to act (at least long-end rates will provide relief if this was the case). Unfortunately, our sense is that the answer to the first question – will short-end rates go lower – is “no”, and the answer to the second – will long-end rates go higher – is “probably”. At face value, that combination means there’s “nowhere to hide” and that time is of the essence. Here’s why:

For the short end, it’s all about the RBNZ. It has signalled that it is done easing, and we now expect the next move to be a hike, albeit way off in 2018. Given the removal of deflation risks, improving commodity prices, local capacity constraints and stellar local growth, further OCR cuts look like a pipe dream (black swans notwithstanding).

For the long end (here and abroad), it’s all about US interest rates, which have surged since President-elect Donald Trump’s victory. We think the bulk of the ‘shock’ rise is behind us, but even so, we expect global rates to be on a gradually upward trajectory as markets focus on the exhaustion of super-easy monetary policy and the transition to pro-growth fiscal policy. Put simply, that’s central banks buying fewer bonds and governments issuing more.

This combination of a basing in short-end rates and scope for higher long-end rates leaves us comfortable maintaining our preference for terming out interest rate hedges. It has become more expensive to, say, move from 2 years to 5 years (when we published our last edition it was cheaper to do so), but even so we see merit in doing this. Although, for example, 5 year rates are around 0.8%pts above their Q3 lows, they are well below where they were at the beginning of the year, and lower than they have been at any point prior to 2016. Similarly, the gap between 2 years and 5 years is positive, but low by historic standards. We therefore continue to favour terming out hedges, and spreading out fixes across 2-5 year terms in a bid to balance out cost and certainty.

Our breakeven table (below) demonstrates just how small a rise in rates needs to be for one to regret not selecting a longer term. Consider for example, the choice between fixing for 2 years at 5.27%; and fixing for 4 years at 5.67%. Over a 4-year horizon, the 2 year rate ‘only’ needs to rise by 0.79%pts over the next 2 years before the 2yr+2yr strategy will end up being more expensive overall. That’s not much of a rise (2 year rates are up ~0.3%pts over the past 3 months alone). We also note that the weighted average cost of bank funding continues to rise, and this will likely have a knock-on impact on retail and rural lending rates.

<table>
<thead>
<tr>
<th>Rural Lending Rates (incl. typical margin)</th>
<th>Breakeven rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term</td>
<td>Current in 6mths</td>
</tr>
<tr>
<td>Floating</td>
<td>5.04%</td>
</tr>
<tr>
<td>6 months</td>
<td>5.11%</td>
</tr>
<tr>
<td>1 year</td>
<td>5.11%</td>
</tr>
<tr>
<td>2 years</td>
<td>5.27%</td>
</tr>
<tr>
<td>3 years</td>
<td>5.47%</td>
</tr>
<tr>
<td>4 years</td>
<td>5.67%</td>
</tr>
<tr>
<td>5 years</td>
<td>5.84%</td>
</tr>
</tbody>
</table>
SUMMARY
Strong economic momentum is being maintained into year-end. We are projecting growth to ease from a 3½-4% pace to 3% over 2017; that’s a deceleration, not a downturn. Firms are finding it more difficult to find skilled labour and credit excesses (leverage build-up) need to be tamed if a boom/bust cycle is to be averted. A by-product of slower credit growth will be more moderate housing activity. New Zealand looks on track to continue performing well amidst a wobbly global scene and international political fracas. The RBNZ is on hold and the NZD looks set to remain elevated. Earthquake challenges look manageable though will put additional pressure on resources.

OUR VIEW
The economy continues to perform well. Strong momentum is being maintained into year-end. The nucleus of this robust economic story centres on the obvious (migration, housing, construction, tourism) but across-the-board strength across an array of sectors is also apparent. While the latest central New Zealand earthquakes certainly present challenges, we believe the economic growth implications will be modest.

We are projecting a moderation in GDP growth over 2017 with growth set to ease from a 3½-4% pace to 3%. Key signals from our suite of timely proprietary leading indicators remain positive. Our confidence composite gauge is pointing to good momentum being maintained. Job ads have now risen in every month since September 2015. The unemployment rate is falling and income growth is running in excess of 5%. Financial conditions have tightened somewhat of late (the likes of tighter credit criteria are having an impact) and need to be watched, but for now continues to flag respectable momentum.

Prospects for the dairy sector have improved. This removes a major source of downside risk and challenge. The meat sector is middling and other major primary sectors are in a growth period supporting new investment, export earnings growth and asset prices.

We continue to be perplexed over the global scene. Emerging-market Asia has high leverage. Europe faces structural challenges. Market distortions are aplenty. Low interest rates are creating imbalances. The social contract between mainstream politics and the electorate is broken; it’s hard to put a positive spin on the US election result. It seems unlikely to drive good policy decisions.

The RBNZ is expected to keep the OCR unchanged at 1.75% and the NZD looks set to remain elevated.

Two moderating influences over the coming year will be:

- **Capacity bottlenecks.** Firms are finding it more difficult to find skilled staff. This is particularly acute in sectors such as construction. Using the migration lever to fill the gaps faces political sensitivities.

![FIGURE 2. INDICATORS OF RESOURCE AND CAPACITY PRESSURES](image)

Source: ANZ, NZIER

- **The need for credit growth to slow and the credit rationing that is already taking place.** This is required to ensure imbalances across the economy (offshore funding dependence, rising leverage, inflation and a potential blowout in the current account deficit) do not foster an economic correction down the track. Housing excesses need to be monitored; another year of strong credit growth would be troubling. A side effect of slower credit growth will be less economic growth (and housing supply) but this will help reduced unnecessarily large swings in the business cycle. It’s about ironing out peaks and troughs and a steadier (and less volatile) pace of growth.

![FIGURE 1: CONFIDENCE COMPOSITE VERSUS GDP](image)

Source: ANZ, Roy Morgan, Statistics NZ
SUMMARY
Move over dairying – tourism is now New Zealand’s largest export earner at $14.5 billion in the year to March 2016. The boom in international tourists to New Zealand presents both challenges and opportunities to the farming sector.

Challenges include a lower correlation between commodities and the NZD as tourism becomes an even larger proportion of domestic economic activity; heightened competition for labour resources; biosecurity risks; and environmental tensions. As sectors become larger (and tourism is getting very large), they also become more significant in shaping policy.

We prefer to see the influx of international tourists as an opportunity for the farming and broader food and beverage sector. The two sectors complement one another. An already-large share of 27% of total international visitors in 2016 visited a farm or orchard when holidaying here and 20% visited a vineyard or wine-trail. In the same period, 65% of Chinese visitors stated they visited a farm or orchard. That’s significant because much of the projected growth in tourism is expected to come from China. So crossover is already occurring, but there seems to be a larger opportunity to build on this momentum.

There are multiple angles of opportunity, ranging from the direct selling of products to tourists through to providing unique authentic farming experiences, accommodation, education on where food comes from, creating new business relationships and even tourists providing short-term labour resources (subject to visa requirements). In many ways, a positive tourist experience in New Zealand represents a free source of marketing for the food and beverage sectors. Visitors leave and, all going well, then seek out New Zealand food and beverage products in their own home markets.

This means the tourism opportunity is much broader than generating additional income for the food and beverage sector alone. It’s also about building on the intangibles and reputation of New Zealand’s food and beverage products. This is important to create lasting impressions and to build brand equity to drive repeat purchases long after tourists return home. Even if only a small proportion of the estimated 4.5 million tourists expected to visit each year by 2022 are enticed into an agri-tourism experience it doesn’t take many years to build up a loyal base of customers, especially when it’s estimated New Zealand can only feed some 50-60 million people each year.

THE BIG PICTURE
International tourism is a key industry. In the year to March 2016, international tourist expenditure totalled $14.5 billion, representing 21% of total goods and services exports. It has once again passed dairying as the country’s top foreign exchange earner after recording phenomenal growth over the past two years (up 40% since 2014).

In terms of sheer numbers, Australia remains the largest source of visitors, although the composition is changing. Australia currently accounts for 41% of total visitor arrivals, but its share has fallen from over 45% in 2012. China is second, at 12%, with its share having grown significantly from less than 5% just 10 years ago. The US, UK and Europe are also key source markets.

But in terms of total spending, the picture becomes more interesting. Australia’s share of total visitor spending drops to 25%, as visitors typically stay more briefly and spend less than those from other countries/regions. On the other hand, Chinese tourist spending represents 17% of the total and spending has more than doubled in the past two years. On average, an Australian tourist spends around $2,000 per person (excluding airfares), which is well below the averages of Chinese ($4,750), US ($4,550) and UK ($4,900) tourists.

The level of the NZD certainly plays a role in determining how much visitors spend, but the shift to ‘higher-value’ tourists has contributed to the average spend per visitor overall lifting to $3,400, which is up 26% over the past two years. It is both the sheer number of arrivals as well as this higher spend per visitor that has contributed to the strong growth in total international visitor expenditure.

FIGURE 1. VISITOR ARRIVALS BY SOURCE COUNTRY

Source: ANZ, Statistics NZ
Visitors are also getting older, which is consistent with the higher average spend. The average age of visitors is now close to 41 years, up from around 38 years in the early 1990s. While in part this reflects the compositional shift in arrivals toward more Chinese visitors (who are slightly older on average), the average age of Australia and UK visitors has been trending higher too. The big exception is the US, where visitors have been getting younger on average, although at 44 years, they are still older than the average.

What do they spend their money on? In the year to December 2015, spending on retail sales (excluding food and fuel) made up the largest share of international visitor spending, at 23%. Food and beverage serving services also received a large share, at 20%, while accommodation made up a relatively small share at 5%. Interestingly, as a share of total spending, food and beverage-serving services has been falling over the past seven years. This is likely to reflect that Chinese tourists (which have of course become a larger share of overall visitors) spend far less in this area compared with visitors from other countries. In 2015, Chinese visitors spent only 11% of their total spend on food and beverage serving services, instead spending a relatively higher share on non-food and fuel retail goods (35%) and accommodation (22%).

From a regional perspective, there are few surprises in where visitors spend their money. In the year ended December 2015, 39% of total visitor spending was in Auckland, with Otago second at 19% (the Central Otago factor). The Auckland share has been relatively stable over the past seven years, while Otago’s has grown, largely at the expense of Canterbury.

FIGURE 2. CONTRIBUTIONS TO TOTAL VISITOR SPEND GROWTH

Source: ANZ, Statistics NZ

FIGURE 3. VISITOR SPENDING BY PRODUCT AND COUNTRY (EX AIRFARES)

Source: ANZ, Statistics NZ

FIGURE 4. SPENDING ON FOOD AND BEVERAGE SERVING SERVICES

Source: ANZ, Statistics NZ

FIGURE 5. REGIONAL INTERNATIONAL VISITOR SPENDING

Source: ANZ, Statistics NZ
The tourism sector is a large employer. In the year to March 2016, over 188,000 people were directly employed in the tourism sector, or 7.5% of total employment. A further 144,000 were indirectly employed, taking total tourism sector employment to 13.2%. The food and beverage sector, according to the Ministry of Business Innovation and Employment (MBIE), employs nearly one in five New Zealand workers.

With regards to key tourism sector infrastructure, utilisation rates and capacity pressures are increasing. In September 2016, there were over 3,060 commercial accommodation establishments across the country. This has been trending a little lower over the past few years, having peaked at close to 3,400 in 2010. Excluding holiday parks, there are 2,660 establishments, and this has been trending lower too. Capacity, based on stay unit nights, is currently 0.7% lower than the same period last year (again excluding holiday parks). This has meant that occupancy rates have been rising,
with the seasonally adjusted rate sitting at over 58% in September, the highest on record. Rising occupancy has been a nationwide phenomenon, but is particularly pronounced in Auckland and Otago. Over the past 12 months, occupancy has averaged 73% and 67% respectively (both records), although during peak periods it can get as high as 82% and 81% respectively.

**FIGURE 10. REGIONAL OCCUPANCY RATES**

Source: ANZ, Statistics NZ

**WHAT COULD THE FUTURE LOOK LIKE?**

The outlook for the tourism sector looks bright. MBIE forecasts international visitor arrivals to grow at a decent 5.4% per year, reaching 4.5 million in 2022 (from 3.4 million now). This actually assumes that the pace of arrivals, which has been running at close to a 10% annual pace over the past two years, moderates going forward. But the near-term outlook looks especially strong (putting aside possible temporary disruptions caused by the latest central New Zealand earthquakes) as new airline routes and airline capacity should be strongly supportive of increased arrivals numbers. In fact, we estimate that the different number of international airlines flying to these shores will top 29 next year, which is up from 19 in 2014. There has been particularly strong growth in new Asian and North American carriers. History has shown that it is new airline supply that is the biggest driver of arrivals growth, given New Zealand’s position in the Southern Ocean.

Most importantly, total visitor spending is also forecast to increase strongly. MBIE estimate that total international visitor spend (excluding airfares) could top $16 billion in 2022 – a 66% increase from 2015’s level. While increased visitor numbers are a big part of that, it is also assumed that visitors spend more per person on average, which will be influenced by the likes of the NZD, income levels, inflationary considerations, and also the composition of visitor arrivals. Interestingly, China is forecast to become New Zealand’s most important market (by tourist spend) within the next two years, with total spend reaching $5.3 billion by 2022 – easily surpassing Australia.

Tourism is a luxury good so its elasticity with respect to incomes is more than 1 (i.e. you spend more than a dollar of additional income earned on tourism activities). Considering a big chunk of Asia is growing around 5%, the mathematics look pretty good!

**FIGURE 11. INTERNATIONAL AIRLINES FLYING TO NEW ZEALAND (EX CARGO)**

Source: ANZ, Ministry of Transport

**FIGURE 12. MBIE TOTAL VISITOR SPEND FORECASTS**

Source: ANZ, MBIE

**CHALLENGES AND OPPORTUNITIES FOR THE FARMING SECTOR AND BROADER FOOD/BEVERAGE INDUSTRY**

There are many angles to view how the farming sector and broader food/beverage industry can leverage off the positive outlook for tourism.

From a direct point of view, the food and beverage sectors domestically will obviously benefit from an increase in visitor spending.
If the current shares of spending are assumed to remain unchanged, tourists are forecast to be spending over $4 billion on food and beverage services and retail products by 2022.

The trouble is, these spending shares are unlikely to remain constant, especially if China’s slice of the overall tourist spending pie grows as expected. Rather than holding overall spending shares constant, if country-based spending shares are assumed to remain unchanged, international tourist spending on food and beverage services and retail products could be $300 million (7.5%) lower than under the status quo case above. This is because China’s visitors currently spend less on these items than visitors from other regions.

This therefore presents both a challenge and an opportunity for the food and beverage sector. If nothing is done, the food and beverage sectors will certainly still benefit from the direct increase in tourist spending, but it will get a smaller slice of the pie. The opportunity is about effectively extracting its share of the extra spend. Effective strategies should be implemented to either lift this area of spending by Chinese visitors, or look at alternative ways of leveraging or piggy-backing off the expected growth in Chinese visitor spend for the food and beverage sector. Of course, a focus on China should not come at the expense of visitors from other countries, but many of the thoughts below can be viewed as broadly appropriate for all tourists.

Other thoughts on the possible opportunities from more agri-tourism include:

- **Look at developing specialised stores or unique shopping experiences related to the New Zealand food & beverage sector.** Visitors already spend the greatest share of their budgets on non-food and fuel related retail goods. This is especially the case for Chinese visitors. Is the food and beverage sector effectively tapping into this? Examples could include more specialty stores in high-volume tourism thoroughfares and areas that stock only uniquely New Zealand food and beverage products. This can include a range of products, or focus on specific categories such as dairy, meat, honey, seafood etc. Equally there would seem to be greater opportunities to give tourists a controlled experience of the entire production process (growing, harvesting, processing etc) of specific foods and beverages that is then followed up with a shopping, dining, or other event experience. There are certainly some examples of this occurring, but with lifting tourism spending there feels like scope for more.

- **Tourists are often attracted to authentic local specialities on menus and when attending events.** So there is a need to showcase and market New Zealand’s unique seafood, lamb and other dishes that have been the hallmarks of the country’s cuisine for many generations. There can also be regional or cultural overlays, such as kiwifruit products in Te Puke, or Hawke’s Bay lamb cooked in a hangi. But it isn’t just about the one-off sale. These products then need to be available to purchase as a gift to take home, or delivered direct when a tourist arrives home (to ensure freshness and avoid the need to carry products when travelling that are often perishable). This drives repeat purchasing.

- **The way products are marketed and sold is changing.** Consumers are increasingly being reached through the internet, mobile apps and social media, so an online presence is a necessity. The ability of tourists to repeat purchase local specialities and other products once back in their home country is important when they want to relive their holiday experience. The changing nature of sale channels through the internet, mobile apps and social media is allowing this to occur more easily (both in time and cost) than has historically been the case.

A great example is tourists who visit a winery (which many do) and do a wine tasting. These customers can then be signed up to the wineries’ online sale platforms to receive a case of product each year, as well as special offers. A step further would be wineries who offer a dining experience, with tourists being able to sign up to receive all the products available on the menu on a regular basis, including cooking instructions/demonstrations too. New Zealand is estimated to be able to feed only 50-60 million people per annum. So if even only a small proportion of the estimated 4.5 million tourists visiting our shores each year sign up to a direct sale channel it doesn’t take long to create a significant new channel to market that can deliver higher margins back to producers and processors. This helps reduce the margin loss that often occurs in agri supply chains.

- **Develop entirely new products with the international tourist specifically in mind.** This could take a range of avenues, but should be targeted at the natural growth areas of Asia and North America. The two groups have quite different tastes, food preferences and cultural drivers.

- **Look at joint ventures with some top accommodation providers that give options of farm stays or eco-type accommodation.** This potentially helps alleviate emerging capacity constraints at key times of the year and tourist hot spots.
• Encourage or incentivise tour operators to include agri tourism experiences within their packages, perhaps marketed as the ‘all NZ’ experience. This could include visits to farms, orchards, vineyards, tasting rooms etc. Dedicated farms could perhaps be ‘developed’ for this purpose. Encouragingly, the number of Chinese tourists visiting farms or orchards is already high. However, their penetration for food and wine events and vineyards is below average. It’s the reverse for US and UK visitors.

• Combining agri-tourism and adventure activities. They have a natural fit and New Zealand is already well known as an adventure playground. So there would seem to be increased opportunities for the agri side to tap into those attracted by adventure activities by offering bush treks, visiting of caves, horse riding, bike riding, hunting opportunities and other such activities. This, alongside offering other services such as accommodation, allows new sources of income to be generated in certain situations.

• Creating lasting authentic experiences that drive future product loyalty. Cultural experiences, such as experiencing the great outdoors, New Zealand’s natural scenery and Māori traditions etc need to be combined into all products and services being offered to international visitors. This can help drive brand loyalty and repeat purchases of New Zealand food and beverage products once they return home.

• Look at ways to encourage visitors to broaden their travel beyond the traditional tourist hot-spots (i.e. Auckland and Queenstown). Some of the smaller regions may be better placed to highlight New Zealand’s unique primary produce, although this could require additional infrastructure and strategic planning. But it could have the added benefit of taking pressures off the traditional destinations during peak periods that are already struggling with capacity.

• Offering opportunities for extended stays (subject to visa requirements) to help with day-to-day tasks on orchard or farms. This could be particularly useful in providing some labour to help with seasonal requirements, completing certain projects (i.e. planting a wetlands), or on smaller/lifestyle type operations.

All up there seems to be a wide range of possibilities for agri-tourism and the food/beverage sector to leverage off increased international visitor spending.

Supply constraints look as though they will present the biggest challenge to the positive tourism outlook. MBIE emphasise that its forecasts are an estimate of ‘unconstrained future demand’ and don’t take into account supply issues and capacity. Therefore it will be critical for the industry to continue to invest in accommodation capacity (which has been falling modestly of late) and other key infrastructure to ensure that these demand forecasts do not just become ‘pie in the sky’ type thinking. The recent damage to some key roading infrastructure in the upper South Island highlights the challenges and risks for the sector. Additional accommodation capacity is being built. MBIE estimate that large hotel developments, either under construction or in the planning stages, will add approx 2,670 beds over the next few years, with Auckland and Queenstown seeing the lion’s share of this growth. But it is not just about ‘more beds’, it’s about the right type of accommodation that leverages off New Zealand’s attributes and our unique food and beverage products.

Other challenges include the likes of increased pressure on biosecurity. Obviously a growing number of visitors heightens the risk of associated diseases and pests entering the country. That’s just a natural outcome from an increase in foot traffic. However, there is a chicken-and-egg element to this, as the infiltration of any diseases could put New Zealand’s ‘clean and green’ image at risk and damage the attractiveness of New Zealand as a tourist destination. It emphasises the need for biosecurity infrastructure, capacity and technology to keep pace with the forecast growth in visitor arrivals. There will be some that question New Zealand’s farming practices too. But we believe this should be seen as an opportunity to improve outsiders’ understanding of food and where it comes from, rather than as a threat.

EDUCATION CORNER: TOURISM AND ITS CONNECTION TO NEW ZEALAND’S COUNTRYSIDE
## FX Rates

<table>
<thead>
<tr>
<th></th>
<th>Actual</th>
<th></th>
<th></th>
<th>Forecast (End Month)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oct-16</td>
<td>Nov-16</td>
<td>8-Dec</td>
<td>Dec-16</td>
</tr>
<tr>
<td>NZD/USD</td>
<td>0.715</td>
<td>0.714</td>
<td>0.716</td>
<td>0.71</td>
</tr>
<tr>
<td>NZD/AUD</td>
<td>0.941</td>
<td>0.957</td>
<td>0.958</td>
<td>0.93</td>
</tr>
<tr>
<td>NZD/EUR</td>
<td>0.653</td>
<td>0.671</td>
<td>0.665</td>
<td>0.66</td>
</tr>
<tr>
<td>NZD/JPY</td>
<td>75.07</td>
<td>80.72</td>
<td>81.49</td>
<td>78.1</td>
</tr>
<tr>
<td>NZD/GBP</td>
<td>0.588</td>
<td>0.574</td>
<td>0.567</td>
<td>0.58</td>
</tr>
<tr>
<td>NZ TWI</td>
<td>75.6</td>
<td>77.1</td>
<td>78.6</td>
<td>76.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Dec-16</th>
<th>Mar-17</th>
<th>Jun-17</th>
<th>Sep-17</th>
<th>Dec-17</th>
<th>Mar-18</th>
<th>Jun-18</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZD/USD</td>
<td>0.67</td>
<td>0.65</td>
<td>0.64</td>
<td>0.64</td>
<td>0.64</td>
<td>0.65</td>
<td></td>
</tr>
<tr>
<td>NZD/AUD</td>
<td>0.93</td>
<td>0.93</td>
<td>0.93</td>
<td>0.94</td>
<td>0.97</td>
<td>0.98</td>
<td></td>
</tr>
<tr>
<td>NZD/EUR</td>
<td>0.64</td>
<td>0.63</td>
<td>0.62</td>
<td>0.61</td>
<td>0.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NZD/JPY</td>
<td>77.1</td>
<td>74.8</td>
<td>73.6</td>
<td>73.6</td>
<td>74.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NZD/GBP</td>
<td>0.56</td>
<td>0.55</td>
<td>0.52</td>
<td>0.51</td>
<td>0.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NZ TWI</td>
<td>73.7</td>
<td>72.2</td>
<td>71.4</td>
<td>71.4</td>
<td>72.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Oct-16</th>
<th>Nov-16</th>
<th>8-Dec</th>
<th>Dec-16</th>
<th>Mar-17</th>
<th>Jun-17</th>
<th>Sep-17</th>
<th>Dec-17</th>
<th>Mar-18</th>
<th>Jun-18</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZ OCR</td>
<td>2.00</td>
<td>1.75</td>
<td>1.75</td>
<td>1.75</td>
<td>1.75</td>
<td>1.75</td>
<td>1.75</td>
<td>1.75</td>
<td>1.75</td>
<td>2.00</td>
</tr>
<tr>
<td>NZ 90 day bill</td>
<td>2.14</td>
<td>2.04</td>
<td>2.04</td>
<td>2.10</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.20</td>
<td>2.30</td>
</tr>
<tr>
<td>NZ 10-yr bond</td>
<td>2.71</td>
<td>3.13</td>
<td>3.17</td>
<td>3.40</td>
<td>3.60</td>
<td>3.70</td>
<td>3.80</td>
<td>3.90</td>
<td>4.00</td>
<td>4.10</td>
</tr>
<tr>
<td>US Fed Funds</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>0.75</td>
<td>0.75</td>
<td>1.00</td>
<td>1.00</td>
<td>1.25</td>
<td>1.25</td>
<td>1.50</td>
</tr>
<tr>
<td>US 3-mth</td>
<td>0.88</td>
<td>0.93</td>
<td>0.95</td>
<td>1.05</td>
<td>1.13</td>
<td>1.20</td>
<td>1.33</td>
<td>1.45</td>
<td>1.60</td>
<td>1.75</td>
</tr>
<tr>
<td>AU Cash Rate</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>AU 3-mth</td>
<td>1.75</td>
<td>1.77</td>
<td>1.77</td>
<td>1.70</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
</tr>
</tbody>
</table>

## Interest Rates

<table>
<thead>
<tr>
<th></th>
<th>Actual</th>
<th></th>
<th></th>
<th>Forecast (End Month)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oct-16</td>
<td>Nov-16</td>
<td>8-Dec</td>
<td>Dec-16</td>
</tr>
<tr>
<td>NZ OCR</td>
<td>2.00</td>
<td>1.75</td>
<td>1.75</td>
<td>1.75</td>
</tr>
<tr>
<td>NZ 90 day bill</td>
<td>2.14</td>
<td>2.04</td>
<td>2.04</td>
<td>2.10</td>
</tr>
<tr>
<td>NZ 10-yr bond</td>
<td>2.71</td>
<td>3.13</td>
<td>3.17</td>
<td>3.40</td>
</tr>
<tr>
<td>US Fed Funds</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>0.75</td>
</tr>
<tr>
<td>US 3-mth</td>
<td>0.88</td>
<td>0.93</td>
<td>0.95</td>
<td>1.05</td>
</tr>
<tr>
<td>AU Cash Rate</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>AU 3-mth</td>
<td>1.75</td>
<td>1.77</td>
<td>1.77</td>
<td>1.70</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Dec-16</th>
<th>Mar-17</th>
<th>Jun-17</th>
<th>Sep-17</th>
<th>Dec-17</th>
<th>Mar-18</th>
<th>Jun-18</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZ OCR</td>
<td>1.75</td>
<td>1.75</td>
<td>1.75</td>
<td>1.75</td>
<td>1.75</td>
<td>1.75</td>
<td>1.75</td>
</tr>
<tr>
<td>NZ 90 day bill</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>NZ 10-yr bond</td>
<td>3.40</td>
<td>3.60</td>
<td>3.70</td>
<td>3.80</td>
<td>3.90</td>
<td>4.00</td>
<td>4.10</td>
</tr>
<tr>
<td>US Fed Funds</td>
<td>0.75</td>
<td>0.75</td>
<td>1.00</td>
<td>1.00</td>
<td>1.25</td>
<td>1.25</td>
<td>1.50</td>
</tr>
<tr>
<td>US 3-mth</td>
<td>1.13</td>
<td>1.20</td>
<td>1.33</td>
<td>1.45</td>
<td>1.60</td>
<td>1.75</td>
<td></td>
</tr>
<tr>
<td>AU Cash Rate</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>AU 3-mth</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
</tr>
</tbody>
</table>

## Economic Indicators

<table>
<thead>
<tr>
<th></th>
<th>Jun-16</th>
<th>Sep-16</th>
<th>Dec-16</th>
<th>Mar-17</th>
<th>Jun-17</th>
<th>Sep-17</th>
<th>Dec-17</th>
<th>Mar-18</th>
<th>Jun-18</th>
<th>Sep-18</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP (%) q/q</td>
<td>0.9</td>
<td>0.6</td>
<td>1.0</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
<td>0.6</td>
<td>0.6</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>GDP (%) y/y</td>
<td>3.6</td>
<td>3.4</td>
<td>3.5</td>
<td>3.4</td>
<td>3.2</td>
<td>3.4</td>
<td>3.0</td>
<td>2.8</td>
<td>2.5</td>
<td>2.2</td>
</tr>
<tr>
<td>CPI (%) q/q</td>
<td>0.4</td>
<td>0.3</td>
<td>0.2</td>
<td>0.5</td>
<td>0.4</td>
<td>0.6</td>
<td>0.2</td>
<td>0.9</td>
<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>CPI (%) y/y</td>
<td>0.4</td>
<td>0.4</td>
<td>1.1</td>
<td>1.4</td>
<td>1.4</td>
<td>1.7</td>
<td>1.7</td>
<td>2.1</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Employment (%) q/q</td>
<td>2.4</td>
<td>1.4</td>
<td>0.7</td>
<td>0.6</td>
<td>0.5</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td>Employment (%) y/y</td>
<td>4.5</td>
<td>6.1</td>
<td>5.9</td>
<td>5.2</td>
<td>3.3</td>
<td>2.2</td>
<td>1.9</td>
<td>1.7</td>
<td>1.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Unemployment Rate (%) sa</td>
<td>5.0</td>
<td>4.9</td>
<td>4.8</td>
<td>4.8</td>
<td>4.7</td>
<td>4.6</td>
<td>4.6</td>
<td>4.5</td>
<td>4.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Current Account (%) GDP</td>
<td>-2.9</td>
<td>-3.0</td>
<td>-3.1</td>
<td>-3.3</td>
<td>-3.4</td>
<td>-3.4</td>
<td>-3.3</td>
<td>-3.3</td>
<td>-3.3</td>
<td>-3.3</td>
</tr>
<tr>
<td>Terms of Trade (%) q/q</td>
<td>-2.5</td>
<td>-1.8</td>
<td>0.7</td>
<td>0.8</td>
<td>0.9</td>
<td>0.8</td>
<td>0.6</td>
<td>0.3</td>
<td>0.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Terms of Trade (%) y/y</td>
<td>-4.3</td>
<td>-2.3</td>
<td>0.4</td>
<td>-2.9</td>
<td>0.5</td>
<td>3.2</td>
<td>3.1</td>
<td>2.6</td>
<td>2.1</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Figures in bold are forecasts. q/q: Quarter-on-Quarter, y/y: Year-on-Year
IMPORTANT INFORMATION

The distribution of this document or streaming of this video broadcast (as applicable, "publication") may be restricted by law in certain jurisdictions. Persons who receive this publication must inform themselves about and observe all relevant restrictions.

1. Disclaimer for all jurisdictions, where content is authored by ANZ Research:

Except if otherwise specified in section 2 below, this document is issued and distributed in your country/region by Australia and New Zealand Banking Group Limited (ABN11 005 357 522) ("ANZ"), on the basis that it is only for the information of the specified recipient or permitted user of the relevant website (collectively, "recipient"). This document is confidential and may not be reproduced, distributed or published by any recipient without taking due account of the relevant legal and regulatory requirements. It is given without the objective or knowledge of the recipient or of any person. Nothing in this document is intended to be an offer to sell, or a solicitation of an offer to buy, any product, security, instrument or investment, to effect any transaction or to conclude any legal act of any kind. If, despite the foregoing, any services or products referred to in this document are deemed to be offered in the jurisdiction in which this document is received or accessed, no such service or product is intended for nor available to persons resident in that jurisdiction if it would be contradictory to local law or regulation. Such local laws, regulations and other limitations always apply with non-exclusive jurisdiction of local courts. Certain financial products may be subject to mandatory clearing, regulatory reporting and/or other related obligations. These obligations may vary by jurisdiction and be subject to frequent amendment. Before making an investment decision, recipients should seek independent financial, legal, tax and other relevant advice having regard to their particular circumstances.

The views and recommendations expressed in this publication are the author’s. They are based on information known by the author and on sources which the author believes to be reliable, but may involve material elements of subjective judgement and analysis. Unless specifically stated otherwise: they are current on the date of this publication and are subject to change without notice; and, all price information is indicative only. Any of the views and recommendations which comprise estimates, forecasts or other projections, are subject to significant uncertainty, and any estimate, forecast or projection is subject to the qualifications and disclaimers referred to in this document. Such views and recommendations may not always be achieved or prove to be correct. Indications of past performance in this publication will not necessarily be repeated in the future. No representation is being made that any investment will or is likely to achieve profits or losses similar to those achieved in the past, or that significant losses will be avoided. Additionally, this publication may contain 'forward looking statements'. Actual events or results or actual performance may differ materially from those reflected in such forward looking statements. All investments involve risk and may result in both profits and losses. Foreign currency rates of exchange may adversely affect the value, price or income of any products or services described in this publication. The products and services described in this publication are not suitable for all investors, and transacting in them may be contrary to the laws of your country. ANZ is not responsible for any loss, damage, claim, proceeding, cost or expense ("Liability") arising directly or indirectly and whether in tort (including negligence), contract, equity or otherwise out of or in connection with this publication. If this publication has been distributed by electronic transmission, such as e-mail, then such transmission cannot be guaranteed to be secure or error-free as information could be intercepted, altered, lost, deleted, arrive late or incomplete, or contain viruses. ANZ and its Affiliates do not accept any Liability as a result of electronic transmission of this publication.

ANZ and its Affiliates may have an interest in the subject matter of this publication as follows:

• They may receive fees from customers for dealing in the products or services described in this publication, and their staff and introducers of business may share in such fees or receive a bonus that may be influenced by total sales.
• They or their customers may have or have had interests or long or short positions in the products or services described in this publication, and may at any time make purchases and/or sales in them as principal or agent.
• They may act or have acted as market-maker in products described in this publication.

ANZ and its Affiliates rely on information barriers and other arrangements to control the flow of information contained in one or more business areas within ANZ or within its Affiliates into other business areas of ANZ or of its Affiliates. This document is published in accordance with ANZ’s policies on Conflicts of Interest and Information Barriers.

Please contact your ANZ point of contact with any questions about this publication including for further information on these disclosures of interest.

2. Country/region specific information:

Australia. This publication is distributed in Australia by ANZ. ANZ holds an Australian Financial Services licence no. 234527. A copy of ANZ’s Financial Services Guide is available at http://www.anz.com/documents/AU/aboutANZ/FinancialServicesGuide.pdf and is available upon request from your ANZ point of contact. If trading strategies or recommendations are included in this publication, they are solely for the information of 'wholesale clients' (as defined in the Corporations Law 2001) and are not intended for, and must not be distributed to, any person in those jurisdictions who would come within the definition of "retail client".

Brazil. This publication is distributed in Brazil by ANZ on a cross border basis and only following request by the recipient. No securities are being offered or sold in Brazil under this publication, and no securities have been and will not be registered with the Securities Commission – CVM.

Brunei. Japan. Kuwait. Malaysia. Switzerland. Taiwan. This publication is distributed in each of Brunei, Japan, Kuwait, Malaysia, Switzerland and Taiwan by ANZ on a cross-border basis.

Cambodia. This document acknowledges that although ANZ Royal Bank (Cambodia) Ltd. is a subsidiary of ANZ, it is a separate entity to ANZ and the obligations of ANZ Royal Bank (Cambodia) Ltd. do not constitute deposits or other liabilities of ANZ and ANZ is not required to meet the obligations of ANZ Royal Bank (Cambodia) Ltd.

European Economic Area (“EEA”): United Kingdom. ANZ UK is authorised by the Financial Conduct Authority (“FCA”) and limited regulation by the PRA. Details about the extent of our regulation by the PRA are available from us on request. This publication is distributed in the United Kingdom by ANZ solely for the information of persons who would come within the FCA definition of "eligible counterparty" or "professional client". It is not intended for and must not be distributed to persons who would come within the FCA definition of "retail client". Nothing here excludes or restricts your right to reject an offer made to a customer which ANZ may have under the UK Financial Services and Markets Act 2000 or under the regulatory system as defined in the Rules of the PRA and the FCA. Germany. This publication is distributed in Germany by the Frankfurt Branch of ANZ solely for the information of "wholesale clients" (as defined in the Banking Act (BankGeldVergütungsACT) "AGV") subject to the FCA definition of "professional client" or "retail client". No part of this document is intended for, and must not be distributed to, any person in those jurisdictions who would come within the FCA definition of "professional client" or "retail client".

Fiji. For Fiji regulatory purposes, this publication and any views and recommendations are not to be deemed as investment advice. Fiji investors must seek licensed professional advice should they wish to make any investment in relation to this publication.

Hong Kong. This publication is issued or distributed in Hong Kong by the Hong Kong branch of ANZ, which is registered at the Hong Kong Monetary Authority to conduct Type 1 (dealing in securities), Type 4 (advising on securities) and Type 6 (advising on corporate finance) regulated activities. The contents of this publication have not been reviewed by any regulatory authority in Hong Kong. If in doubt about the contents of this publication, you should obtain independent professional advice.