RBC Capital Markets

Uprooting tradition: What plant-based alternatives mean for the future of protein

RBC Imagine™

Thinking further forward

EQUITY RESEARCH | MAY 12, 2021

For Required Non-U.S. Analyst and Conflicts Disclosures, see page 45.

EQUITY RESEARCH

Capital Markets

RBC Consumer Equity Team
Click here for contributing analysts' contact information

May 12, 2021

RBC Imagine™: Uprooting tradition

What plant-based alternatives mean for the future of protein

RBC Europe Limited
Emma Letheren (Analyst)
James Edwardes Jones (Analyst)

RBC Capital Markets, LLC
Nik Modi (Analyst)
Mehra Romezi (Senior Associate)
Steven Shemesh (AVP)

RBC Dominion Securities Inc.
Irene Nattel (Analyst)
Alex Carette (Senior Associate)
Martin Gravel

Our view: Consumers are increasingly shifting to meat and dairy alternatives. Cell-based options are some way from proper commercialisation but plant-based products have taken root. They still only represent a fraction of consumption but the direction of travel is clear; as consumers' environmental and health concerns mount and innovation provides more appealing alternatives, plant-based penetration will increase rapidly.

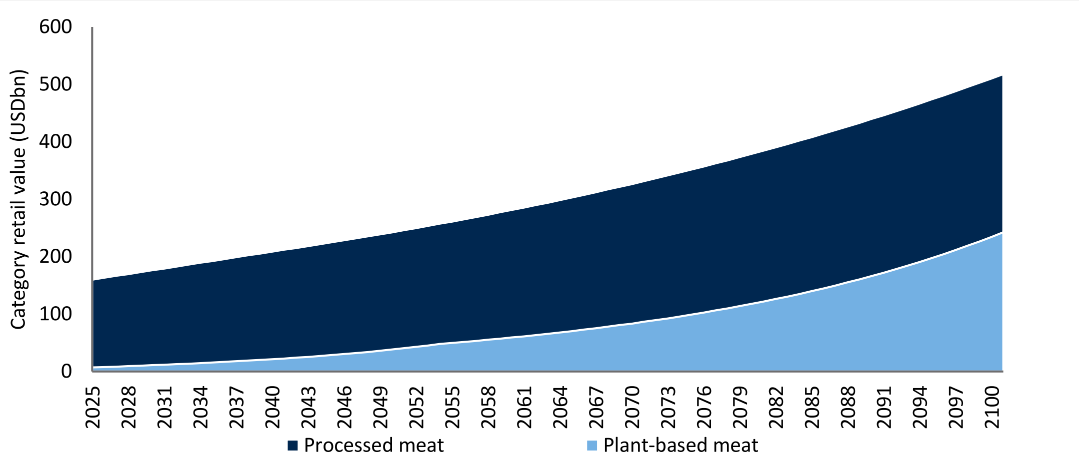
A 2019 Euromonitor survey found that almost 50% of consumers globally restrict their animal product consumption. We think COVID-19 has exacerbated this, drawing attention to environmental and health concerns while lockdown prompted extensive consumer trial. Plant-based meat and dairy growth rates almost doubled in North America and Western Europe in 2020.

We've interviewed 10 leaders in the space (see p 33) and immersed ourselves in NGO, IGO and academic research to evaluate the plant-based opportunity. While we expect the future of protein will be diverse, we think plant-based alternatives are the immediate disruptors. Consumers' motivations vary a lot between environmental concerns, health and animal welfare, while the supply-side 'pull' is provided by improved, and improving, products. What's clear from our conversations is that the big prize is flexitarians, not those with hard-core ideological, dietary or health motivations.

So far, animal products in the more indulgent categories (meat and cheese) have resisted this challenge better than their commoditised peers in milk and butter. Plant-based milk has secured triple the global penetration of plant-based meat and cheese. However, accelerating investment and innovation is driving improvements in taste, availability and price.

For most of our global, multi-brand and multi-product coverage, this is not moving the needle yet. However, as the category expands it will become more meaningful for top line as well as valuation (Nestlé's revenues may be over 200 times the size of Beyond Meat's - we're not even going to think about profits - but its market cap is only 50 times bigger). We also think presence in the plant-based segment has implications for culture and ESG credentials: it demonstrates agility and forward-thinking and there is overwhelming evidence that animal husbandry is responsible for significant environmental stress.

Exhibit 1 - Our long-term forecasts for the global meat occasion



Source: RBC Capital Markets estimates, Euromonitor

RBC Imagine™
Thinking further forward

Table of contents

RBC Imagine™: Protein and Beyond

An introduction

"What I was experiencing was more than a clever meat substitute.
It was a taste of the future of food"
Bill Gates, 2013 after eating the Beyond Burger

COVID-19 has increased our attention on health as well as the fragility of the world we live in. According to many companies in our global coverage, this has translated into a step change in consumers' attention to animal protein consumption and its health and environmental impact. The RBC's Global Consumer Staples team therefore decided to investigate the future of protein, what it is, where it's going and what this means for our global coverage.

Within our coverage, the future of meat affects meat processors **Maple Leaf Foods** (MFI CAD), **Hilton Foods** (HFG LN) and **Cranswick** (CWK LN). It also affects **Nestlé** (NESN SW), **Kellogg Company** (K US), **Unilever** (ULVR LN) and **Conagra Brands** (CAG US) which have developed sizeable businesses in meat alternatives. Within dairy, dairy producers **Saputo** (SAP CAD) and **Danone** (BN FP) are most exposed and both also sell dairy-free alternatives. We have held conversations with all of these companies – with the exception of Danone – in recent months to understand their view, strategy and activities in the space. We have also spoken to **Beyond Meat** and **Upfield**, which we don't cover but are leaders in the global plant-based meat and dairy categories respectively. Thank you to the corporate representatives who gave their time and shared their knowledge.

In addition, we've had our heads buried in numerous corporate, NGO, government and academic reports. The plant-based space is where we've focused as it is the most commercialised and where our coverage has the most exposure. Therefore, in our opinion, it will be the most important for our investment cases in the next few years.

We note there *is* more to the future of protein than plant-based dairy and meat – there's also plant-based fish and eggs and even insects. We also touch on cell-based protein (also called cultured, cultivated, synthetic or lab-grown) which has recently hit major milestones and is attracting increasing investment. However these are relatively underdeveloped and uncommercialised sub-segments (and less relevant to our coverage). We also leave out vegetarian, protein-rich whole foods such as chickpeas, black beans and nuts; valid and popular animal protein alternatives but not where our coverage plays.

RBC Imagine™: Uprooting tradition is split into four sections: firstly, structural drivers behind the plant-based occasion, and then two sections diving into meat and dairy alternatives separately. We think the categories are at different stages of maturity and therefore want to assess them separately. In each of the category sections, we discuss:

- The current state of the market (products, penetration, geographical variations);
- Barriers to further adoption;
- Category potential (outlook to 2025 and beyond);
- The major players.

In the last section, we summarise our conversations with the 10 corporates as well as our reading on Danone: who thinks what, who's doing what and what that means for the investment cases.

Our key conclusions

1. **What is the future of protein?**

There are many strands to the future of protein. We've focused on plant-based meat and dairy alternatives as these are the most commercialised sub-segments and those to which the companies we cover are most exposed. We think these sub-segments will have most relevance for our coverages' investment cases over the next five years.

Longer term, we think the plate of the future will consist of a mix of traditional animal products with plant-based and cell-based ones. Cell-based meat remains largely uncommercialised and faces significant hurdles: price, consumer acceptance and its environmental and health impact is unclear. However it could offer a better sensory profile match to meat and more opportunities for variation in price and quality.

2. **Why are eating habits changing?**

Health, environmental and animal welfare concerns have always been present but are gathering importance for consumers, governments and corporations alike. We think the emergence of plant-based products that are comparable to animal products is a particularly important driver for recent accelerations in the plant-based category; flexitarians are the big opportunity according to our industry contacts and they enjoy meat and dairy. Developments in taste, availability and price increasingly allow consumers to fulfil their health/environment/animal welfare ambitions without compromising their existing lifestyles.

3. **What are the ESG implications for corporates involved in the space?**

We've seen a lot of evidence that livestock farming has significant negative implications for climate change, land and water use. Any protein alternative that is accepted by consumers and offers materially less environmental impact (which early data implies is the case for plant-based products) can help solve ongoing environmental challenges. Hence we anticipate increasing government funding for plant-based alternatives. No matter how the marketing is tailored or why consumers are purchasing it, the environmental benefits of plant-based alternatives has positive ESG implications for any corporate involved in the sector in our view.

4. **What are the key differences between the plant-based meat and dairy opportunity?**

Plant-based products in commoditised categories such as butter and milk have reached strong penetration levels. Plant-based milk now has penetration in the low-teens while plant-based butter is reviving the margarine category. The real white space opportunity is in plant-based meat and cheese.

Meat and cheese have been more protected from the plant-based challenge so far. They are often part of indulgent food occasions making consumers more demanding about taste. They also are less affected by the prevalence of lactose intolerance. As plant-based replications of meat and cheese improve, we expect plant-based penetration to accelerate.

5. **Give me some numbers!**

Euromonitor estimates the plant-based meat category could grow by between 3% and 4% per year over the next five years (globally excluding Asia Pacific given plant-based is already relatively mature). In US dollars, this would represent a US$ 7bn opportunity. In milk, penetration is expected to go from 9% to 12% (US$ 12bn) by 2025. Looking longer term, we find the plant-based meat category could reach US$ 50bn by 2055 whilst plant-based cheese could reach almost US$ 30bn.

6. **Who is best placed in our coverage?**

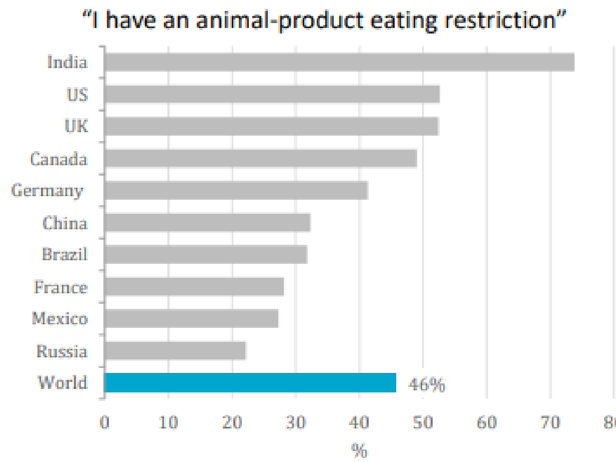
Danone and Saputo appear well placed to benefit long-term from plant-based dairy whilst Kellogg, Maple Leaf Foods, Nestlé and ConAgra Brands have all secured strong shares in plant-based meat. We also think this has implications for culture and ESG credentials: it demonstrates agility and forward-thinking and should have a positive impact on climate change.

Structural drivers of the plant-based occasion

Flexitarians

A 2019 survey by Euromonitor found 46% of respondents globally are restricting their consumption of animal products. Similarly, an industry contact told us that in 2019, 38% of consumers were looking to reduce meat consumption. This was up from 28% in 2017 and now, post-COVID-19 which we think has drawn consumers attention even further away from animal products, we expect it to be even higher.

Exhibit 2 - Nearly 50% of survey respondents restrict their consumption of animal products



Source: Euromonitor 2019 survey

Some of these people will have allergies, religious restraints or simple dislikes. But many of them do not. These are 'flexitarians'; consumers who enjoy meat and dairy products but are looking to reduce their consumption. Our industry contacts define them as those who eat meat and/or dairy-free once or twice a week.

Interestingly, flexitarians actually make up the majority of plant-based meat consumers: Beyond Meat found that 95% of those who purchased its plant-based burgers were also purchasers of beef burgers. In milk, evidence shows consumers switch to plant-based milk alternatives on a more 'full-time' basis; a 2020 study[1] of 995 US households found that 38% of respondents drank plant-based milk but only 41% of them continued consuming dairy milk. We note this study did not cover respondents' consumption of other dairy products; we expect the proportion would have been higher than 41% if extended outside milk. US dairy consumption per capita was still growing pre-COVID-19 (unlike dairy milk which declined 1% in 2019). (Both categories grew in 2020).

There are numerous drivers behind flexitarianism and we explore what we think are four key ones. These include concerns about environmental, health and animal welfare which have been around for a while but are escalating in our opinion. We also think the emergence of comparable products has been a key driver for plant-based products in particular (supply-push rather than demand pull) given there are many types of alternative proteins. And by comparable, we mean in terms of quality, taste, price and convenience.

[1] 'Beverage milk consumption patterns in the United States: Who is substituting from dairy to plant-based beverages?', Christopher A. Wolf et al, Journal of Dairy Science, October 2020

Structural driver 1: Environmental concerns

When we set out to write this report, we thought environmental concerns would be the most significant driver behind increasing consumer demand for meat and dairy substitutes. It's certainly the 'noisiest' driver and features in the media daily. Interestingly, many of our interviewees found a common result in their consumer research – yes, consumers care about the environment but it's not the overwhelming factor in their purchasing decisions.

Only 25% of flexitarians put meat's 'perceived environmental impact' as their reason for reducing meat intake according to our industry contacts. Others found that consumers self-declare as being concerned about the environment; however when it comes to purchasing decisions, they tend to place more emphasis on 'me' (health, taste and price) than 'we'. Indeed, the Good Food Institute found that 'taste' was the attribute most likely to drive plant-based purchase intent for all age groups and diet types in 2019. 'Altruistic benefits' (such as environmental impact and animal welfare) was the attribute least likely to drive purchase intent.

Sustainability is more important for younger consumers. For example, Unilever found diet is one of the areas 18- to 24-year olds are most willing to change for the benefit of the planet. We also believe that COVID-19 has brought environmental concerns to the fore. We think environmental concerns will become an increasingly important driver for the plant-based segment in the future.

It therefore makes sense that the marketing of many plant-based products doesn't emphasise ideological views about saving the world. In fact, we were about halfway through our conversation with Beyond Meat before the company mentioned the reduced environmental impact of their products. Many of our other interviewees were not sure exactly how much better for the environment their products were. This is not to say that reducing animal consumption is bad for the environment. The overriding conclusion from our reading of academic, NGO, government and corporate studies is quite the opposite. Here are a few statistics and quotes that stood out to us.

'Climate change looms as one of the biggest environmental crises in human history and the lifecycle and supply chain of ***livestock products*** *is the largest contributor of Greenhouse Gas emissions worldwide.'* - Curtin University Sustainability Policy Institute, a United Nations partner.

'We could feed around twice as many humans with today's global harvest if we did not feed ***livestock*** *but rather consumed the yield ourselves'.* – How Will Cultured Meat and Meat Alternatives Disrupt the Agricultural and Food Industry? AT Kearney, 2019.

*'**Livestock** is the world's largest user of land resources, with pasture and land dedicated to the production of feed representing almost 80% of total agricultural land. Agriculture also uses approximately one-third of the world's fresh water*.' – Maple Leaf Foods website (link to webpage)

'The EAT-Lancet Commission showed that if people eat more ***plant-based*** *foods, emissions could be cut by up to 80%.'* – Unilever website (link to webpage)

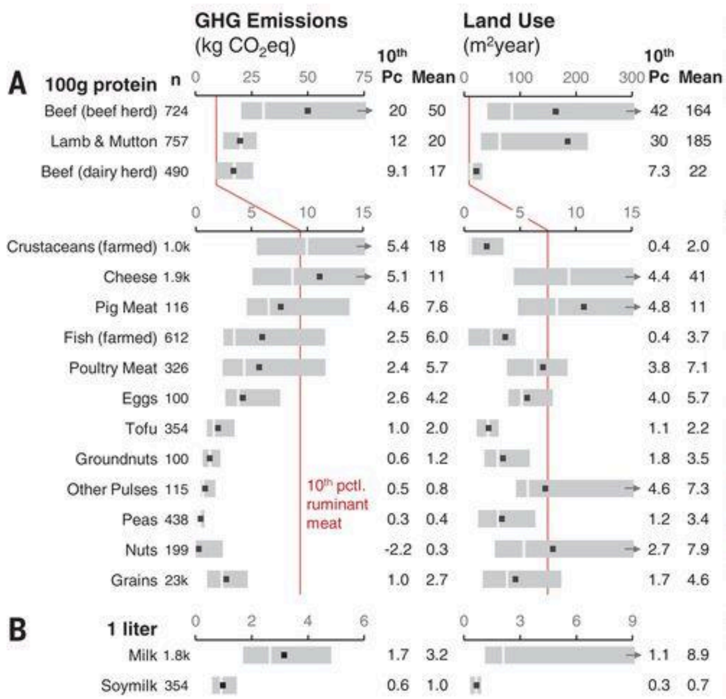
A study with the University of Michigan on the life cycle of Beyond Meat's ***plant-based*** *burgers relative to a typical* ***animal*** *burger found that Beyond Burgers uses 99% less water, 93% less land, 90% fewer greenhouse gas emissions and 46% less energy.* – Beyond Meat

*Upfield estimates **dairy** butter products are 3-4 times worse for the environment (based on carbon footprint) than the **plant-based** options.* - Upfield

To get a better idea of the scale of comparative environmental impacts, we've used the most thorough and recent study we could find. Joseph Poore, an Oxford University Agricultural and Environment researcher, looked at the environmental impact of animal and plant-based product supply chains in 2018. This included everything from deforestation to clear land for farming, processing, packaging, transportation and retailing of the products.

The exhibit below is complex but the length of the bars demonstrate the sizeable difference between animal and plant proteins' greenhouse gas emissions and land use. Poore found that even the lowest impact beef uses 36 times more land and creates six times more emissions than peas and beans. Milk looks significantly better, however soymilk still generates a fraction of the environmental impact of cow's milk and cheese is even worse than pork and poultry. He found that even the most impactful plant-based protein (for example tofu grown in Brazil with deforestation in its value chain) has a lower overall environmental impact than meat. The most impactful plant-based milk (soya) uses less land and emissions than the least impactful cow's milk. Poore estimates a vegan diet could have up to double the impact on greenhouse gas emissions than owning an electric car instead of a gasoline car would.

Exhibit 3 - Environmental impact of animal relative to plant protein



Source: Reducing food's environmental impacts through producers and consumers by J. Poore and T. Nemecek. Science: Vol 360 Issue 6392 (1 June 2018)

In addition, there are several other environmental problems caused by animal consumption. We've mentioned high water use briefly but current industrialised farming practices have also been found to cause soil erosion, desertification, salt and freshwater pollution. Given the host of evidence we found, we think the conclusion is compelling; switching from eating meat to plants is the right thing to do for the planet.

This comes with two caveats; there is insufficient data on existing processed plant-based products (and they are insufficiently scaled) for us to truly understand their own long-term environmental impact. The author of the study above highlights existing data often comes from the plant-based companies themselves which reduces its reliability. The Intergovernmental Panel on Climate Change (the UN's body for assessing science related to climate change) highlights this in its Special Report on Climate Change and Land[2].

In addition, not all animal products are as impactful as others (as Exhibit 3 demonstrates). The Food and Agriculture Organization of the United Nations[3] estimates pig and poultry production accounts for under 10% of livestock greenhouse gas emissions and requires up to five times less feed to produce a kilogram of protein than a cow, sheep or goat. It has also been argued that grazing grass-fed beef (currently a very small proportion of global beef production as it is mostly grain-fed) can have carbon benefits, make the land more resilient to flooding and drought and promote soil diversity and nutrient content.

However given what we've read, it does seem highly unlikely to us that plant products could surpass animal products in their environmental impact. We do think that these products will be viewed as a part of a solution to climate change and unsustainable agriculture practices (and hence government funding towards plant-based alternatives has been increasing).

We think environmental concerns will continue to drive the plant-based category (even if they are not *the* driving force). We also conclude that, no matter how marketing is tailored or why consumers are purchasing these products, the production and consumption of plant-based foods has positive environmental implications.

Structural driver 2: Health concerns

The companies in our coverage largely agreed that health is one of the core motivators behind plant-based purchases. Danone found 47% of the younger generations are eating healthier and 30% are willing to actually pay a premium for that.

So is meat and dairy that bad for you? There are nutritional benefits; meat is a good source of protein, zinc and iron. However…

> *'Reducing excessive consumption of meat, […] in favour of plant and/or alternative protein sources can help reduce the intake of saturated fats while increasing dietary fibre intake, contributing to the improvement of our health, reducing the incidence of obesity, cardiovascular diseases and cancer'*
>
> 'The Future Protein Manifesto' by EIT Food (a food innovation community under the European Institute of Innovation and Technology; a body of the EU), 2020

However, as with environmental impact, the health impact of meat varies. Beef, lamb and pork for example are all high in saturated fats. According to Cancer Research UK, chemicals such as haem (in red meat), nitrates (in processed meat), and PCAs (released when grilling or barbecuing at high temperatures) can increase the risk of cancer by damaging body cells. In comparison, Unilever's 'The Vegetarian Butcher' burger patty for example contains more fibre and less saturated fat than meat.

[2] 'Meat analogues such as imitation meat (from plant products), cultured meat, and insects may help in the transition to more healthy and sustainable diets, although their carbon footprints and acceptability are uncertain.'

[3] 'Tackling Climate Change through Livestock – A global assessment of emissions and mitigation opportunities', Food and Agriculture Organization, 2013

Health concerns in dairy also vary. Our dairy coverage emphasise the nutritional benefits of dairy. Indeed, there's research to support this. This is from the Harvard T.H. Chan School of Public Health:

'Cow's milk is a good dietary source of necessary vitamins and minerals. A serving of cow's milk contains calcium, vitamin D, vitamin A, and a host of micronutrients that you need in your diet.'

That said, other dairy products such as cheese and butter have been criticised for their higher fat content. In addition, many consumers struggle to digest lactose in milk; a 2017 study by C.L. Storhaug et al found that 68% of the global population suffers from lactose malabsorption (although this was only 30-40% in parts of Europe and the US). Our industry contacts think this medically captive audience is a core reason why plant-based milk has so far developed stronger penetration than plant-based meat or cheese (lactose is only present in certain cheeses).

Another health issue driving consumers into plant-based products is the threat of antibiotic resistance.

'By 2050, drug-resistant infections could cause global economic damage on par with the 2008 financial crisis.'

'Drug Resistant Infections: A Threat to Our Economic Future', World Bank, 2017

Although certain markets, such as the UK, have cracked down on antibiotic use in livestock, the livestock agriculture industry remains the biggest user of antibiotics (according to the above report). As an example, 88% of growing swine in the U.S. receive antibiotics in their feed for disease prevention and growth promotion purposes[4]. Antibiotic use is also still growing; global consumption of antibiotics in agriculture is expected to increase by 67% from 2010 to 2030. In Brazil and China, it will grow by nearly 100% over the same period (according to the same World Bank report).

This widespread antibiotic use has been widely accredited to a rise in antibiotic resistant diseases. In a 2019 Ted Talk, Good Food Institute (GFI) Executive Director Bruce Friedrich predicted that antibiotics will become ineffective in our lifetime with US deaths from 'super bugs' evolving from livestock antibiotic use multiplying by one thousand by 2050. Genetically modified crops used for animal feed have also been linked to antibiotic resistance.

Lastly, the meat industry in particular has been peppered by animal consumption-linked disease outbreaks (in fact, we're still living through two; COVID-19 and African Swine Flu). In addition, industry scandals, such as most recently in Poland where abattoirs were caught slaughtering diseased cows leading to a 20% reduction in Poland's meat consumption in 2019, have also raised health concerns.

This all comes with a few caveats. Of course, there are also nutritional benefits of animal protein as we've mentioned. In addition, health-conscious consumers are increasingly looking for more 'natural' products which given rise to some push back against the plant-based category being the best alternative; many protein substitutes are far more processed than meat or milk (to use our previous example, we counted 23 different ingredients in Unilever's The Vegetarian Butcher's UnbelievaBULL burger). In addition, our industry contacts note that plant-based cheese has very little nutritional value. Furthermore, another alternative, cell-based meat, contains the high saturated fat levels and cancer-inducing chemicals that meat does (although like plant-based, it won't include antibiotic use).

To conclude, health concerns will remain a driver and we expect plant-based offerings to innovate to match the health benefits offered by animal products (for example adding calcium or protein). We also think the traditional dairy and meat industries can fight back on this;

[4] 'A Review of Antibiotic Use in Food Animals: Perspective, Policy, and Potential', T.F. Landers et al, 2012

i) meat producers can improve their 'health offerings' (reduce antibiotic and GMO crop use) and ii) milk still seems beneficial if you're not lactose intolerant.

Structural driver 3: Animal welfare

We're less sure there's been a step change in this one. We're not convinced COVID-19 has brought attention to it. Companies and nations have been improving conditions for livestock for decades (some more slowly than others; Cranswick holds a Tier 1 Business Benchmark on Farm Animal Welfare (BBFAW) rating whilst Maple Leaf Foods holds a Tier 3 rating and Saputo a Tier 4 one) and we expect animal welfare to continue to move in the right direction. We understand from our conversations and related reading that only a small portion of consumers reduce their animal product intake primarily as a result of animal welfare concerns.

As Good Food Institute's Bruce Friedrich put eloquently: 'for 50 years, environmentalists and global health experts and animal activists have been begging the public to eat less meat'. The above concerns are not new. We think there's another big piece of the puzzle which will drive consumers to the plant-based category long-term.

Structural driver 4: Product replication

'Over a third of British families believe sustainable living is unachievable'
'Plan-Eat', Meatless Farm, 2020.

We believe (as do many of the companies in our coverage) that recent innovations in the plant-based category are closer than ever to traditional animal products and that this has been a significant factor behind recent growth in the category. For example, creamier plant-based butters that more closely replicate dairy butter has helped revive the margarine category. Creamier, more dairy-like oat milk (that can even *froth*) has been taking share from not only cow's milk but also other plant-based milk products.

For meat alternatives, lower prices and products' entrance to the refrigerator aisle (products were previously mainly frozen) as well as restaurant and fast-food chains has enhanced the accessibility and convenience of being flexitarian.

Such innovations have made a flexitarian lifestyle more feasible than before, enabling meat- and dairy-loving consumers to *not* have to sacrifice their everyday lifestyle to fulfil their health, animal welfare and/or environmental ambitions. Other vegetarian proteins such as chickpeas, tofu or falafel do not look, taste or perform like animal products and often involve more time-intensive cooking methods. We think the arrival of tasty, quality products is particularly important for indulgent foods such as meat and cheese.

A big factor supporting this step up in innovation is significant funding behind plant-based ventures. According to Good Food Institute, plant-based companies attracted US$ 2.1bn worth of funding globally in 2020. This was *three times* the investment attracted in 2019. Bigger FMCG players are also getting involved; Maple Leaf Foods, Nestlé, Danone and Unilever have all made sizeable acquisitions in the space over the last few years. The same goes for governments; the European Union allocated funding to the Smart Protein project which develops plant-based products using the by-products and residue of animal feed production last year for example.

There are a few segments where animal product replication has not been as successful so far. For example, the failure of dairy-free cheese products to replicate the taste, consistency and performance of dairy cheese has held back the category in our opinion. Plant-based cheese is still only a low-single-digit proportion of total cheese consumption; in contrast we estimate that plant-based milk now has low-teens penetration in developed markets.

Now it's time to look at the first of our plant based alternative categories in more detail: meat.

Meat and beyond: Examining the plant-based meat category

Taking stock: Products

"I would envision a future where the aisle is no longer called the meat aisle, it's called the protein aisle, and there is real meat in there which is maybe grass-fed, sustainably grown […] but a bigger and bigger part of that aisle will be plant-based and also cell-based'.

Morten Toft Bech, Founder of Meatless Farm, Future of Food panel discussion, 16 Nov 2020.

Product A: Identical meat substitutes

Plant-based 'meat substitutes' are created to closely replicate processed meat products such as burgers, chicken strips or sausages. In these products, the structure and presentation of plant proteins are altered to mimic the texture, appearance and functionality of proteins in animal meats. There is huge product variety in this category but many are made from pea protein or fermented mycoproteins (such as Monde Nissin's Quorn).

Exhibit 4 - A few examples

Source: Beyondmeat.com, Gardein.com, Quorn.co.uk

Product B: Non-identical meat substitutes

Unlike identical meat substitutes, these products are not meant to taste or look like meat. This sub-segment has fallen out of favour due to the rise of flexitarianism (consumers who enjoy meat but want to eat less). There is again huge product variety in this category; products are made from high protein vegetables such as beans, soy, seitan, mushrooms and chickpeas. The category also includes processed products sold to help consumers create high protein vegetarian meals at home such as texturized vegetable protein, TVP.

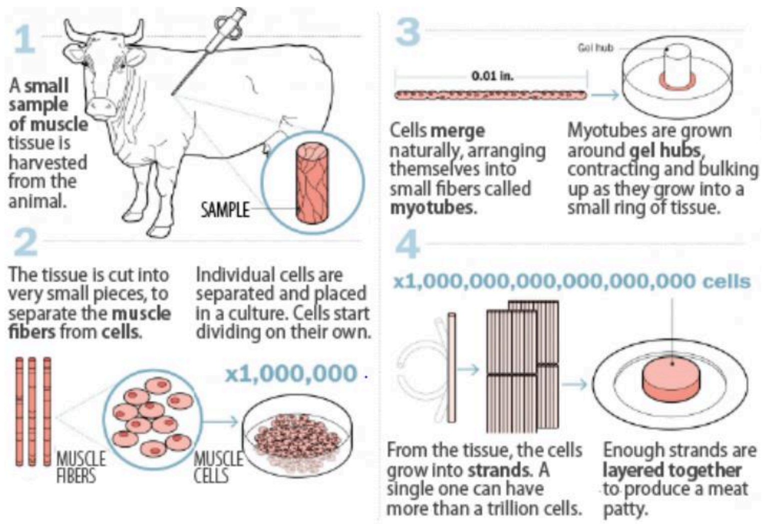
Exhibit 5 - A few examples of veggie meat substitutes

Source: morningstarfarms.com, bobsredmill.com, tofoo.co.uk

Product C: Cell-based meat

Another increasingly prominent meat alternative is cell-based meat. It can also be referred to as cultivated, cultured, synthetic or lab-grown meat. Unlike the plant-based options above, these products still contain meat. However, it's grown in a laboratory from animal cells therefore bypassing the environmental and animal welfare costs of farming. These are also targeted at flexitarians given products have a very similar sensory profile to meat. In most of the world, the category remains years away from commercialisation (is it currently only on sale in Singapore) and technology is still in development; none of the companies in our coverage are currently involved.

Exhibit 6 - How cell-based meat is created



Source: Regulation of Cell-Cultured Meat, Congressional Research Service, Federation of American Scientists. (25 Oct 2018)

Product D: Everything else

Other meat alternatives include insect and algae protein (currently underdeveloped and uncommercialised categories) and unprocessed high-protein wholefoods such as lentils, halloumi and nuts. These are all very real categories. However, for now, he companies in our global coverage have no exposure (except for Cranswick which processes halloumi).

In this note we focus on Product A, the growth area (although we expand on cell-based products later).

Taking stock: Category penetration

According to Euromonitor, the global meat substitutes category had a retail value of US$ 21bn in 2020. This compares to the processed meat market at US$ 170bn implying it holds 11% penetration of the overall meat occasion (defined as both meat and meat substitutes occasions combined).

In conversations with corporates, we sense-checked this. Beyond Meat estimates the category holds only 1% penetration globally. We think there are several factors behind this significant variation:

- Euromonitor includes the Product B sub-segment in its calculation of the meat substitutes category. We want to focus more on the plant-based meat replicas (Product A). This can be evidenced by the fact that when we remove Asia Pacific from our global calculations, penetration falls to 3%, much more in line with Beyond Meat's estimation. This makes sense; in Asia Pacific Product Bs such as tofu are commonplace.

- We also think there's a different base here. Beyond Meat estimates a significantly larger global meat category. This is because it includes food service (Euromonitor only includes retail) and we think its meat definition encompasses more products. Euromonitor's 'meat' category is focused on *processed* meat; 'sales of packaged raw pieces/cuts of meat and minced meat are excluded as these are not considered to be "processed"'. We don't think this encompasses the entire opportunity given less 'processed' meat products, such as mince, already have plant-based options in the market directly competing with them.
- Beyond Meat's estimation includes food service; Euromonitor's does not. We don't think this would have made a material difference to the percentage penetration. Plant-based has been growing fast in both food service and retail.

Given the limited granularity we have on this occasion, we are going to go ahead and look at Euromonitor's global estimates excluding Asia Pacific. We think this largely resolves the biggest issue (the inclusion of products such as tofu and seitan). But it is worth readers bearing in mind that actual penetration might be a few percentage points behind where Euromonitor estimates due to its exclusion of certain meat products.

Penetration by geography

According to Euromonitor, meat substitutes hold 3-4% penetration in the biggest meat-eating regions, North America and Western Europe. In comparison, their penetration is over 30% in Asia. In the data Asia actually represents 77% of the global meat substitutes category. By contrast, Beyond Meat estimates North America makes up c. 40% of the global meat substitutes category. As discussed, we think the significant disparities here are an issue of definition. If we exclude Asia Pacific from our Euromonitor data, we find that North America consists of 44% of the global meat substitutes category, in line with Beyond Meat's estimate.

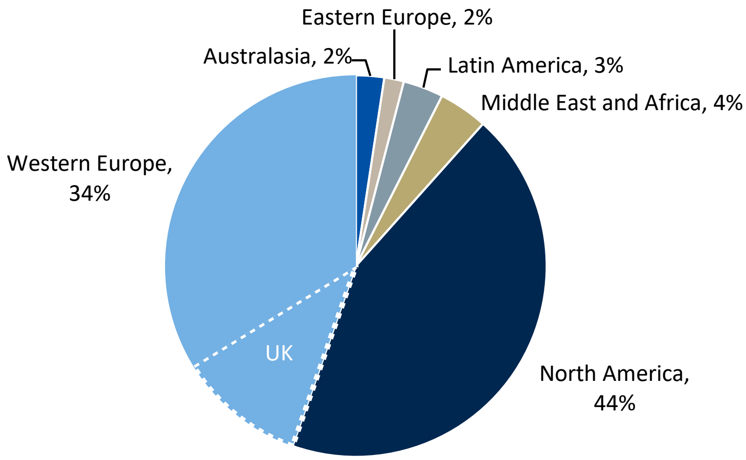
Exhibit 7 - Category sizes by geography

Geography	Traditional Meat category (retail value, USDm)	Meat substitutes category (retail value, USDm)	Meat substitutes as % of meat occasion
World	169,819	20,743	11%
Asia Pacific	32,533	16,276	33%
Australasia	1,710	107	6%
Eastern Europe	18,882	74	0%
Latin America	9,979	152	2%
Middle East and Africa	7,031	186	3%
North America	41,669	1,955	4%
Western Europe	58,015	1,993	3%

Source: Euromonitor, RBC Capital Markets

Within Western Europe, the UK is well-ahead on plant-based protein trends according to our industry contacts. Indeed, Euromonitor estimates the UK makes up a third of western Europe's meat substitutes category.

Exhibit 8 - Geographical split of the meat substitutes category excluding Asia Pacific in 2020



Source: Euromonitor, RBC Capital Markets

We've discussed in detail the strong structural drivers that should allow the plant-based categories to gain further penetration. However, there's a few barriers to adoption that remain.

Remaining barriers to consumer adoption

Taste

We've tasted a fair few meat substitute products over the last few months and can decisively say that, in our opinion, only a few products are really close to replicating meat. This view is shared by our industry contacts. Given the indulgence of the meat occasion and the importance of taste to consumers highlighted by our coverage, we think it is unlikely the category will reach full adoption potential until the sensory experience of these products is optimised.

Price

Meat substitutes sell at a premium to traditional meat products. For example, the most popular SKU of the Beyond Burger (its 2-pack) currently retails at a price 400% higher than an equivalent beef burger. Our industry contacts expect this to remain an issue for quite a few years to come. Interestingly, some major players (such as Impossible Foods) have recently announced retail price cuts. Perhaps this is the beginning of a trend.

Costs should come down as supply chain capacity increases and players scale and consolidate. Continued intense competition and the rise of private label will also bring this barrier down. Most of the companies in our coverage told us plant-based meat is currently higher margin than meat. We are unsure whether this is sustainable long term.

Health

Earlier we alluded to some pushback on how healthy meat substitutes are. Although made of vegetables, they are highly processed and calorific (a Beyond Burger is over 250 calories). As research on cell-based products grows, it will be interesting to see how healthy it is relative to animal meat and plant-based alternatives. Lastly, as meat producers innovate and increasingly try to capture health trends, we think this could keep consumers in the traditional meat category and prevent consumer adoption in the long-term. Some meat options (grass-fed, reared without antibiotics products, healthier cuts and poultry) can rival plant-based protein in terms of health.

Cell-based meat

Cell-based meat is currently unscaled and our industry contacts estimate it is still years from commercialisation (some even said a decade). Last December, Singapore became the first country to give regulatory approval to sell a cell-based product (Eat Just's lab-manufactured chicken nuggets). Another milestone was reached in April; Eat Just's chicken can now be ordered online in the region. There is only one publicly traded cell-based meat company so far (Meat-Tech 3D, listed on the Tel Aviv Stock Exchange but also filed for US IPO).

Our industry contacts highlighted several hurdles to cell-based products' development; pricing is an issue (although improving) and consumer acceptance is uncertain. In addition, this category's products still contain meat compounds which therefore don't necessarily match health trends. And does something grown in a lab tick consumers' desire for more natural ingredients? Lastly, the environmental consequences of cell-based meat are uncertain. There are already some studies that estimate cell-based meat could be *as* bad for the environment as beef in the long term. For example, John Lynch and Raymond Pierrehumbert in 'Climate Impacts of Cultured Meat and Beef Cattle' estimate cell-based meat causes more global warming than beef production over 1000 years due to accumulating CO_2 emissions (beef emits mainly methane which peaks and declines over time whilst CO_2 accumulates) (February 2019).

Investments in the space are ramping up however and we think this category could drive additional growth in the alternative meat occasion. But it could also take share. A 2019 report by consulting firm AT Kearney forecasts cell-based meat *overtaking* plant-based meat by 2040; it forecasts a 2040 meat category consisting of 40% animal meat, 25% plant-based and 35% cell-based. It argues that cell-based meat holds stronger commercial potential; it's potentially closer to meat's sensory profile and can be adapted to differing nutritional and quality demands resulting in varied price offerings.

Given recent milestones and accelerating investment, it feels likely that cell-based meat will become more important for the category and our coverage in the years to come. In particular, meat processor Hilton Foods noted cell-based meat can be packaged by its existing meat packaging technology. (It already packs the plant-based Beyond Burger in the UK alongside meat products). We think it's likely that the plate of the future will be a mix of the three (traditional meat, plant-based and cell-based). Depending on the proportion each achieves, cell-based could pose a threat to the plant-based category.

Population growth

The global population is expected to reach almost 10 billion by 2050 ('US State of the Industry Report: Plant-Based Meat, Eggs and Dairy', Good Food Institute (GFI), 2019). There is currently not enough scale behind alternative proteins to fulfil the protein demand that will accompany such robust population growth. This disadvantage provides an opportunity for the meat industry for decades to come. Indeed, GFI's report estimates a 50% increase in meat demand by 2050.

Category potential: Plate of the future

Category growth rates

The meat substitutes category has been developing at quite a speed, most notably in developed markets. In 2020, these trends accelerated.

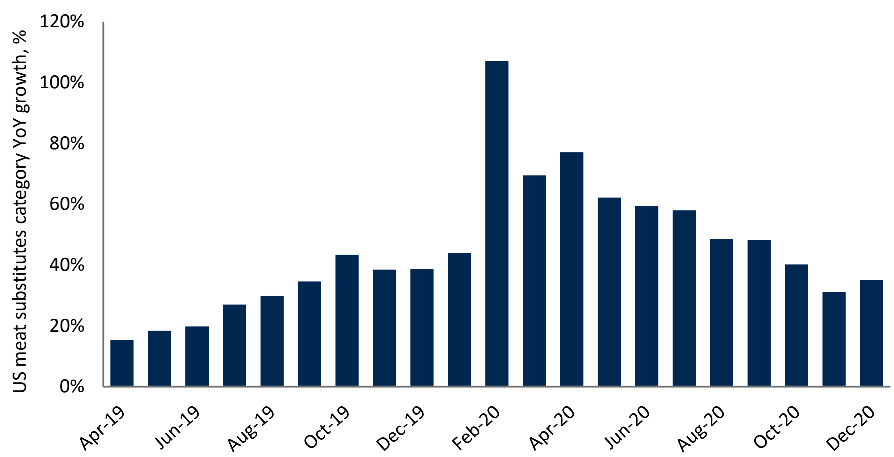
Exhibit 9 - Historical growth in meat substitutes

Geography	2015-2019 CAGR: %	2020: %
World	5%	11%
Asia Pacific	4%	8%
Australasia	10%	10%
Eastern Europe	10%	14%
Latin America	-2%	1%
Middle East and Africa	8%	5%
North America	17%	40%
Western Europe	10%	17%

Source: Euromonitor, RBC Capital Markets

This was particularly prevalent in the US with growth rates reaching over 100% in early 2020.

Exhibit 10 - Growth in meat substitutes was particularly impressive in US during 2020



Source: IRI, RBC Capital Markets

A key driver behind this acceleration was a shift towards at-home consumption which we expect to at least partially reverse once consumers return to a less restricted lifestyle post COVID-19.

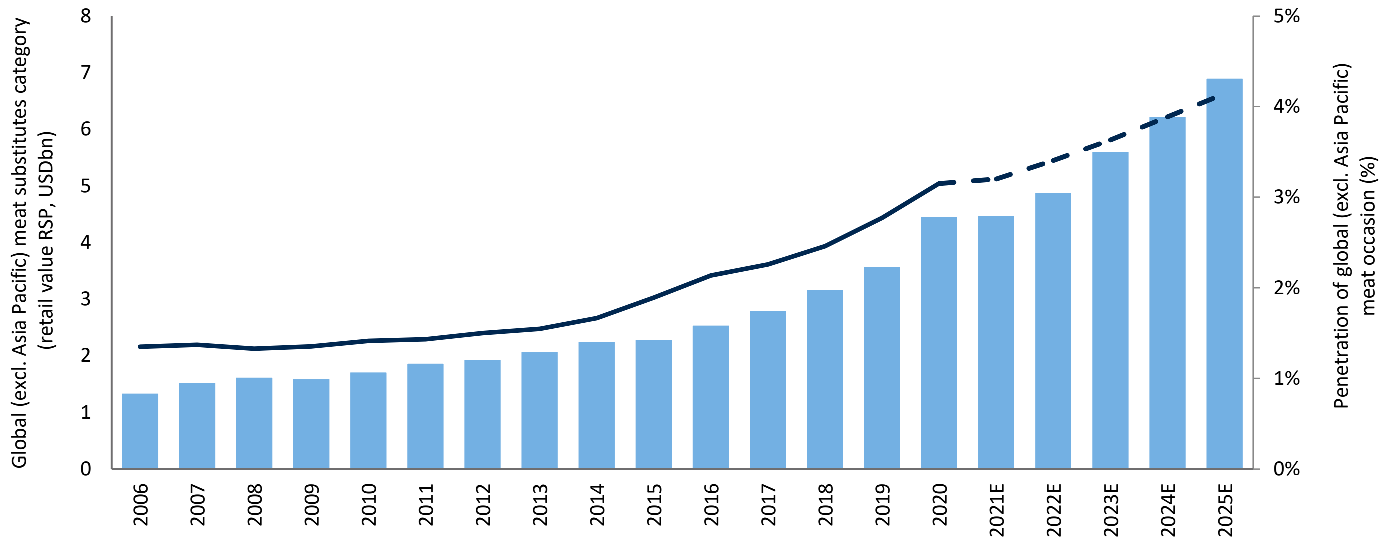
However, as Kellogg's CEO and Chairman Steven A. Cahillane described, 2020 was 'a sampling event like none other' (CAGNY Conference, 17 Feb 2021). Household penetration ramped up; Numerator (the largest household survey in the US) found US household penetration increased from 12% in March 2020 to 15% in February 2021. We also think COVID-19 drew attention to health and sustainability concerns. Increased trial and health/environment awareness amongst consumers should allow the category to retain at least some of these recent gains. Which leads us on to…

Quantifying the long-term opportunity

Euromonitor estimates the global meat substitutes category could reach US$ 7bn retail value by 2025. We've excluded Asia Pacific given the definition includes products such as tofu which clouds our conclusion on plant-based meat for that region.

This is still only a 4% penetration of the global meat occasion. Given Euromonitor excludes several meat products (such as raw cuts of meat and minced meat) penetration could even be a few points lower.

Exhibit 11 - Euromonitor forecasts a US$ 7bn global meat substitutes category by 2025 (excluding Asia Pacific)



Source: Euromonitor, RBC Capital Markets

In Western Europe and North America where the trend is developing faster, Euromonitor estimates the category could reach 5-6% penetration of the meat occasion in 2025. This is a 4y-CAGR of 13% and 10% FY21-25 respectively (relative to the meat category at 4% and 2%).

The blue sky scenario

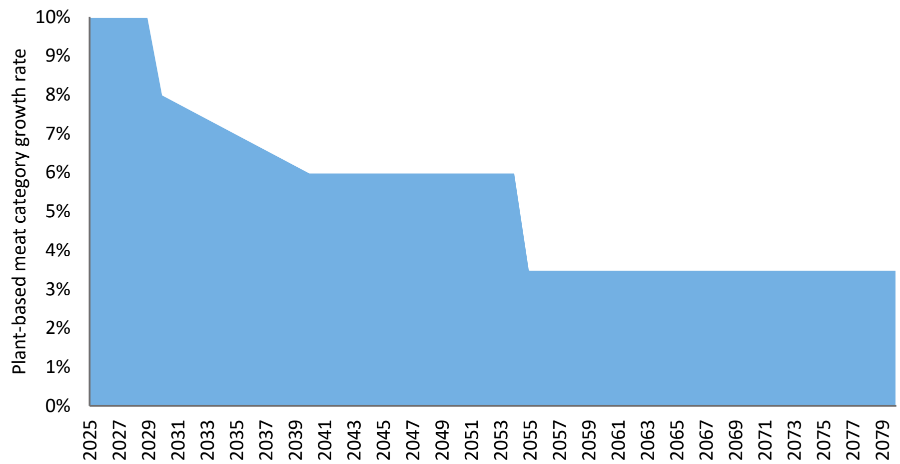
We wanted to look beyond this to truly understand the category's potential. We use Euromonitor's 2025 forecasts as our base and continue to exclude Asia Pacific.

We assume 2% growth in the global meat category (excluding Asia Pacific) moderating over time to 1.5%. We think low single digit growth is achievable as we do think meat players will pivot portfolios towards healthier and more sustainable occasions retaining consumers in the category (and securing price growth). Plus, as discussed, plant-based meat cannot yet fulfil protein demand on its own.

We assume a 10% growth rate in the plant-based meat continues until 2030. We don't think this is unrealistic; 2017-19 CAGR in the category has been 12% and we have recently seen a step change in consumer interest, trial, corporate innovation and investment. In addition, as scale and consolidation ease pricing dynamics in the category, consumers should be increasingly willing to switch into plant-based alternatives. By 2030 we forecast a moderation in growth as cell-based meat begins to reach scale and commercialise in multiple markets around the world posing a competitive threat to plant-based meat.

From 2030 to 2040 we assume growth in plant-based moderates from 10% to 6%. From 2040 we assume growth is 6% until the plant-based meat secures 15% of the global meat occasion in 2055 when it drops to 3.5%. Why 15%? Because it was at this level of penetration that growth in the North American milk alternatives category began to moderate. In addition, our industry contacts think plant-based meat can reach similar levels of penetration to North American plant-based milk. Beyond Meat thinks the category could surpass plant-based milk's penetration level given there are more meat occasions than milk.

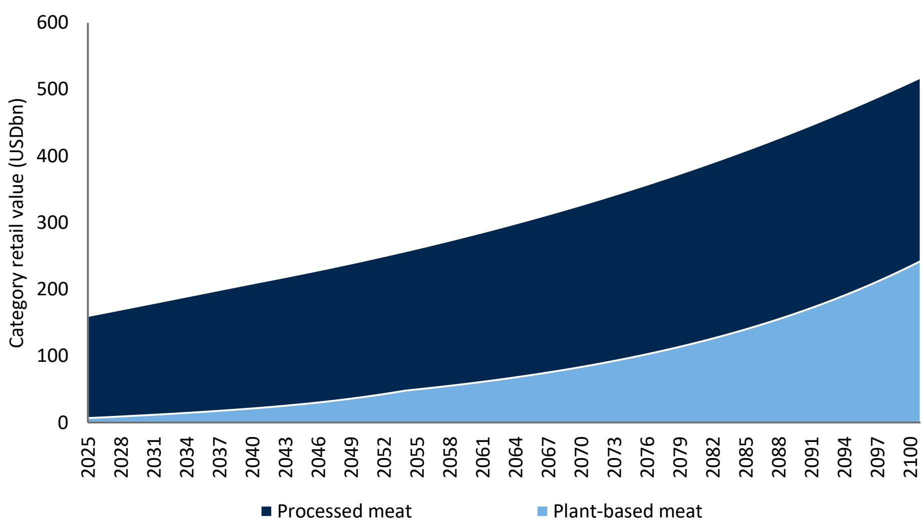
Exhibit 12 - Our growth forecasts for the plant-based meat occasion



Source: RBC Capital Markets estimates

Using these assumptions, we forecast that the plant-based meat sector reaches just under US$ 50bn of retail sales in 2055 and develops from 3% of the meat occasion last year to 15% penetration.

Exhibit 13 - Our long-term forecasts for the global meat occasion (excluding Asia Pacific)



Source: RBC Capital Markets estimates, Euromonitor

Even after securing 15% penetration and with growth moderating, we expect the plant-based category continues to outperform the meat category and fill white space with penetration stretching to 30% by 2100. This is broadly in line with the Kearney report we referenced earlier which estimated plant-based meat reaches 25% of the meat occasion long term.

The other conclusion we can draw from this exercise is that there is still significant potential in traditional meat. It goes from an estimated US$ 160bn category in 2025 to a US$ 260bn category by 2055. There is significant scope for meat to not only meet the growing population's protein demand but also to tailor products and agriculture methods towards the environmental and health concerns prevalent in developed markets.

Clearly, we could be wrong here. Firstly, the opportunity could be even bigger; as we have used Euromonitor's 2025 estimates as a base, our forecasts exclude food service. It also excludes plant-based meat used within processed snacks and meals; Conagra Brands forecasts another US$ 5bn in plant-based meat could come from plant-based meat within prepared meals and snacks. It could also be smaller; given the indulgence of meat as an occasion relative to milk, it might not be able to reach a similar penetration to plant-based milk. Alternatively, consumers could flock to cell-based meat as it comes to market; it might be cheaper and tastier than plant-based options long term.

We conclude that plant-based meat is a significant commercial opportunity for our coverage. It doesn't move the needle for our companies right now but it very much could in the future. For example, if Kellogg can hold onto its current 18% share of the category in North America, meat substitutes could represent 8% of its sales by 2050 (assuming Kellogg grows 3% long term) relative to 2.6% of sales now. We also think that there are cultural (as well as ESG) implications for the companies that are adapting their portfolios to embrace this category; it shows forward thinking and agility in our opinion.

So…who is involved in the category?

The players

Private label penetration

Branded goods currently dominate the meat substitutes category. Although increasing, private label share remains significantly lower than in traditional meat (as expected given the category's maturity). Many in our coverage expect intense private label competition to come in the category. Asia Pacific is the anomaly (but private label share in general is low).

Exhibit 14 - Private label share in 2020 shows branded players dominate in meat substitutes

Geography	Meat Substitutes	Processed Meat
North America	2.2	16.7
Western Europe	16.4	48.6
Asia Pacific	7.0	4.5
World	7.4	23.5

Source: Euromonitor, RBC Capital Markets

The branded players

Our industry contacts estimate local competitors dominate, with some 60% of meat substitutes retail share held by local players. Competition remains elevated and our industry contacts see new entrants every other month. However, several think the pace of entry is starting to slow with new players struggling to break into the market.

Our market share data tells a slightly different story; some first movers such as Beyond Meat, Nestlé and Maple Leaf Foods have managed to carve out significant share and maintain dominance whilst others have been losing share over the past few years. In the following tables we highlight the top players in North America and Western Europe.

Exhibit 15 - Market share of the top meat substitutes players in North America

Geography	Category	Brand Name	Company Name	2020	Market share gain/(loss) in bps (CY18-20)
North America	Meat Substitutes	Beyond Meat	Beyond Meat Inc	23.2	1,710
North America	Meat Substitutes	Morningstar	Kellogg Co	17.0	-1,040
North America	Meat Substitutes	Gardein	ConAgra Brands Inc	6.5	-450
North America	Meat Substitutes	Field Roast	Maple Leaf Foods Inc	5.7	130
North America	Meat Substitutes	Lightlife	Maple Leaf Foods Inc	4.4	80

Highlighted companies are those we spoke to in preparation of this report.
Source: Euromonitor, RBC Capital Markets

The data shows Kellogg Company and Conagra Brands have lost sizeable share in the last 24 months in the face of positive category trends. In the last 12 months Euromonitor only found three companies gained share; Beyond Meat (market share +930bps in 2020), Maple Leaf Foods (+120bps) and new entrant Meatless Farm (market share +10bps).

And here are the top players of Western Europe. We also include Unilever given it aims to be an increasingly significant player in the space.

Exhibit 16 - Market share of the top meat substitutes players in Western Europe

Geography	Category		Company Name	2020	Market share gain/(loss) in bps (CY18-20)
Western Europe	Meat Substitutes	Quorn	Monde Nissin Corp	16.7	100
Western Europe	Meat Substitutes	Rügenwalder Mühle	Rügenwalder Wurstfabrik Carl Müller	5.0	130
Western Europe	Meat Substitutes	Garden Gourmet	Nestlé SA	4.9	90
Western Europe	Meat Substitutes	Linda McCartney	The Hain Celestial Group Inc	3.9	20
			...		
Western Europe	Meat Substitutes	The Vegetarian Butcher	Unilever Group	1.1	10

Highlighted companies are those we spoke to in preparation of this report.
Source: Euromonitor, RBC Capital Markets

We note that in Europe, private label has so far gained a substantial 16% share and the companies in our coverage expect this to continue to increase. In North America it holds only 2% share currently (unsurprising given private label is generally less of a thing in this region).

We also spoke to Cranswick and Hilton Foods on plant-based, two European meat processors who aren't featured in these tables. This is because they don't own the brands. Hilton Foods does play in the meat substitutes space; currently it packages plant-based meat products by Beyond Meat and Unilever and has a JV with B2B plant-based meat processor Dalco. Cranswick is yet to enter the space of meat substitutes as it sees enough opportunities in meat and vegetarian continental products such as halloumi.

Before we move onto plant-based dairy, here's a summary of what we know so far.

- In terms of meat alternatives, plant-based meat is more scaled than cell-based;
- Growth has already been impressive (from a small base). However COVID-19 could have been a game changer exacerbating consumer trial and health & environmental concerns;
- There is still significant white space and we believe strong structural drivers will ensure the continued growth of plant-based;

- It is ethically and environmentally a good thing to be selling plant-based products in our view. There are significant ESG-creds to be earnt by any company in this space;
- The short-term barriers to consumer adoption are price, taste and healthy innovations by meat manufacturers. Looking longer term, demand for natural ingredients and competition with cell-based meat could prevent consumption shifting into plant-based.

From page 33 we summarise our key takeaways from our discussions with eight players in the plant-based meat and/or traditional meat space: Kellogg Company, Conagra Brands, Maple Leaf Foods, Nestlé, Unilever, Hilton Foods, Cranswick and Beyond Meat.

Dairy and beyond: Examining the plant-based dairy category

Lifting the lid: Current state of the market

Product A: Milk and yoghurt alternatives

Like their dairy equivalents, plant-based milk and yoghurt products are relatively similar to one another (although not yet as commoditised as their dairy counterparts in our opinion). The biggest difference is which plant protein each product uses. For example, Danone's Alpro now sells plant-based milk using at least seven different plant proteins including nuts, coconut, rice, oat and soya. The category has expanded from drinking milk into other milk products: flavoured drinks, yoghurts and ready-to-drink coffee.

Exhibit 17 - A few examples of milk and yoghurt substitutes

Source: alpro.com, oatly.com, activia.us.com

Product B: Plant-based spreads

The spreads category is polarised between dairy butter (containing milk solids, often in block form) and plant-based butter; mostly in spread form (margarine) and vegetable oil-based. Margarine has been around for over a century (it was initially developed as a cheap alternative to butter) and traditionally has a slightly different performance profile and lighter taste. This has left a gap in the market for emerging plant-based butter products which endeavour to rival the creamier taste and appearance of dairy butter despite still being vegetable oil-based.

Exhibit 18 - A few examples of plant-based spreads

Source: Upfield.com, smartbalance.com

Product C: Dairy alternative cheese

Dairy alternative cheese is one of the smaller segments of dairy alternatives. Given difficulties in replicating taste (of particular importance given cheese is viewed as an indulgent product) and performance (it's difficult to grate or melt most plant-based cheeses), penetration of the dairy cheese category has been relatively limited so far.

Exhibit 19 - A few examples of dairy alternative cheese

Source: Upfield.com, vitalitedairyfree.co.uk

Product D: Cell-based dairy

Like cell-based meat, the cell-based dairy category is in its early stages and not yet commercialised. The more advanced attempts have been in cell-based milk which uses a similar process to that shown in Exhibit 6. It collects and multiplies cells found in milk and induces lactation resulting in milk developed without the use of animals.

Product E: Everything else

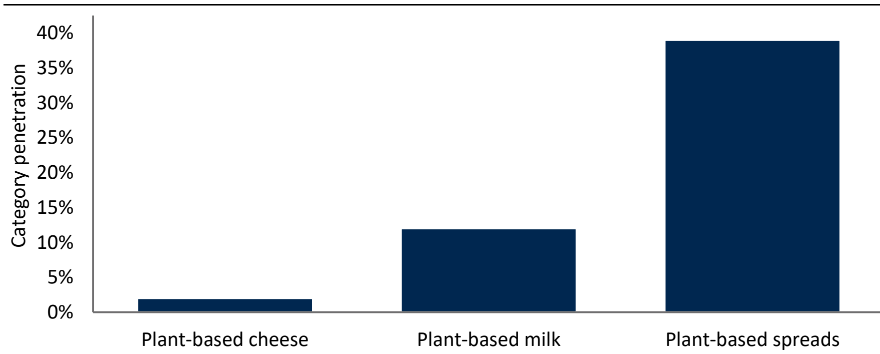
Clearly, the dairy category encompasses many different products. We haven't touched on ice cream, desserts or condiments such as mayonnaise and sour cream. These remain small but plant-based dairy continues to expand into these sub-segments; US plant-based ice cream grew 34% between 2017 and 2019.

Lifting the lid: Current penetration

Penetration varies widely amongst dairy alternatives. Plant-based spreads, given the maturity of the margarine category, is the most mature reaching about 40% of the overall butter & spreads occasion in 2020 according to Euromonitor. (Euromonitor defines 'Butter' as including milk fats whilst 'margarine' is made from vegetable oils. Therefore plant-based butter, although marketed as butter, still lies in the 'margarine' Euromonitor category.)

Plant-based milk is the next most mature with the companies in our coverage estimating 10-15% penetration of the milk category (with one top-end estimate of 20%) in developed markets. This is reflected in our Euromonitor data which estimates milk alternatives generated US$ 17bn retail value in 2020 and consisted of 12% of the total milk occasion. We don't have data around other dairy-free products, however according to our industry contacts plant-based cheese is only 1-2% of the cheese category. We remind readers plant-based meat has also only achieved low single digit penetration in developed markets.

Exhibit 20 - Penetration by category in dairy alternatives



Source: Euromonitor, RBC Capital Markets estimates based on conversations with industry contacts

Penetration by geography

We excluded Asia Pacific from our plant-based meat data as we felt high consumption of tofu clouded our conclusions. Similarly, milk alternatives have been entrenched in Asian diets far longer than elsewhere as Asia has higher levels of lactose intolerance. Asia Pacific consists of over half the global milk alternatives category according to Euromonitor.

In contrast to the meat alternatives category, Western penetration of milk alternatives is already catching up with Asia. Only five years ago, dairy alternatives' penetration in Asia Pacific was double that of North America. This gap has closed; milk occasions in both regions are 16% plant-based (while Australasia and Western Europe aren't too far behind). To demonstrate, excluding Asia reduces plant-based milks' global penetration from 12% to 9% whilst plant-based meat's penetration falls from 11% to 3%.

Exhibit 21 - Plant-based milk category penetration by geography

Geography	Traditional Milk category (retail value, USDm)	Milk Alternatives category (retail value, USDm)	Milk Alternatives as % of milk occasion
World	120,208	16,876	12%
Asia Pacific	48,638	9,385	16%
Australasia	3,173	267	8%
Eastern Europe	8,319	210	2%
Latin America	12,534	687	5%
Middle East and Africa	10,640	488	4%
North America	16,337	3,202	16%
Western Europe	20,567	2,638	11%

Source: Euromonitor, RBC Capital Markets

In spreads, margarine is well-penetrated in all regions (and over half the category in some).

Exhibit 22 - Plant-based spreads category penetration by geography

Geography	Butter category (retail value, USDm)	Margarine category (retail value, USDm)	Margarine as % of spreads occasion
World	22,729	14,829	39%
Asia Pacific	2,543	1,584	38%
Australasia	335	414	55%
Eastern Europe	3,940	2,001	34%
Latin America	1,781	1,885	51%
Middle East and Africa	2,106	2,080	50%
North America	4,555	2,098	32%
Western Europe	7,469	4,767	39%

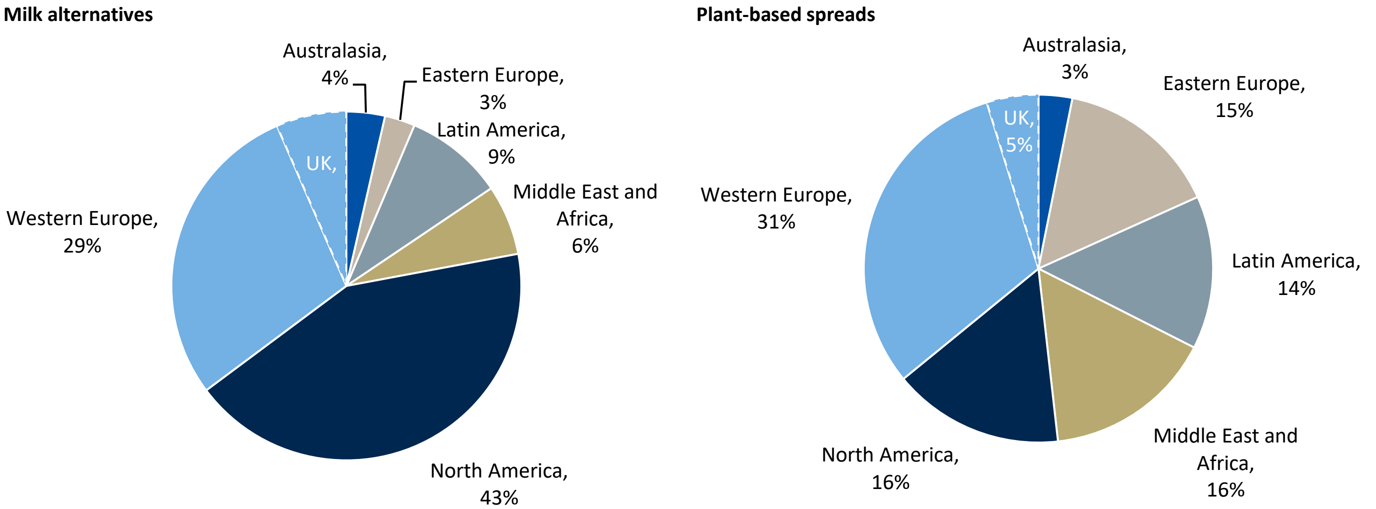
Source: Euromonitor, RBC Capital Markets

We think plant-based cheese is most prominent in the plant-based hotspots Western Europe, North America, Brazil and Israel.

On the following page is the geographical split of milk alternatives and margarine. We've excluded Asia Pacific again for consistency with our equivalent plant-based meat chart in Exhibit 8. Excluding Asia, North America and Western Europe are by far the largest consumers of milk alternatives. Plant-based spreads are split fairly equally between regions.

We've also split out the UK once again. Although it enjoys higher penetration in plant-based spreads, it's not remarkably more advanced in plant-based milk with UK penetration in line with the rest of Western Europe.

Exhibit 23 - Geographical split of the plant-based milk and spreads category



Source: Euromonitor, RBC Capital Markets

Remaining barriers to consumer adoption

Although penetration has developed faster than in plant-based meat, there are still some remaining headwinds for the plant-based milk category.

Sensory experience

Some plant-based products have come a long way to replicate the sensory experience of dairy (for example, barista oat milk which can froth like milk and plant-based yoghurt, which pretty much tastes the same as its dairy equivalent in our view), others have not.

For example, our industry contacts believe the failure of plant-based cheese products to closely replicate the taste and performance of dairy cheese has led to limited penetration. We believe cheese is an indulgent food occasion which makes taste of paramount importance. In addition, cheese is multi-purpose; many varieties must be able to melt or be grated, which has so far been difficult to replicate. We think it is unlikely the plant-based cheese category will reach full adoption potential until the sensory experience of these products is improved.

Consumption occasions

Meat occasions surpass dairy occasions (milk and butter is largely limited to breakfast and dessert whilst cheese does not commonly feature in breakfast) in our opinion which could limit the plant-based dairy category's growth long term. However, milk and butter alternatives have been able to develop higher penetration than plant-based meat. We think this is because milk and butter are consumed in a less indulgent manner, rarely forming the centrepiece of a meal, and products are more commoditised (resulting in less discriminating consumers). This potentially implies plant-based milk and spreads can seize a bigger proportion of the category long term than meat can. We don't think the same can be said for cheese.

Price

A more short-term barrier to consumer adoption is price. We think costs should come down as supply chain capacity increases and players consolidate. Given the consensus from our industry contacts seems to be that plant-based products are higher margin than their equivalents, we think there is room for price optimisation.

Health

The companies in our coverage highlighted to us the health benefits of dairy (calcium, protein and probiotics to name a few). We think plant-based dairy products will need to ensure they replicate these benefits to push penetration further. In addition, consumers are demanding more natural ingredients, and plant-based dairy (like meat) is processed.

We note that our industry contacts do not think that health is a major barrier in the plant-based cheese category given it serves an indulgent occasion.

Cell-based products

As we've already discussed, cell-based dairy is currently unscaled and uncommercialised. It's even further behind cell-based meat which our industry contacts estimate is still years from commercialisation. There are also several barriers to its development; technological advancement, transparency around its environmental impact and better cost structures are needed while consumer acceptance is uncertain.

That said, milestones are being reached; the first cell-based milk company went public last month. BioMilk, a start-up producing cow (and human breast) milk from cells listed on the Tel Aviv Stock Exchange in April and plans to release its first samples in the next two years. Although distant, we do think this category could drive additional growth in the dairy alternatives category and it definitely could take share from plant-based dairy long term.

Population growth

We mentioned the global population is expected to reach almost 10 billion by 2050 according to the Good Food Institute. This will undoubtedly come with increased dairy demand that at the moment cannot be serviced by alternative products. The scale and geographic reach of the dairy industry makes it much better placed to seize this opportunity.

Category potential: Mooving on

Category growth rates

Our industry contacts have witnessed a step up in attention paid to the dairy alternatives category during COVID-19. Purchase frequency as well as penetration gains have ramped up. According to Euromonitor, both plant-based milk and spreads enjoyed an acceleration in growth. The Good Food Institute estimates the plant-based cheese and yoghurt categories have also been growing healthily; US retail sales were +51% and +95% in 2017-19 respectively.

As mentioned in our meat section, we believe this has been driven by increased at-home cooking and experimenting as well as a step up in awareness about health and the environment. Danone notes plant-based dairy is growing faster in the US than the rest of the world (we can also see this in the Euromonitor data).

Exhibit 24 - Historical growth in dairy alternatives

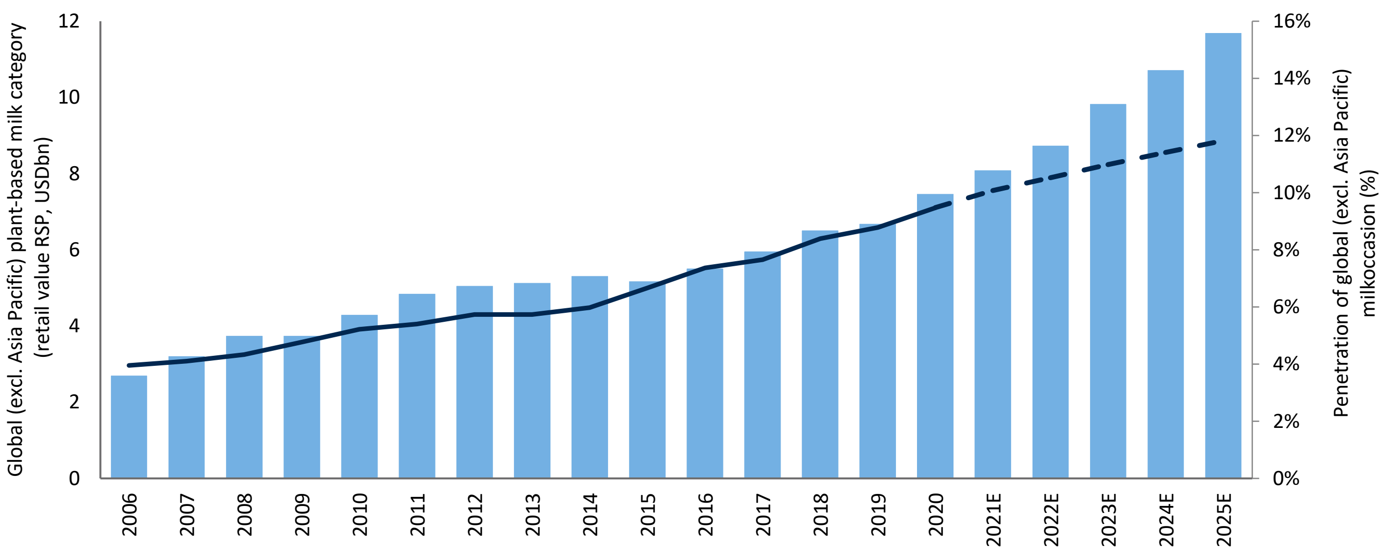
	Milk alternatives		Plant-based spreads	
Geography	Category growth 2015-2019 CAGR: %	Category growth 2020: %	Category growth 2015-2019 CAGR: %	Category growth 2020: %
World	2%	4%	-1%	3%
Asia Pacific	0%	-2%	-1%	7%
Australasia	5%	1%	-7%	-5%
Eastern Europe	32%	23%	1%	1%
Latin America	-3%	-3%	-1%	-3%
Middle East and Africa	9%	7%	5%	5%
North America	5%	17%	-5%	7%
Western Europe	11%	11%	-2%	3%

Source: Euromonitor, RBC Capital Markets

Quantifying the potential: Milk

Euromonitor expects the global plant-based milk category to evolve into a US$ 12bn opportunity by 2025. (We exclude the relatively mature Asia Pacific market as we don't think there's a significant growth opportunity here; plant-based milk already enjoys strong penetration in the region and growth has been lacklustre in recent years). This compares to a smaller $7bn plant-based meat opportunity by 2025.

Exhibit 25 - Euromonitor forecasts a US$ 12bn global plant-based milk category by 2025 (excluding Asia Pacific)



Source: Euromonitor, RBC Capital Markets

We believe there is more runway for growth in the plant-based meat category given its lower penetration; even by 2025 it is expected to only hold only 4% of the global meat opportunity (excl. Asia Pacific) whilst plant-based milk will hold 12%. There are a few reasons why stronger penetration has been reached thus far (lactose intolerance and commoditisation of milk making consumers less picky about taste) but we believe plant-based meat should eventually achieve similar penetration.

Quantifying the potential: Spreads

The growth opportunity for plant-based spreads is narrower in our view. The category is only expected to grow 17% over the next five years (relative to over 50% in the other plant-based categories) and plant-based penetration is expected to *decline* from 40% in 2020 to 37% in FY25E. We think a decline is unlikely given recent innovations in plant-based butter and ongoing flexitarian trends. However we agree that there is much less growth potential in plant-based spreads than in the other two sub-categories.

Quantifying the potential: Cheese

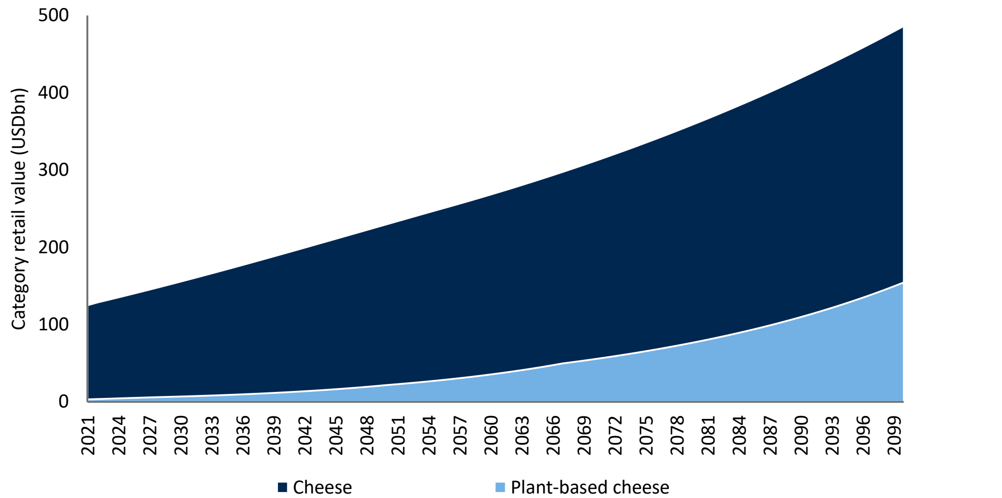
We think plant-based cheese enjoys the largest potential in plant-based dairy. We don't have data on the category however we understand from our industry contacts that plant-based cheese has so far only secured a low-single-digit penetration of the cheese category in developed markets. We use Euromonitor's estimate of the size of the cheese category in 2019 (in order to look at a more normal year prior to COVID-19) to estimate the size of the plant-based cheese opportunity if it gained penetration at a similar pace to plant-based meat.

Our industry contacts estimate the global cheese category is currently growing 2-3%. Euromonitor estimates 5% CAGR 2021-25 however we think this is quite bullish. We model the cheese category declining slowly from 3% to 1.5%. We have excluded Asia Pacific once again from our global forecasts for completeness.

Growth in plant-based cheese is currently very high (but from a low base); US retail sales in plant-based were +51% from 2017-19. We assume growth of 15% in 2019 moderating over time to 3.5% once plant-based cheese reaches 15% penetration (this is also what we forecast for plant-based meat). We estimate reaching this penetration will take longer than in meat; plant-based meat hits 15% penetration in 2055 whilst plant-based cheese reaches the same level in 2068. Although technological advancement and investment in plant-based cheese is accelerating, many products are yet to effectively compete with cheese in terms of taste and performance which will hold penetration back. For meat, this has already been achieved. Cheese is also much more varied in taste, texture and performance therefore many different plant-based innovations will be required.

Our assumptions result in plant-based cheese growing from c. US$ 2bn in 2019 with only 2% penetration of the cheese category to 10% penetration in 2055 with a huge US$ 28bn of sales.

Exhibit 26 - Our long-term forecasts for global plant-based cheese (excluding Asia Pacific)



Source: RBC Capital Markets estimates

In the same way that participation in plant-based meat has positive implications for ESG and culture, we think the same is true for plant-based dairy. Our research on ESG implications in the first section of this report implied that the development of plant-based cheese is particularly going to move the dial environmentally; dairy milk's negative impact seemed to be to a lesser extent. Plus, dairy milk has some health benefits (if you're not lactose intolerant).

Danone and Saputo seem best-placed in our coverage to benefit from plant-based trends given both have big ambitions for the plant-based cheese space whilst Danone is also well-positioned to benefit from any additional penetrations gains to be secured in plant-based milk.

The players

Private label penetration

Although the plant-based milk category remains generally fragmented, private label has gained material share. In fact, it has already reached a similar level to plant-based spreads (even more in North America) despite the much higher maturity of the plant-based spreads category. If private label was a brand, it would enjoy the second and third largest share in Western Europe and North America's plant-based milk categories respectively. Given the commoditisation of milk (private label holds nearly 50% share in North America and Western Europe), we expect competitive pressures to continue.

Exhibit 27 - Private label share in 2020 shows branded players dominate

Geography	Milk: Dairy	Milk: Plant-based	Spreads: Dairy	Spreads: Plant-based
North America	47.9	14.8	38.6	7.6
Western Europe	47.7	18.6	31.1	18.3
Asia Pacific	1	0.1	0.4	2.2
World	17.8	6.1	21.3	9.0

Source: Euromonitor, RBC Capital Markets

We don't have data behind the plant-based cheese occasion but the Good Food Institute estimates private label products consisted of only 2% of the US category's retail sales in FY19. We think this is reliable; it estimated a 14% private label share for plant-based milk similar to

Euromonitor's 15%. In all cases, the plant-based dairy category continues to be dominated by branded products.

The branded players

The table below presents the combined market share of the top ten brands in each sub-category. The top ten brands dominate the plant-based categories, though given the dynamism of the categories we think that top ten is likely to fluctuate more than for animal products. In plant-based cheese, competition is particularly low; the Good Food Institute reported that the top ten brands produced 94% of the category's 2019 retail sales.

Exhibit 28 - The combined market share of the top ten brands

	Animal products			Plant-based		
Geography	Milk	Spreads	Meat	Milk	Spreads	Meat
North America	31.6	39.2	35.7	65.3	79.7	69.6
Western Europe	18.0	34.1	11.9	55.1	43.7	41.7

Source: Euromonitor, RBC Capital Markets

Our industry contacts maintain that competition remains elevated in the categories with many new players seen each year. However it looks like not many have been able to materially break in. That said, in plant-based meat we discovered there had been substantial share price gains and losses between the top players in the last few years which supports this view. Let's see if this is the case in plant-based milk and spreads.

Exhibit 29 - Top players in dairy alternatives in North America and Western Europe

Geography	Category	Brand Name	Company Name	2020	Market share gain/(loss) in bps (CY18-20)
North America	Milk Alternatives	Silk	Danone, Groupe	28.7	-240
North America	Milk Alternatives	Almond Breeze	Blue Diamond Growers	25.2	200
North America	Milk Alternatives	Califia Farms	Califia Farms LP	3.6	50
North America	Milk Alternatives	Ripple	Ripple Foods Inc	2.0	60
North America	Milk Alternatives	So Fresh	Earth's Own Food Co Inc	1.7	20
North America	Milk Alternatives	So Delicious	Danone, Groupe	1.4	10

Geography	Category	Brand Name	Company Name	2020	Market share gain/(loss) in bps (CY18-20)
Western Europe	Milk Alternatives	Alpro	Danone, Groupe	25.1	130
Western Europe	Milk Alternatives	Oatly	Cereal Base CEBA AB	9.2	380
Western Europe	Milk Alternatives	Bjorg	Koninklijke Wessanen NV	5.0	-90
Western Europe	Milk Alternatives	Chufi	Lactalis, Groupe	4.6	40
Western Europe	Milk Alternatives	Provamel	Danone, Groupe	3.8	-30

Notes: Highlighted companies are in our coverage or those we spoke to in preparation of this report.
Source: Euromonitor, RBC Capital Markets

We spot a similar phenomenon in plant-based milk with several of the top brands losing share in Western Europe, and Danone's Silk losing significant share in North America between 2018 and 2020.

On the next page, we look at plant-based spreads.

Exhibit 30 - Top players in dairy alternatives in North America and Western Europe

Geography	Category		Company Name	2020	Market share gain/(loss) in bps (CY18-20)
North America	Margarine and Spreads	Country Crock	Upfield Holdings BV	15.7	0
North America	Margarine and Spreads	I Can't Believe It's Not Butter!	Upfield Holdings BV	14.4	20
North America	Margarine and Spreads	Blue Bonnet	ConAgra Brands Inc	8.6	-10
North America	Margarine and Spreads	Becel	Upfield Holdings BV	8.5	-50
North America	Margarine and Spreads	Land O'Lakes	Land O' Lakes Inc	8.2	-40

Geography	Category		Company Name	2020	Market share gain/(loss) in bps (CY18-20)
Western Europe	Margarine and Spreads	Becel	Upfield Holdings BV	9.9	10
Western Europe	Margarine and Spreads	Flora	Upfield Holdings BV	6.1	20
Western Europe	Margarine and Spreads	Rama	Upfield Holdings BV	6.1	-10
Western Europe	Margarine and Spreads	Lätta	Upfield Holdings BV	5.2	10
Western Europe	Margarine and Spreads	St Hubert	St Hubert SAS	5.0	30
Western Europe	Margarine and Spreads	Dairy Crest	Saputo Inc	2.5	10

Notes: Highlighted companies are in our coverage or those we spoke to in preparation of this report.
Source: Euromonitor, RBC Capital Markets

Market share moves (although both positive and negative) are significantly smaller here. This makes sense given the maturity of the plant-based spreads category relative to plant-based milk or meat. We think competition is significantly less elevated in this sub-segment. In addition, Upfield does dominate; it holds over 40% of the category in both Western Europe and North America.

Plant-based cheese remains small as a category and we have limited data. However some of the leading brands are Violife (owned by Upfield), Follow Your Heart (owned by Danone) and Field Roast (owned by Maple Leaf Foods).

We've discussed a lot, so we thought we'd sum up what we know so far.

- Plant-based spreads have held strong penetration for decades whilst the drinking milk category has accelerated in recent years and now holds double digit penetration of the milk occasion. Plant-based penetration is weaker in the more indulgent dairy categories of cheese and ice cream;
- There is still significant white space in plant-based cheese and we believe strong structural drivers will drive growth (however product quality will be of paramount importance). There is some scope for further growth in plant-based milk;
- Given the environmental impact of livestock farming and health concerns around antibiotic use, companies involved in plant-based dairy will not only be financially rewarded;
- The main barriers to adoption that remain are sensory experience (particularly in cheese), price and health given the nutritional benefits of dairy such as calcium. Looking longer term, growth could be restrained by: i) the fact dairy consumption occasions may be more limited than meat, ii) competition from cell-based dairy and iii) population growth which demands dairy products faster than plant-based companies can produce.

Over the next few pages, we summarise key company views of the plant-based market, strategies and activities. Pages 36, 41 and 43 focus on plant-based dairy; we discussed the subject with plant-based spreads producer, Upfield and leading milk player, Saputo. We also include Danone as a major player that has spoken at length on the subject at its conferences; however the company was unable to speak to us in this occasion.

Company profiles

Beyond Meat – Not covered

1. Beyond Meat's view of the plant-based market

Beyond Meat estimates the global meat substitutes market is US$ 14-15bn today. This compares to a US$ 1.4trn global meat category. Its penetration varies geographically with North America making up c.40% of the global category in 2018 (including food service and retail). In Q4 20 its US household penetration was 5.3%. Adoption has been even faster in Canada.

In the US specifically, replicating the 13% penetration of dairy alternatives implies a potential US$35bn category. Beyond Meat thinks it could even surpass this penetration level as: 1) dairy occasions are limited whereas meat can be included at every meal, and 2) milk alternatives have been unable to completely mimic the sensory experience and performance of milk. If you can offer the same sensory experience at a similar price and in a healthier and more sustainable product then there will be no ceiling to its penetration in Beyond Meat's opinion.

2. Beyond Meat's plant-based strategy

Beyond Meat's over-riding purpose is to offer consumers a healthier and more environmentally friendly way to consume meat without compromising on the sensory experience. This last point is key – in surveys consumers do care about health and sustainability however when voting with their wallets, it's the great tasting products that sell. Taste is what will grow the category. Beyond Meat continuously innovates to ensure it offers the best sensory experience - Beyond Burger 4.0 prototypes are already being tested. It continues to extend its product range to new meat occasions to ensure consumers can find environmentally favourable options at all times. It is targeting flexitarians and notes 95% of people purchasing plant-based burgers when dining out are also purchasing beef burgers.

Beyond Meat's ongoing obstacle is price. It targets at least one major product at price parity with animal protein within three years. Its top selling SKU (the burger 2-pack) currently retails at US$12/lb whilst animal burger patties range from US$3/lb to US$7-8/lb for organic and grass fed. The key to getting its price down is: 1) supply chain maturity (namely increased pea protein production capacity); 2) economies of scale; 3) internalising finished goods production. Beyond Meat is aiming for a mid-30s gross margin in the long term (it has only just turned positive EBITDA).

Beyond Meat started in the food service channel where restaurants helped with marketing costs and brand building. It has now expanded into retail. In the early stages of the company, Beyond Meat looked into cell-based meat: it is not wedded to a particular technology and would pursue if it could become a mainstream product. It has concerns about its cost curve, scaling ability, consumer acceptance and inferior nutrition profile given meat compounds are criticized for health risks. It thinks it will become meaningful in a few years.

3. Plant-based activities

Beyond Meat's business is entirely in the plant-based meat occasion. Its product range includes burgers, meatballs and breakfast items. Its current gap is snacks however this will likely change after the recently announced PepsiCo deal. A study with the University of Michigan on the life cycle of its plant-based burgers relative to a typical 80/20 animal burger found that Beyond Burgers use 99% less water, 93% less land, 90% fewer greenhouse gas emissions and 46% less energy. Beyond Meat recently announced a deal with McDonalds to be its preferred supplier for the McPlant patty as well as explore additional menu items. It also announced an agreement with Yum Brands to supply plant-based options to chains such as KFC, Pizza Hut and Taco Bell.

4. Stock implications

Beyond Meat is not covered by RBC.

Conagra Brands, Inc. (NYSE: CAG) – Sector Perform, price target USD 38

1. Conagra Brands' view of the plant-based market

Assuming a 15% penetration (the likes of which has been achieved in dairy alternatives) in meat, the US plant-based meat opportunity could be US$ 30bn. US$ 25bn of this would be 'center of plate' products (such as a plant-based burger) and $5bn would be meat within meals and snacks.

Like Unilever, Conagra Brands think that motivations for plant-based depends on consumer age - health plays a more significant role amongst older people whereas younger generations are focused on the environmental impact. Conagra Brands thinks COVID-19 *has* led to a substantial step change in consumer interest in plant-based products. It expects roughly half the delta between current plant-based meat growth rates and pre-COVID-19 growth rates in US retail is due to a step change in interest. (The other half is due to a shift into at-home consumption).

After a stream of new entrants into the space, CAG has seen the rate of new entrants slow down recently. It also notes that the market remains dominated by the first movers – recent entrants have not managed to gain much share.

2. Conagra Brands' plant-based strategy

Conagra Brands is heavily focused on taste and flavour. It thinks this is its differentiation and continuously innovates its plant-based products to get the best taste. In terms of its product strategy, it sees two opportunities: meat substitutes and using plant-based ingredients within packaged meals and snacks for consumers looking to make smarter decisions. It sees its meat substitutes range as more of a 'must-have' to remain competitive. It is more excited about the latter - opportunities to add non-meat products to existing product ranges such as frozen foods and soups. There is also a margin opportunity here given plant-based ingredients are cheaper than meat and end product price is unlikely to change.

Like Nestlé, CAG is focusing on retail as it is concerned about the lack of brand-building opportunities in food service - it expects current QSR branding to be phased out and for the food service opportunity to become focused on price and fulfilment, limiting margins.

Conagra Brands thinks cell-based meat is an interesting opportunity however it is well away from being commercial. CAG also holds concerns about consumers' acceptance of the product.

3. Plant-based activities

Conagra Brands' core plant-based brand is **Gardein** which offers a range of meat and fish substitutes. Conagra is one of the only players we've spoken to in preparation of this report to have scaled plant-based fish products successfully. **Gardein** currently generates around US$ 200m sales (10% is in food service). CAG believes it has only just scratched the surface of the plant-based ingredient opportunity and looks to step up activity here. We also note it has a plant-based spread brand – **Earth Balance**. It has four other margarine businesses but these are not marketed towards the plant-based opportunity. It has launched some additional plant-based dairy products such as non-dairy whipped cream and hot cocoa mix.

4. Stock implications

Before COVID-19 hit the US, CAG arguably had its fair share of problems – primarily driven by a series of missteps with the integration of Pinnacle Foods. Pantry loading and stay at home orders ultimately served up a big boost for the company. While most of CAG's portfolio (outside of foodservice) should continue to benefit from elevated demand and a structural shift towards at home eating, we believe that is already baked into current valuation.

While we expect the company to benefit from the increasing popularity of plant-based products, we note that Conagra still has a large tail of low growth brands that serve as an offset to Gardein's growth.

Cranswick plc (LSE: CWK) – Sector Perform, price target GBP 39

1. Cranswick's view of the plant-based market

Cranswick envisages a future with both plant-based and animal protein. It expects meat consumption to continue to rise whilst the global population expands given meat alternative options are not yet sufficiently scaled to be able to meet the protein demand coming with that population growth; the world will *have* to eat meat. It highlights poultry in particular is seeing good growth (it is cheaper, healthier and more environmentally friendly than red meat) and notes UK farming (its dominant market) is much more sustainable and ethical than elsewhere in the world.

It is also cautious about the full ESG implications of scaling up plant-based protein given the lack of data and experience so far. It thinks cell-based meat is at least 10 years away from reaching any sort of scale. Cranswick thinks there is a lot of noise around the category – growth is strong but from a small base. In comparison, COVID-19 has driven strong growth in meat from a much larger base.

2. Cranswick's plant-based strategy

Cranswick continues to see strong potential in the animal meat category (see above) however it does look at all opportunities in the food space. It is too early to say whether it will eventually enter the plant- or cell-based meat space particularly given it is so far unsure whether the latter is commercially viable. For now, it is pursuing expansion in the poultry space as well as geographic diversification in meat.

3. Plant-based activities

Cranswick is currently uninvolved in the meat substitutes space. It does have a small vegetarian business within its Convenience division selling items such as halloumi and olives. It recently expanded this business with the acquisition of Katsouris Bros in 2019.

4. Stock implications

Cranswick is not involved in the meat substitutes category and assured us that it does not need to be. We get the impression that it is knowledgeable and well-read on the sector so we don't think Cranswick is head-in-the-sand about this. Its argument that population growth will continue to fuel meat demand is fair, however we can't help but notice Cranswick's current geographical split: none of its regions are exposed to this phenomena.

If we are right in this report, that meat substitutes are a category that are here to stay but that will take a number of years to reach a material proportion, we think Cranswick has a number of years to be right about this. However, looking longer term we think one of three eventualities will occur. Either Cranswick significantly geographically diversifies to remain exposed to the meat category in countries where population continues to grow, or it dominates the stagnating (and even shrinking) UK and European meat markets, or it diversifies into meat alternatives as UK and European meat growth opportunities dry up (following in the footsteps of meat-manufacturing peers Maple Leaf Foods and Hilton Foods). All options will involve significant capital investment.

Danone (NXT PA: BN) – Sector Perform, price target EUR 64

1. Danone's view of the plant-based market

We were unable to speak to Danone. However it has been forthcoming about the topic during previous public appearances. Danone believes consumers are becoming increasingly aware of their health: its research finds that 47% of the younger generations are eating more healthily with 30% willing to pay a premium for that. It expects health and environmental concerns, as well as a general trend towards protein, to drive high single digit growth in the plant-based category. It notes plant-based is growing faster in the US than the rest of the world.

According to previous CEO Emmanuel Faber at Danone's FY20 results call, recent accelerations of its plant-based business during COVID-19 have been provoked by a shift to at-home consumption as well as increased awareness of health and the environment. COVID-19 increased frequency and penetration gains (Kellogg also said this). It finds that consumers are sticky once becoming flexitarian. Danone notes penetration is already relatively strong in dairy (c. 15% in the US for example). It's much lower in categories such as cheese (2% in the US).

2. Danone's plant-based strategy

Environmental passion is baked into Danone's business decisions and it believes 'planetary' diets are an important environmental solution. It believes these diets will include dairy *and* plant-based products. Like Saputo, Danone continues to highlight the nutritional benefits of dairy (namely calcium and amino acids) and notes milk's less negative environmental impact vs meat (it has a fifth of the carbon footprint of beef and uses 60% less land). It also thinks retaining dairy will help consumers move away from a meat-heavy diet.

Danone targets €5bn plant-based sales by 2025 amounting to 15-20% of our forecast sales. This should mostly be achieved through category growth but also through extensions into new categories and geographies. For example, **Alpro** is present in double the number of markets it was when acquired. Danone thinks plant-based cheese is particularly exciting given its low penetration and food service potential.

3. Plant-based activities

Danone's plant-based business generated €2bn sales in FY20 (10% of Group sales). Through the acquisition of WhiteWave (the largest dairy alternatives business at the time) in 2017, it owns leading brands such as **Alpro** in Europe and **Silk** in US. It has a particularly strong footing in soy products. Danone has been pivoting its existing dairy portfolio towards the plant-based occasion. For example, it now has plant-based yoghurts under the **Activia** brand. It also recently acquired one of the largest US plant-based cheese brands **Follow Your Heart**.

4. Stock implications

WhiteWave made Danone a leader in plant-based milk. We like that it is using its acquired know-how to pivot the rest of its dairy portfolio towards the plant-based occasion. It is also, along with Beyond Meat, one of the few companies we looked at where we felt it has a real purpose other than just chasing growth - its (now ex-) CEO Emmanuel Faber has talked at length about reducing its environmental impact and we scored Danone highly in our sector ESG report.

That said, in our view Danone suffers from a relative lack of interest in its shareholders (not least, it was the only one in our global coverage that declined to speak to us in preparation of this report) and underwhelming financial performance. We also fear the commoditisation of milk alternatives (flagged by our industry contacts) given undifferentiated products and increasing private label share. Its US brand Silk has already lost significant share in the last few years. We hope Danone is agile enough to reverse this share loss and leverage its milk leadership to lead the plant-based occasion in other (less commoditised) dairy categories.

Hilton Food Group plc (LSE: HFG) – Outperform, price target GBP 15

1. Hilton Food's view of the plant-based market

Hilton is not keen to publicise its view on the meat free market, which we understand given its symbiotic relationship with customers and desire to avoid sharing competitively sensitive information. Management were very helpful and knowledgeable on the subject however.

2. Hilton Food's plant-based strategy

Hilton Foods notes opportunities have not run out in meat – it did not feel compelled to go into plant-based products but it does see it as an additional growth opportunity. It aims to be customers' protein partner of choice, no matter the protein. It is also innovating to make its meat products healthier – many meat substitutes don't match ongoing trends for natural, less processed foods. It believes there is a real opportunity with grain-fed meat and mixed meat and vegetable products.

It is increasingly diversifying into meat substitutes as it believes it presents an additional opportunity. It is building its knowledge of the segment with its JV with plant-based meat processer Dalco and has the option to use its existing packing technology to pack cell-based and plant-based meat. Overall, it expects the plant-based business to be additive to margins long-term.

3. Plant-based activities

Its plant-based business is small for Hilton Foods; only 2% of its total volumes (including Dalco). In the UK it sells a mixed meat/vegetable product and packs for brands such as Beyond Meat and The Vegetarian Butcher.

Dalco has been around since 1995 and now has a wide range of products. It has a B2B co-packaging model allowing it to share costs with the customer.

4. Stock implications

We found Hilton Foods very knowledgeable about the category. We have no doubt that as the category develops, Hilton Foods will get involved where it thinks it makes sense. In addition, Exhibit 13 demonstrates how much potential growth lies ahead in meat as well. It's been successful at winning contracts overseas and we expect it to become increasingly geographically diversified over the long term. Its heavy exposure to red meat (rather than healthier, environmentally less impactful meats such as poultry and pork) however could be a disadvantage. We would expect Hilton Foods to also further diversify within meat.

This will likely come at a cost; Hilton's acquisition and capital expenditure spend has been significant over the years and we don't think this will change as it tries to eek growth out of the meat category by expanding internationally and ramping up capacity in the plant-based space. However, our above-consensus capex expectations still imply strong upside to the share price.

Kellogg Company (NYSE: K) – Sector Perform, price target USD 67

1. Kellogg's' view of the plant-based market

Kellogg's believes the main contributor to recent growth in the category has been new fridge entrants such as Beyond Meat creating excitement in the category (which was previously dominated by frozen options) but also awareness of health and environmental benefits.

Although the category was growing well before, Kellogg's does think that COVID-19 has had a lasting impact on the plant-based segment. The CEO has called COVID-19 the 'greatest sampling event of our lifetimes'. It has also increased awareness of sustainability issues. Household penetration in meat substitutes still remains low however.

The category is very fragmented and Kellogg's think this is unlikely to change (although, like Conagra Brands, it notes the rate of new entrants have slowed down). K is yet to see signs of commoditisation within the category; it expects recent price actions by peers are due to COVID-19 (loss of out-of-home occasion) and not a sign of major retail price reductions to come.

2. Kellogg's' plant-based strategy

Kellogg's has products tailored to mainly vegetarians. More recently it has launched products marketed towards flexitarians. It does not have any explicit revenue goals however expects the category to continue to grow ahead of the rest of its portfolio.

K thinks its competitive advantage lies in its strong heritage in retail brand-building, understanding consumer behavior and innovation. It has not had to rely on QSR to absorb its marketing costs like Beyond Meat and Impossible Foods. It is also not heavily investing to pull consumers into the category given competition raises awareness for the category anyway and it has continued to grow nicely.

Kellogg's R&D team has looked into cell-based meat however for now, it thinks it has plenty of opportunities within plant-based products.

3. Plant-based activities

Kellogg's has multiple plant-based brands. Its biggest is **MorningStar Farms** which it acquired in 1999 and currently holds 17% share in North America according to Euromonitor. The brand has always been profitable under Kellogg's. It has traditionally targeted the vegetarian and vegan occasion (and this is where its largest share lies). K has recently has brought out new meat look-a-like products under its **Incogmeato** brand so it can also target the flexitarian market. It is focused on extending its product range to different meat occasions.

Lastly, we note K is phasing out two smaller plant-based brands **gardenburger** and **Kashi**.

4. Stock implications

We think management is making the right choices to position the company for future growth, but it will take time and progress likely won't be linear. Kellogg's should inevitably benefit from the structural shift towards more preparing/eating meals at home, but we would like to see some additional proof points that capabilities, consumer insights are improving and it can sustain top-line growth beyond the pandemic.

While Kellogg's certainly has a strong foothold in the plant-based category, it is not big enough to drive the company's overall top line (and the company has been losing share within tracked channel data).

Maple Leaf Foods Inc. (TSX: MFI) – Outperform, price target CAD 36

1. MFI's view of the plant-based market

Maple Leaf Foods expects the North American plant-based meat category to grow from low-single digits to CAD 25bn with similar penetration to non-dairy milk. MFI's view is that the growth in plant-based category will be largely fueled by flexitarians; its research shows the largest group of plant-based consumers are meat-eaters who want to reduce their meat intake for health reasons. MFI sees three consumer buckets – 1) very health conscious consumers interested in clean products with a healthy ingredient deck; 2) those looking for exact plant-based meat-replicas; 3) the foodies who are looking for new, indulgent and tasty food options. It finds those motivated by environmental factors are the loudest but actually a very small group.

Maple Leaf Foods also sees an opportunity for more sustainable meat options to take share of the overall meat category (non-GMO and reared without antibiotics for example).

2. MFI's plant-based strategy

MFI is extremely focused on creating healthier products with natural ingredients in both meat and plant-based. MFI wants to create as broad a range of products as possible to target the broadest range of consumers and offer the best selection for retailers. Deep channel experience in CPG/branded products/innovation should enable MFI to put forward a breadth of offering that will enable the company to gain share among the flexitarians who will drive segment growth. As an example, MFI recently rolled out the first pea-based stadium hot dog under the Field Roast brand.

Maple Leaf continues to innovate its meat offering to match consumer trends towards health and sustainability. For example, MFI is expanding its Raised Without Antibiotics herds (note pork and poultry already have less of an environmental impact than beef or sheep). MFI is not involved with cell-based meat for now as it's unsure it matches consumer trends for natural ingredients.

MFI is investing heavily in its plant-based meat business, with SG&A support C$ 150 MM annually, resulting in forecasted EBITDA loss in the $110-115 MM range in 2021, similar to 2020 results. Long term, MFI expects EBITDA margin on plant-based to be higher than meat as products are branded and have substantially lower input costs. MFI has two plant-based brands in order to target the different consumer buckets - its **Lightlife** brand focuses on health-conscious consumers whilst **Field Roast Grain** targets the foodies. Unlike Impossible Foods and Beyond Meat, MFI targets the retail opportunity more than food service based on the view that if the market is to get to $25bn, products need to become an integral part of food shop/weekly home meal plan. Maple Leaf currently enjoys the largest retail distribution out of Impossible Foods and Beyond Meat with 66% ACV share (a dollar weighted retail penetration number).

3. Plant-based activities

MFI's plant-based meat subsidiary Greenleaf Foods, makes up c.5% of group sales. **Lightlife** (with 4% market share in North America) and **Field Roast** (with 6% share according to Euromonitor) and are carbon neutral. MFI continues to extend its product range into different 'meats' and fill white space in retail. MFI also sells environmentally friendly meat products – Raised Without Antibiotics, vegetable and grain-fed and non-GMO meat, which are growing faster growth than traditional meat options. In 2020, 20% of MFI sales were generated from sustainable products.

4. Stock implications

Sustainability as a core pillar of Maple Leaf's strategy differentiates the company from most of its natural competitors, and positions it well from an ESG perspective. Investors are concerned about the magnitude of SG&A investments to support plant-based; our model points to MFI reaching break-even in the plant-based segment around 2024, assuming the segment achieves its targeted annual revenue CAGR of 30%. To date, MFI is facing stiff competition in the retail channel from Beyond, and latterly, Impossible in the grounds segment.

Nestlé S.A (SWX: NESN) – Sector Perform, price target CHF 102

1. Nestlé's view of the plant-based market

Nestlé sees the plant-based alternatives category as attractive given its small size relative to overall food consumption. Demand in the space has stepped up significantly over the last 12 months even after excluding lockdown-related channel shifts into at-home consumption. Interest is increasing across demographics, but most notably amongst young people.

Nestlé sees variations in plant-based drivers between markets. In Asia, the vegetarian occasion is already prevalent, whilst health and nutritional value is becoming an increasingly importance driver. In Western countries, sustainability plays an increasingly prevalent role. Its local marketing teams match brand messaging to local demand dynamics. The categories remain fragmented especially in milk (barriers to entry are lower given milk is a commoditised product).

2. Nestlé's plant-based strategy

Nestlé is present in both meat and dairy alternative categories. Nestlé has been involved in the vegetarian space for thirty years. Its target market is not just vegetarians/vegans but also the flexitarians we have discussed. It is focused on the downstream opportunity – reinvigorating its prepared dishes and cooking aid portfolio to contain plant-based alternatives (10% of R&D employees are dedicated to this). For example, it wants to expand its vegan chocolate range which it estimates is a CHF 100m opportunity. It also sees opportunities to enter more markets (its currently in 20). It is particularly excited about Asia where the vegetarian occasion is already commonplace but there is a lack of plant-based convenience foods under Western brands. Nestlé also plays in the meat substitutes category. It expects it to be highly price competitive.

Unlike some competitors, Nestlé is more interested in the retail opportunity (although it has some presence in food service), its thinking being that retail is where its know-how lies, branding is more visible, it can scale more quickly and the economics will be better. Its product strategy prioritises *differentiation* through taste and nutrition and its R&D teams are continuously looking for ways to improve the sensory experience and nutritional profile. For example, 80% of its **Garden Gourmet** products hold top marks with Nutri-Score. It thinks differentiation is easier in meat substitutes than in dairy – products are more varied, price points are higher and private label share is lower.

3. Plant-based activities

Nestlé generates over CHF 800m sales in products with plant-based ingredients (such as the vegetarian DiGiorno's pizza and the vegan KitKat). Within this, its dairy alternatives business is worth around CHF 120m sales and includes creamers, ice cream, chocolate and new plant-based milk brand Wunda. It also includes CHF 200m of what Nestlé calls 'meat analogues' under the **Sweet Earth** and **Garden Gourmet** brands. The latter holds 5% share of Western Europe retail according to Euromonitor. Its plant-based burger patties tend to have 80-90% fewer emissions than meat patties.

4. Stock implications

We like Nestlé's strategy – focusing on the downstream opportunity instead of fighting it out amongst the meat substitute players. Its market share is okay in Western Europe, however we agree eventual price competition is a concern. In any case, given Nestlé's scale, a CHF 200m business in meat substitutes is not going to move the share price of a CHF 92bn company.

Reinvigorating its entire prepared dishes and cooking aid portfolio might be more likely to move the needle. This category was 14% of sales in 2020. The segment's sales growth did double in 2020 however we are unsure how much of this was due to channel shifts in lockdown which we expect to at least partly unwind. We are wary of increasing competition in plant-based alternatives: many of Nestlé's competitors are making similar portfolio adjustments. Conversely we have no doubt that they will regard Nestlé as a formidable competitor.

Saputo Inc. (TSX: SAP) – Outperform, price target CAD 46

1. Saputo's view of the plant-based market

SAP believes dairy has well-defined nutritional benefits and while traditional fluid milk is in decline, cheese remains a low single digit growth category. Similar to Danone, SAP has seen a step up in attention on the dairy alternative category during COVID-19. Its reasoning is that COVID-19 has accelerated interest in at-home cooking and experimenting.

The dairy alternative cheese category remains highly under-developed with only low single digit penetration of the cheese category. There are no large players in the space and competition is low. SAP thinks the main barrier to entry has been the failure of non-dairy alternatives to replicate the taste and consistency of cheese; to date consumers are only open to dairy alternatives if they taste the same as their dairy equivalents. Health does not seem to be a factor in consumers' purchasing decisions in SAP's categories, noting that plant-based cheese has very little nutritional value. SAP has not seen a crossover between dairy-free and dairy cheese consumers cannibalisation in sales.

2. Saputo's plant-based strategy

Saputo sees dairy alternatives as a significant growth opportunity. SAP is already active in co-packing of plant-based beverages and would like to achieve national footprint in the category in the US. However, it is aware the plant-based beverages space appears saturated and expects it to become commoditised.

SAP sees the bigger opportunity in plant-based cheese given relatively low penetration and competition. The company intends to take early leadership in the category by leveraging its acquired know-how from **Vitalite** in the UK. SAP sees its main opportunity in food service given its expertise, supply chain, distribution network and customer relationships. SAP aims to partner with major foodservice chains to develop their menu with dairy alternatives. After establishing its food service presence, SAP also aims to scale in retail. The key differentiators will be taste, performance, and breadth of offer, which the category has lacked. SAP notes that profitability in non-dairy is similar to animal-based products, another reason why dairy-free cheese looks like a more attractive category than dairy-free milk – milk is more commoditised than cheese.

SAP also looks to play the role of consolidator in the dairy-free cheese space. To retain the strong brand equity of its cheese brands, it is unlikely to offer dairy-free cheese under its existing cheese brands unless the products offer consistency in flavour and quality.

3. Plant-based activities

Saputo has a significant footprint in dairy-free products already, selling non-dairy creamers and beverages in North America. Through its acquisition of Dairy Crest in the UK, it owns the dairy-free spread and cheese brand **Vitalite** and is now launching non-dairy cheese products in North America. In FY20, SAP hired a Senior Vice President, Business Development, Dairy Alternatives and is also scaling up its operations with a facility in Canada to be completed by end of the summer.

4. Stock implications

To date, investors have not focused on SAP's exposure to plant-based products as a core line of questioning or investment thesis. SAP's ability to efficiently engage in co-packing in the segment has the dual benefit of giving SAP a revenue/earnings stream in the somewhat mature category of plant-based beverages whilst simultaneously improving capacity utilization in the company's fluid milk facilities.

The potential opportunity within plant-based "cheese" is intriguing. From a foodservice perspective, technical qualities of any dairy substitute are critical. SAP's excellence and proven ability to adapt technical aspects of its cheeses to individual customer needs should give the company a strong base from which to develop its non-dairy offering. Size of the potential market remains unclear but should be largely incremental for SAP.

Unilever PLC (LSE: ULVR) – Underperform, price target GBP 37

1. Unilever's view of the plant-based market

Unilever agrees that plant-based products are gathering momentum and that consumers are becoming increasingly concerned with their health and the environment. Ethical concerns are also a driver. Flexitarians have become mainstream, expanding the plant-based segment beyond the traditional vegan/vegetarian consumer group. This is particularly true for the younger generation - Unilever's consumer research finds 'diet' is one of the areas that 18-24 year olds are most willing to change for the benefit of the planet. Ninety percent said they were willing to eat less meat.

2. Unilever's plant-based strategy

Unilever unveiled its Future Foods strategy last November and is fully embracing plant-based products. It targets €1bn sales in meat, egg and dairy alternatives over the next 5-7 years. It aims to drive non-animal protein sources, diversify plant-based crops and encourage more consumers to adopt a more plant-based diet. Its Knorr Good Food Lab conducts research into how to shift people's behaviour towards food that is better for health and the planet. It is also supporting the industry by advocating against meat lobbies trying to ban names like 'vegetarian butcher' and 'plant-based sausages'. The European Parliament has since voted against the ban.

Growth will include new categories and products as well as expansion of **The Vegetarian Butcher** into new markets.

3. Plant-based activities

We estimate Unilever has about €200m in plant-based sales currently. Unilever has already pivoted many of its brands into the plant-based occasion. The European Vegetarian Union logo is on over 3,000 products. It has launched vegan Magnum, Ben & Jerrys and Hellmann's mayonnaise variants. It aims to make 25% of Knorr's portfolio plant-based by 2025 and highlights vegetarian and vegan recipes on the brand's website. Unilever Food Solutions offers plant-based products to the food service.

Unilever acquired **The Vegetarian Butcher** meat substitute brand in 2018. It is now present in 40 markets across food service and retail (from one market at acquisition). It holds 1% share of Western Europe retail but is also present in Burger King in 26 countries. It claims to be significantly better for the planet, with its burger patty having 96% lower global warming impact vs EU pasture-based beef patty. It also contains more fibre and less saturated fat than meat.

4. Stock implications

Unilever appears to be following a similar strategy to Nestlé; as well as focusing on the meat substitutes opportunity it is launching plant-based alternatives for many of its existing brands.

However, like Nestlé, it has a scale problem. Even if it reaches €1bn in plant-based sales in five years' time, this will amount to just 2% of Group sales. In addition, we are concerned plant-based alternatives risks becoming a cost to compete rather than a peer-leading innovation. For example when we search the supermarket, there are already several vegan mayonnaises available besides Unilever's Hellmann's. That said, if innovation can spur category growth and share gains (or even just prevent share losses), then that's a good thing.

We will be interested to see how the meat substitutes category evolves. For example, Nestlé has pursued more of a retail strategy whilst Unilever's Vegetarian Butcher has expanded into both retail and food service. Given the success of Beyond Meat and Impossible Foods in food service in the US, we wonder if this gives Unilever an advantage, at least in the short term until food service supply exceeds demand which – given the difficulty of branding in food service, is likely to result in price pressure.

Upfield – not covered

1. Upfield's view of the plant-based market

Upfield span out of Unilever in 2018 as largely a spreads business. Today, Upfield is the largest plant-based food company in the world and the leading producer of plant-based spreads, butters, creams and cheeses globally.

Plant-based spreads were originally developed as 'margarine' over a century ago thanks to its favourable economics. Therefore the total spreads occasion (including both dairy and plant-based) is more heavily weighted towards plant-based products than, for example, the milk occasion. However, under Upfield's leadership margarine has started being recognized by consumers as aligned with the plant-based movement. Historically, the barrier to entry has been taste – dairy butter tasted creamier than previous margarines. This created a gap in the market for improved margarines and 'plant-based butter' which more closely replicate the taste and functionality of butter and allow customers to feel like they are not compromising.

Through research, Upfield found consumers are increasingly focused and concerned about the environmental impact of their food choices. However the key purchasing decision factors across categories are taste, texture and functionality as well as affordability and nutrition. (This is what we have heard from quite a few of the companies). Environmental concerns are typically more important for younger generations however. Consumer motivation slightly differs by geography and culture – taste and texture remains a fundamental but the importance of health, animal welfare and the environment varies.

Penetration of dairy-free cheese (c.1% of the total cheese market) is significantly lower than in spreads and milk (dairy-free milk is c.20% of the category). In addition to earlier development and distribution of milk-alternative products, one of the reasons behind this according to Upfield is that dairy alternative brands have had early adoption of the category by lactose- and dairy-protein intolerant consumers. This doesn't fully apply to cheese (certain varieties contain a very low level of lactose). Plus, cheese is a more complex product with local specialties and also more indulgent making taste of paramount importance.

2. Upfield's plant-based strategy

Since its formation in 2018, Upfield has been focused on its vision of 'A Better Plant-Based Future'; renovating its existing product portfolio and innovating further towards plant-based consumer trends. Renewed efforts focus on clean labelling, sustainability and natural ingredients. It also continues to innovate to create tastier dairy alternatives than are currently available. This has been successful so far; whilst in decline under Unilever, Upfield has since been in growth. It notes there is still a place for lighter, less creamy margarine as consumers have a range of taste profiles.

Upfield has expanded into many plant-based dairy occasions such as cheese and cream. It continues to look for opportunities to help accelerate the food transition to plant-based eating. It has launched the first carbon labelling initiative in the industry and notes that dairy butter is 3-4 times worse for the environment than their plant-based options.

3. Plant-based activities

Upfield is the largest plant-based food company globally. Since exiting Unilever, it has launched plant-based butters to more closely replicate the taste of dairy butter. Its plant-butter brands include **Flora Plant** and **Becel Plant-Based Bricks**. It sells plant-based cheese under its **Violife** brand and now has a dairy-alternative cream under its **Elmea** brand. It sells a small amount of heritage products that contain some dairy. They are planning to remove dairy from their portfolio over the coming years.

4. Stock implications

Upfield is not covered by RBC.

Contributing Authors

RBC Europe Limited

Emma Letheren (Analyst)	+44 20 7002 2100	emma.letheren@rbccm.com
James Edwardes Jones (Analyst)	+44 20 7002 2101	james.edwardesjones@rbc.com

RBC Capital Markets, LLC

Nik Modi (Analyst)	(212) 905-5993	nik.modi@rbccm.com
Mehra Romezi (Senior Associate)	(212) 266-4099	mehra.romezi@rbc.com
Steven Shemesh (AVP)	(212) 428-2390	steven.shemesh@rbccm.com

RBC Dominion Securities Inc.

Irene Nattel (Analyst)	(514) 878-7262	irene.nattel@rbccm.com
Alex Carette (Senior Associate)	(514) 878-7254	alexandre.carette@rbccm.com
Martin Gravel (Associate Analyst)	(514) 878-7264	martin.gravel@rbccm.com

Companies mentioned

Conagra Brands, Inc. (NYSE: CAG US; $37.95; Sector Perform)
Cranswick plc (LSE: CWK LN; GBp3,640.00; Sector Perform)
Danone (NXT PA: BN FP; €55.98; Sector Perform)
Hilton Food Group plc (LSE: HFG LN; GBp1,214.00; Outperform)
Kellogg Company (NYSE: K US; $67.15; Sector Perform)
Maple Leaf Foods Inc. (TSX: MFI CN; C$26.24; Outperform)
Nestle S.A. (SWX: NESN SW; CHF108.24; Sector Perform)
Saputo Inc. (TSX: SAP CN; C$39.41; Outperform)
Unilever PLC (LSE: ULVR LN; GBp4,220.50; Underperform)

Required disclosures

Non-U.S. analyst disclosure

Emma Letheren, James Edwardes Jones, Irene Nattel, Alex Carette and Martin Gravel (i) are not registered/qualified as research analysts with the NYSE and/or FINRA and (ii) may not be associated persons of the RBC Capital Markets, LLC and therefore may not be subject to FINRA Rule 2241 restrictions on communications with a subject company, public appearances and trading securities held by a research analyst account.

Conflicts disclosures

This product constitutes a compendium report (covers six or more subject companies). As such, RBC Capital Markets chooses to provide specific disclosures for the subject companies by reference. To access conflict of interest and other disclosures for the subject companies, clients should refer to https://www.rbccm.com/GLDisclosure/PublicWeb/DisclosureLookup.aspx?entityId=1. These disclosures are also available by sending a written request to RBC Capital Markets Research Publishing, P.O. Box 50, 200 Bay Street, Royal Bank Plaza, 29th Floor, South Tower, Toronto, Ontario M5J 2W7 or an email to rbcinsight@rbccm.com.

The analyst(s) responsible for preparing this research report received compensation that is based upon various factors, including total revenues of the member companies of RBC Capital Markets and its affiliates, a portion of which are or have been generated by investment banking activities of the member companies of RBC Capital Markets and its affiliates.

Distribution of ratings

For the purpose of ratings distributions, regulatory rules require member firms to assign ratings to one of three rating categories - Buy, Hold/Neutral, or Sell - regardless of a firm's own rating categories. Although RBC Capital Markets' ratings of Outperform (O), Sector Perform (SP), and Underperform (U) most closely correspond to Buy, Hold/Neutral and Sell, respectively, the meanings are not the same because our ratings are determined on a relative basis.

Distribution of ratings
RBC Capital Markets, Equity Research
As of 31-Mar-2021

			Investment Banking Serv./Past 12 Mos.	
Rating	Count	Percent	Count	Percent
BUY [Outperform]	762	55.46	299	39.24
HOLD [Sector Perform]	559	40.68	179	32.02
SELL [Underperform]	53	3.86	4	7.55

Conflicts policy

RBC Capital Markets Policy for Managing Conflicts of Interest in Relation to Investment Research is available from us on request. To access our current policy, clients should refer to
https://www.rbccm.com/global/file-414164.pdf
or send a request to RBC Capital Markets Research Publishing, P.O. Box 50, 200 Bay Street, Royal Bank Plaza, 29th Floor, South Tower, Toronto, Ontario M5J 2W7. We reserve the right to amend or supplement this policy at any time.

Dissemination of research and short-term trade ideas

RBC Capital Markets endeavors to make all reasonable efforts to provide research simultaneously to all eligible clients, having regard to local time zones in overseas jurisdictions. RBC Capital Markets' equity research is posted to our proprietary website to ensure eligible clients receive coverage initiations and changes in ratings, targets and opinions in a timely manner. Additional distribution may be done by the sales personnel via email, fax, or other electronic means, or regular mail. Clients may also receive our research via third party vendors. RBC Capital Markets also provides eligible clients with access to SPARC on the Firms proprietary INSIGHT website, via email and via third-party vendors. SPARC contains market color and commentary regarding subject companies on which the Firm currently provides equity research coverage. Research Analysts may, from time to time, include short-term trade ideas in research reports and / or in SPARC. A short-term trade idea offers a short-term view on how a security may trade, based on market and trading events, and the resulting trading opportunity that may be available. A short-term trade idea may differ from the price targets and recommendations in our published research reports reflecting the research analyst's views of the longer-term (one year) prospects of the subject company, as a result of the differing time horizons, methodologies and/or other factors. Thus, it is possible that a subject company's common equity that is considered a long-term 'Sector Perform' or even an 'Underperform' might present a short-term buying opportunity as a result of temporary selling pressure in the market; conversely, a subject company's common equity rated a long-term 'Outperform' could be considered susceptible to a short-term downward price correction. Short-term trade ideas are not ratings, nor are they part of any ratings system, and the firm generally does not intend, nor undertakes any obligation, to maintain or update short-term trade ideas. Short-term trade ideas may not be suitable for all investors and have not been tailored to individual investor circumstances and objectives, and investors should make their own independent decisions regarding any securities or strategies discussed herein. Please contact your investment advisor or institutional salesperson for more information regarding RBC Capital Markets' research.

For a list of all recommendations on the company that were disseminated during the prior 12-month period, please click on the following link: https://rbcnew.bluematrix.com/sellside/MAR.action

The 12 month history of SPARCs can be viewed at RBC Insight.

Analyst certification

All of the views expressed in this report accurately reflect the personal views of the responsible analyst(s) about any and all of the subject securities or issuers. No part of the compensation of the responsible analyst(s) named herein is, or will be, directly or indirectly, related to the specific recommendations or views expressed by the responsible analyst(s) in this report.

Third-party-disclaimers

The Global Industry Classification Standard ("GICS") was developed by and is the exclusive property and a service mark of MSCI Inc. ("MSCI") and Standard & Poor's Financial Services LLC ("S&P") and is licensed for use by RBC. Neither MSCI, S&P, nor any other party involved in making or compiling the GICS or any GICS classifications makes any express or implied warranties or representations with respect to such standard or classification (or the results to be obtained by the use thereof), and all such parties hereby expressly disclaim all warranties of originality, accuracy, completeness, merchantability and fitness for a particular purpose with respect to any of such standard or classification. Without limiting any of the foregoing, in no event shall MSCI, S&P, any of their affiliates or any third party involved in making or compiling the GICS or any GICS classifications have any liability for any direct, indirect, special, punitive, consequential or any other damages (including lost profits) even if notified of the possibility of such damages.

RBC Capital Markets disclaims all warranties of originality, accuracy, completeness, merchantability or fitness for a particular purpose with respect to any statements made to the media or via social media that are in turn quoted in this report, or otherwise reproduced graphically for informational purposes.
References herein to "LIBOR", "LIBO Rate", "L" or other LIBOR abbreviations means the London interbank offered rate as administered by ICE Benchmark Administration (or any other person that takes over the administration of such rate).

Disclaimer

RBC Capital Markets is the business name used by certain branches and subsidiaries of the Royal Bank of Canada, including RBC Dominion Securities Inc., RBC Capital Markets, LLC, RBC Europe Limited, RBC Capital Markets (Europe) GmbH, Royal Bank of Canada, Hong Kong Branch and Royal Bank of Canada, Sydney Branch. The information contained in this report has been compiled by RBC Capital Markets from sources believed to be reliable, but no representation or warranty, express or implied, is made by Royal Bank of Canada, RBC Capital Markets, its affiliates or any other person as to its accuracy, completeness or correctness. All opinions and estimates contained in this report constitute RBC Capital Markets' judgement as of the date of this report, are subject to change without notice and are provided in good faith but without legal responsibility. Nothing in this report constitutes legal, accounting or tax advice or individually tailored investment advice. This material is prepared for general circulation to clients and has been prepared without regard to the individual financial circumstances and objectives of persons who receive it. The investments or services contained in this report may not be suitable for you and it is recommended that you consult an independent investment advisor if you are in doubt about the suitability of such investments or services. This report is not an offer to sell or a solicitation of an offer to buy any securities. Past performance is not a guide to future performance, future returns are not guaranteed, and a loss of original capital may occur. RBC Capital Markets research analyst compensation is based in part on the overall profitability of RBC Capital Markets, which includes profits attributable to investment banking revenues. Every province in Canada, state in the U.S., and most countries throughout the world have their own laws regulating the types of securities and other investment products which may be offered to their residents, as well as the process for doing so. As a result, the securities discussed in this report may not be eligible for sale in some jurisdictions. RBC Capital Markets may be restricted from publishing research reports, from time to time, due to regulatory restrictions and/ or internal compliance policies. If this is the case, the latest published research reports available to clients may not reflect recent material changes in the applicable industry and/or applicable subject companies. RBC Capital Markets research reports are current only as of the date set forth on the research reports. This report is not, and under no circumstances should be construed as, a solicitation to act as securities broker or dealer in any jurisdiction by any person or company that is not legally permitted to carry on the business of a securities broker or dealer in that jurisdiction. To the full extent permitted by law neither RBC Capital Markets nor any of its affiliates, nor any other person, accepts any liability whatsoever for any direct, indirect or consequential loss arising from, or in connection with, any use of this report or the information contained herein. No matter contained in this document may be reproduced or copied by any means without the prior written consent of RBC Capital Markets in each instance.

Additional information is available on request.

To U.S. Residents:

This publication has been approved by RBC Capital Markets, LLC (member FINRA, NYSE, SIPC), which is a U.S. registered broker-dealer and which accepts responsibility for this report and its dissemination in the United States. Any U.S. recipient of this report that is not a registered broker-dealer or a bank acting in a broker or dealer capacity and that wishes further information regarding, or to effect any transaction in, any of the securities discussed in this report, should contact and place orders with RBC Capital Markets, LLC.

To Canadian Residents:

This publication has been approved by RBC Dominion Securities Inc.(member IIROC). Any Canadian recipient of this report that is not a Designated Institution in Ontario, an Accredited Investor in British Columbia or Alberta or a Sophisticated Purchaser in Quebec (or similar permitted purchaser in any other province) and that wishes further information regarding, or to effect any transaction in, any of the securities discussed in this report should contact and place orders with RBC Dominion Securities Inc., which, without in any way limiting the foregoing, accepts responsibility for this report and its dissemination in Canada.

To U.K. Residents:

This publication has been approved by RBC Europe Limited ('RBCEL') which is authorized by the Prudential Regulation Authority and regulated by the Financial Conduct Authority ('FCA') and the Prudential Regulation Authority, in connection with its distribution in the United Kingdom. This material is not for general distribution in the United Kingdom to retail clients, as defined under the rules of the FCA. RBCEL accepts responsibility for this report and its dissemination in the United Kingdom.

To EEA Residents:

This material is distributed in the EU by either RBCEL on an authorised cross-border basis, or by RBC Capital Markets (Europe) GmbH (RBC EG) which is authorised and regulated in Germany by the Bundesanstalt für Finanzdienstleistungsaufsicht (German Federal Financial Supervisory Authority) (BaFin).

To Persons Receiving This Advice in Australia:

This material has been distributed in Australia by Royal Bank of Canada, Sydney Branch (ABN 86 076 940 880, AFSL No. 246521). This material has been prepared for general circulation and does not take into account the objectives, financial situation or needs of any recipient. Accordingly, any recipient should, before acting on this material, consider the appropriateness of this material having regard to their objectives, financial situation and needs. If this material relates to the acquisition or possible acquisition of a particular financial product, a recipient in Australia should obtain any relevant disclosure document prepared in respect of that product and consider that document before making any decision about whether to acquire the product. This research report is not for retail investors as defined in section 761G of the Corporations Act.

To Hong Kong Residents:

This publication is distributed in Hong Kong by Royal Bank of Canada, Hong Kong Branch, which is regulated by the Hong Kong Monetary Authority and the Securities and Futures Commission (SFC) in Hong Kong, RBC Investment Services (Asia) Limited and RBC Global Asset Management (Asia) Limited, both entities are regulated by the SFC. This material is not for general distribution in Hong Kong to persons who are not professional investors (as defined in the Securities and Futures Ordinance of Hong Kong (Cap. 571) and any rules made thereunder.

To Singapore Residents:

This publication is distributed in Singapore by the Royal Bank of Canada, Singapore Branch, a registered entity licensed by the Monetary Authority of Singapore. This material has been prepared for general circulation and does not take into account the objectives, financial situation, or needs of any recipient. You are advised to seek independent advice from a financial adviser before purchasing any product. If you do not obtain independent advice, you should consider whether the product is suitable for you. Past performance is not indicative of future performance. If you have any questions related to this publication, please contact the Royal Bank of Canada, Singapore Branch. Royal Bank of Canada, Singapore Branch accepts responsibility for this report and its dissemination in Singapore.

To Japanese Residents:

Unless otherwise exempted by Japanese law, this publication is distributed in Japan by or through RBC Capital Markets (Japan) Ltd. which is a Financial Instruments Firm registered with the Kanto Local Financial Bureau (Registered number 203) and a member of the Japan Securities Dealers Association (JSDA) and the Financial Futures Association of Japan (FFAJ).