



Meat is not a vegetable

Does meat-based food still have a future?

April 2020

They are still something of a niche product, but the trend for alternative meat products is growing. The financial and environmental cost of the world's consumption of animal-based products is immense. Will we be able to afford to eat meat at all in future?

Introduction

Will meat-eating soon be a thing of the past? In its 2019 report, RethinkX, a think tank that specialises in technology-driven disruption, predicted that the number of cows in the US will have fallen by 50 per cent by 2030. The report also suggests a similarly dramatic decrease in other types of animal raised for meat. Meat could be replaced – or more precisely, our daily protein requirement met – by other sources of protein. Current alternatives to meat are largely plant-based, but in future could equally well be grown in a petri dish using gene technology. It all sounds a bit 'Brave New World'. Many of these new products are not yet ready to go into mass production, admittedly, but a great deal has already been learned. RethinkX expects the costs of producing other forms of protein to fall sharply in the near future. The new products are meeting changing demands, particularly in the industrialised nations and particularly among younger consumers. And the innovative new protein sources could also cater to medical needs such as food intolerances. This will increase the acceptance of meat substitutes and boost their sales potential. An incidental benefit of the shift to meatless eating is that it will be possible to substantially reduce the many negative external effects of meat production.

However, it is hard to believe that beef consumption will halve in just one decade. Despite all the legitimate concerns surrounding meat-eating, do we really want to swap our familiar steak for an industrially manufactured fake meat substitute? Most of the global population has grown up eating meat and people have got used to the taste and texture over many years. No one knows how quickly such preferences and behaviour patterns can be altered.

But if RethinkX is even partly right about the changes, the implications for some sections of the capital markets will be serious. It is therefore critical for investors to closely analyse and question which sectors and companies might be at risk. Meanwhile, particularly innovative companies with new products will create huge potential for more sustainable food production and, at the same time, offer the prospect of significant returns.

This study will firstly look at the global meat market and current demographic trends. It will briefly consider whether, based on the trends described elsewhere in this paper and the many external effects, there is even the prospect of a 'sin tax' being imposed on meat products in future. The following sections will then examine the effects of changes to supply and demand on the capital markets and on certain companies and sectors of the economy.

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1 Demographic conditions and the global market for meat

Many producers and investors are currently asking the same question: Is global demand for meat really changing? And if yes, how quickly and where? The answer is yes, but slowly, and not in the same way in all markets.

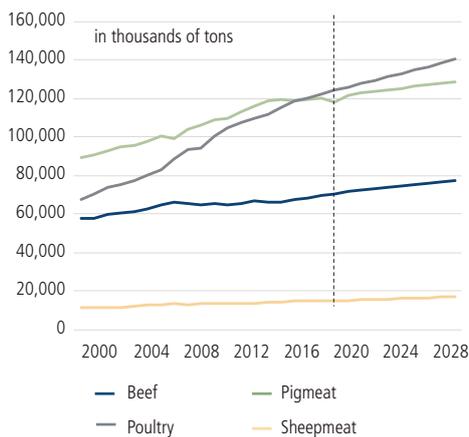
Global demand for meat is still rising

According to the OECD, global meat consumption is still rising, boosted by continued population growth and increasing prosperity in the emerging markets. There is a strong correlation between higher income and greater meat consumption. Figure 1 shows that the global demand for meat products is set to increase further over the coming years. Many researchers and analysts believe growth in the next two decades could be around 3 per cent a year. The demand for poultry meat has risen particularly strongly in the past few years, not just in absolute terms but also per capita.

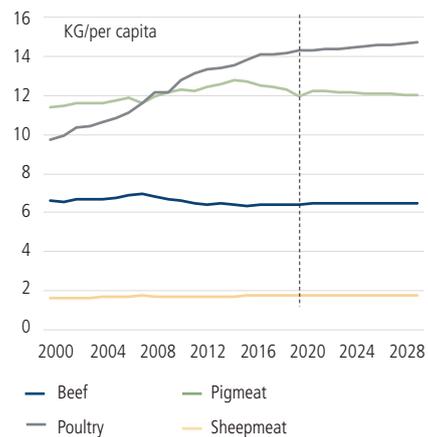
Figure 1

Global meat consumption 2000 – 2028

Meat consumption in industrialised countries 2000 to 2028



Per capita consumption worldwide 2000 to 2028

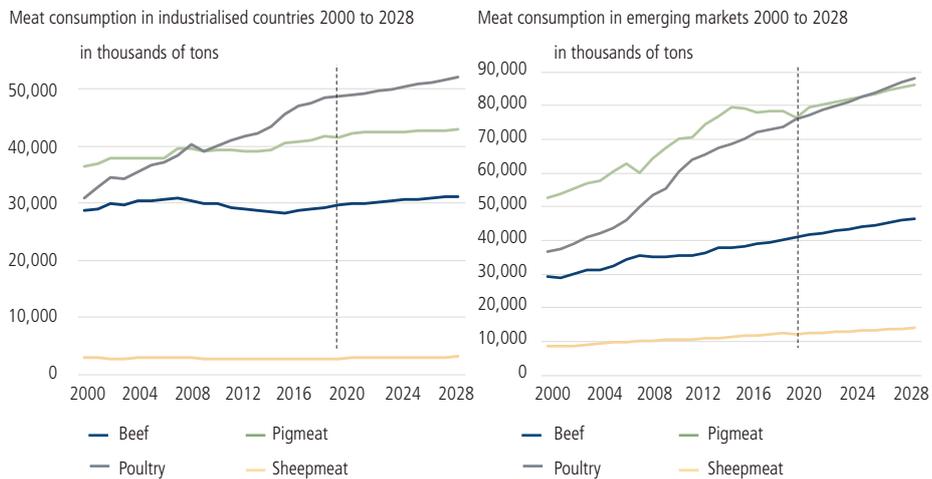


Source: OECD-FAO Agricultural Outlook 2019–2028

Meat consumption increasing more rapidly in the emerging markets

Demographic change is a particular source of hope for the meat industry. Figure 2 shows that demand in the emerging markets will continue to rise in the coming years and will far outstrip the rates of growth in the developed economies.

Figure 2 **Regional differences in meat consumption**

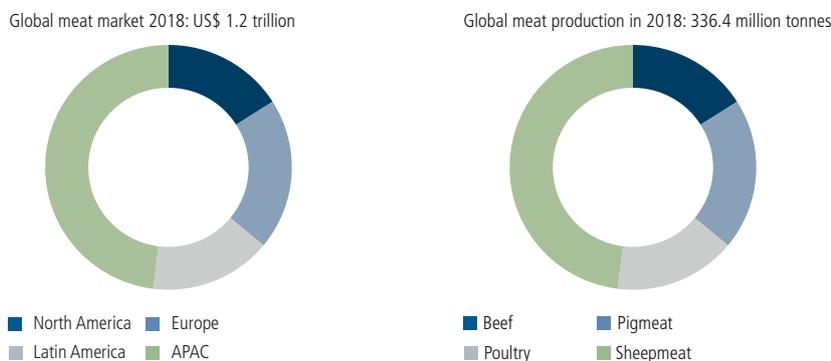


Source: OECD-FAO Agricultural Outlook 2019–2028

Demand in the emerging markets is not expected to change quickly, as current trends are built on long-standing cultural traditions and the consumption of meat is still an important signifier of status.

Poultry and pork are the two most produced types of meat worldwide (Figure 3, chart on the right). Figure 3 also shows that the global meat market is a multi-billion dollar business and is largely dominated by the US, Europe and (particularly in the case of pigmeat) China. The size of the market as a whole – in conjunction with ever-rising demand – is the reason why companies continue to invest in this sector and are keen to defend their market position against new competitors.

Figure 3 **Overview of the meat market (2018)**



Source: OECD-FAO Agricultural Outlook 2019–2028

In summary:

- Global meat consumption is still rising (not declining)
- Demand for meat products is stronger in emerging markets than in industrialised nations
- Poultry production has the highest growth rates
- Meat is (still) a cultural status symbol.

Background: African swine fever

Despite ASF, demand for meat in China remains high

The medium-term effects of African Swine Fever (ASF)

Despite all expectations, ASF – which has been rampant in China since 2018 and has so far led to the slaughter of almost 40 per cent of Chinese pigs – has not resulted in any noticeable shift in demand towards meat substitutes. There has been no sign of a consumer stampede towards alternative meat products either in China or in other countries, even though the price of pork has rocketed in China. Quite the opposite, in fact. To cope with the unwaveringly strong domestic demand for (pig) meat in China, imports of pork from other countries have soared. And Chinese consumers have also switched to eating other types of meat, which has had the global effect of increasing meat prices in other countries and for other types of meat. ASF has created a mini-boom, particularly among global industrial meat producers. They are benefiting from the increase in demand from China and higher prices at present. In the medium term, the current supply shortages could even lead to the creation of additional capacity for meat production outside China, as pigmeat production in China is unlikely to return to normal for years. That is not good news from a sustainability perspective. Firstly, it means an increase in industrial animal production. Secondly, Asian consumers are mainly turning to beef as a substitute, and cattle production is particularly bad for the environment. This will further worsen the carbon footprint of the agricultural sector (see section 2.1).

2 The negative external effects of meat production

In a survey, almost 50 per cent of all consumers who buy alternative meat products said they do so because they want to minimise the wasteful use of resources. Sustainability considerations are thus becoming increasingly important in the food sector – and rightly so. The resources required to raise and keep livestock are immense, with cattle and sheep being particularly harmful to the environment. Section 2 contains important facts and figures about CO₂ emissions, use of water and feed crops, the amount of pasture that is 'necessary' and the use of antibiotics in the livestock farming industry. It is clear that if we are to improve sustainability, meat production needs to be reduced.

2.1 CO₂ intensity in livestock farming is (too) high

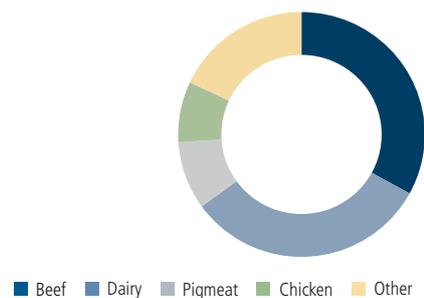
Greenhouse gas emissions from livestock farming accounted for around 15 per cent of global emissions in 2013. That is only slightly less than the quantity produced by the entire transport sector. Put another way, it is roughly equivalent to the total annual emissions of the US and India combined. This is despite the fact that efforts have already been made to make farming – especially animal production – more sustainable and efficient. But despite all these efforts, livestock farming is still a substantial contributor to global greenhouse gas emissions. These are not limited purely to CO₂, but also include other gases that are significantly more harmful to the environment such as methane. Figure 4 illustrates that cutting beef and dairy production would go a long way towards achieving relevant CO₂ reductions.

Cattle and sheep have a particularly negative carbon footprint

Figure 4

CO₂ emissions from livestock farming

CO₂ emissions from livestock farming: 7.1 gigatonnes of CO₂ equivalent

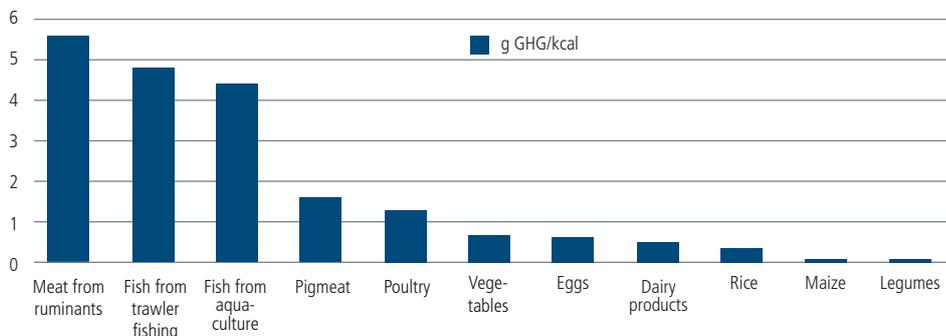


Source: UNEP press release from 29 Nov 2019; FAO: A global assessment of emissions and mitigation opportunities (GLEAM) 2013

The consumption habits of US citizens serve as a great example of how a reduction in meat consumption can dramatically reduce our carbon footprint: If two thirds of the US population switched to a vegan diet, CO₂ equivalent emissions would fall by 60 per cent.

As Figure 5 shows, cattle and sheep are responsible for a particularly large proportion of intensely damaging greenhouse gases because of their special digestive systems.

Figure 5 **Greenhouse gas intensity in food production**



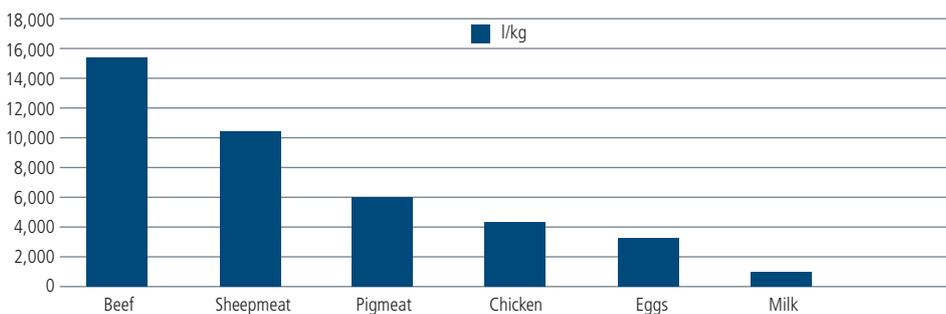
Source: FAIRR Policy White Paper: "Are regulators considering meat taxes?"

2.2 High water consumption is a problem

It takes almost 16,000 litres of water to produce one kilo of beef

Beef production also uses a lot of water. In some emerging economies, this is leading to increased social conflict around the fair distribution of water between the agricultural industry and the general population. The (industrial) raising of cattle and sheep is extremely resource-intensive and thus not very efficient, especially from an environmental perspective (see Figure 6). The amount of water required to produce a kilogram of beef is relatively high by comparison with alternative protein sources.

Figure 6 **Water consumption for selected food types**



Source: Environmental footprint by food type (protein), Clark and Tilman (2017)

Water can become a pinch point in livestock farming

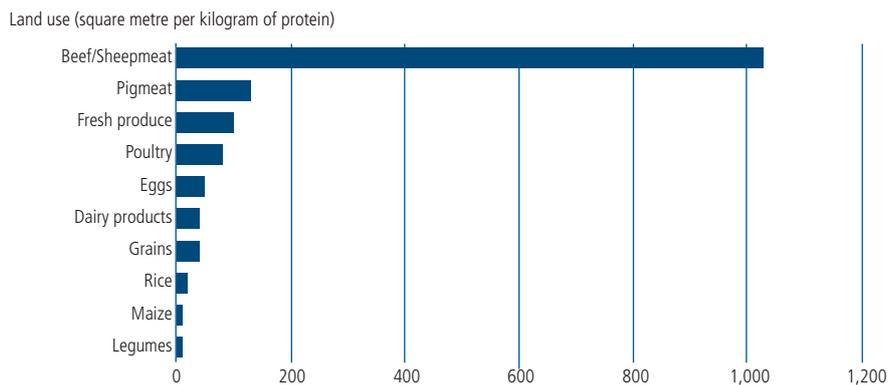
In some – particularly dry – regions, questions are being asked as to how long the raising of animals for food can continue when resources (in this case water) are increasingly scarce or becoming increasingly expensive. From this perspective too, the future viability of livestock farming appears to be at risk.

2.3 A lot of land for not many calories

Every year, large swathes of protected natural habitat in Brazil are turned into pasture land. The ‘reclassification’ of conservation areas as pasture land – often through illegal slash-and-burn clearances – is also occurring in other countries. The Food and Agriculture Organization of the United Nations (FAO) estimates that between 2000 and 2010, almost 70 per cent of forest clearance in Latin America was carried out for the purpose of creating farmland. This trend is being fuelled by the ever-growing demand for meat – especially beef – from the industrialised nations, and for the production of animal feed. German consumers therefore also have to shoulder some responsibility for the continued destruction of the rainforest. Figure 7 is striking. It shows how inefficiently land is used when we look at it in terms of the amount of protein produced. Here too, beef and sheepmeat are shown to be particularly resource intensive.

Increased livestock farming a factor in slash-and-burn clearance

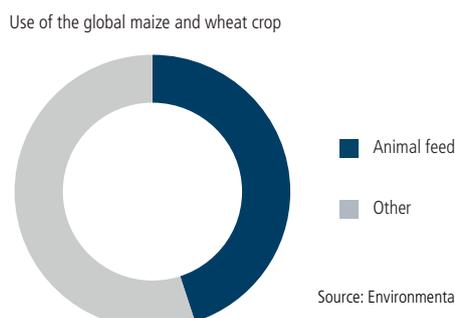
Figure 7 **Use of land in food production**



Source: Environmental footprint by food type (protein), Clark and Tilman (2017)

The amount of land required to raise animals for food is also problematic for social (land distribution) reasons. Around 39 per cent of the Earth’s habitable area is used for products associated with animal farming. But only 18 per cent of global calories consumed come from animal products. Of the wheat and maize grown each year, around 45 per cent is used as animal feed, as shown in Figure 8.

Figure 8 **What happens to the annual maize and wheat harvest?**



Source: Environmental footprint by food type (protein), Clark and Tilman (2017)

Based on the quantity of resources consumed in its production, beef in particular has to be classed as a luxury good – even when not coated in gold leaf.

2.4 Antibiotic resistance

This paper cannot say with certainty the exact point at which eating too much meat becomes bad for the health. However, several studies have shown that white meat such as poultry is, on the whole, healthier than red meat such as beef. And a WHO study showed that processed meat products, particularly those that are smoked or cured, can increase the risk of cancer.

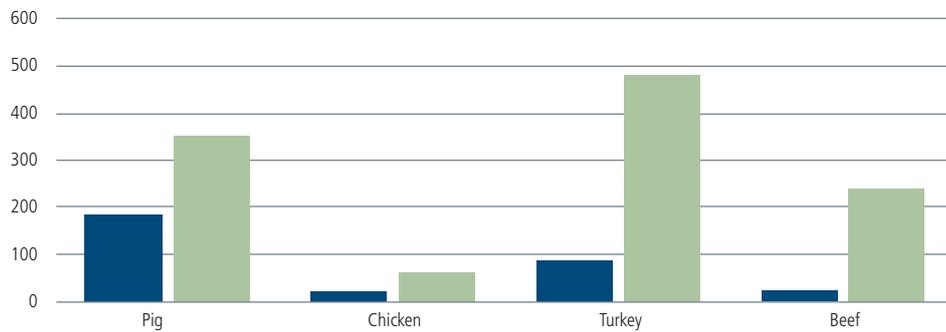
As Figure 9 shows, pigs and certain types of poultry are particularly affected by the use of antibiotics in animal husbandry and in animal feed. Antibiotics are widely used in poultry farming, especially in the US.

Use of drugs
in animal rearing
is (too) prevalent

Agriculture accounts for an astonishing 50 per cent of the antibiotics used throughout the world.

Figure 9

Antibiotic use by type of meat



Source: Environmental footprint by food type (protein), Clark and Tilman (2017)

China is particularly reliant on the use of antibiotics in its intensive pig farms, but even these drugs were unable to protect it against the outbreak of African Swine Fever (ASF).

And the overuse of antibiotics has another negative effect that needs to be taken into consideration: large quantities of antibiotics enter the human food chain, both directly through the continuous consumption of meat and indirectly via the groundwater from waste products generated during the breeding and rearing of animals. This is causing a global increase in antibiotic resistance in humans.

3 Lowering meat consumption

There are ways to reduce the amount of meat eaten. Directly restricting production output on the supply side is hard to reconcile with market principles but on the demand side, regulatory (state) intervention would be possible in order to increase the price of meat. Alternatively, targeted education campaigns and special nutritional advice could be used to encourage consumers to make changes themselves.

3.1 Is regulatory intervention in the form of a meat tax likely?

Is meat too cheap? The collateral damage caused by meat production, as described above, is prompting increased calls for a tax on meat products. There is some justification for increasing the price of meat across the board because of its harmful effect on the environment. At present, the costs associated with production are not sufficiently reflected in the price. From a purely economic perspective, there would be a perfectly good argument for a meat tax. But governments have so far fought shy of this means of controlling the price and consumption of meat.

Currently no prospect of an additional tax on meat

This is partly out of respect for the farming lobby, but also for fear of provoking the wrath of voters who already feel over-regulated. In recent months there have been a number of sustainability initiatives that could well lead to changes and higher prices for consumers in many areas of life – not least the German climate action package. It therefore seems unlikely that the government will wish to add to the tax burden in the current circumstances. After all, history tells us that state-imposed food price rises can easily trigger social unrest. In the long term, it may be that the accelerating pace of climate change – and the far-reaching consequences of this – is the only thing that could justify a meat tax to voters.

On the other side of the world, in New Zealand, they are already thinking one step ahead. As one of the countries with a very high sheep population, New Zealand knows it has to take action and has already announced initiatives to limit its 'sheep emissions'. Although they have not introduced a meat tax, there is an acceptance that harmful emissions have to be priced in via a system that operates along the same principles as the EU's CO₂ emissions trading scheme (EU ETS). In parallel with this, new varieties of sheep are being bred and new types of feed developed that should help to reduce New Zealand's carbon footprint. Aside from individual national initiatives, it seems that education campaigns and regulatory intervention in food production are more likely to be used – at least in the short term – as methods of drawing attention to the many side effects connected with meat production. This is unlikely to lead to rapid changes in consumer behaviour.

3.2 Meat alternatives are the new 'in thing'

At first glance, the positive outlook for the global traditional meat market outlined under point 2 makes the prospects for alternative meat products seem pretty slim. But there has been a change of thinking on diet and consumption in recent years, especially in the industrialised nations.

A new zeitgeist has emerged that could potentially become a thorn in the side of traditional meat producers. According to a Gallup poll, around 11 per cent of 18 to 49-year-olds in the US are already vegans or vegetarians. In Europe and the US in particular, young, high-spending consumers are paying more attention to the health aspects of what they eat, and factoring the negative external effects described above into their purchasing decisions. As Figure 10 shows, these factors – coupled with a concern for animal welfare – are influencing the eating habits of more and more people in the developed economies.

Background: Animal Welfare

Animal welfare is important, but so are other sustainability considerations

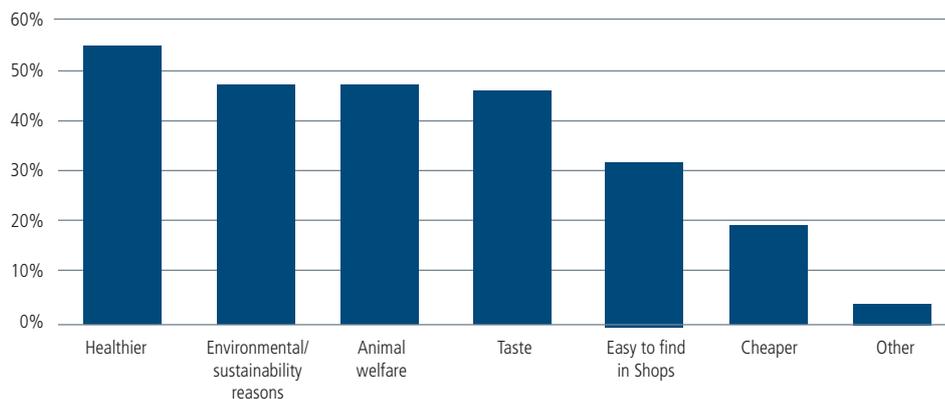
Is animal welfare still important to consumers?

In the past, the decision to go vegan or vegetarian was strongly influenced by animal welfare concerns. However, there are other reasons for giving up meat and the order of importance in which these are ranked by consumers has now changed slightly. Figure 10 shows that, internationally, a healthy diet and a desire not to waste natural resources were key motivations, although surveys conducted in Germany suggest that animal welfare is still important in terms of what consumers expect and demand of the farming industry.

There is however a gap between what consumers say and what they actually do. In surveys, a majority of consumers consistently say they would be prepared to pay more for meat if it meant that animals were raised in better conditions. However, these responses conflict (to some extent) with the results of other surveys and do not completely tally with consumer purchasing behaviour. In reality, most people still tend to buy cheaper meat products. Supermarkets still run promotions featuring cut-price meat products. And although even politicians demand higher prices not only for milk but also for meat, these calls have yet to be translated into action. Meat – especially that imported from newly industrialising countries – is often so cheap that when they get to the meat counter, consumers weaken and end up buying the cheaper product in spite of their best intentions. Translating principles – especially a concern for animal welfare – into action would mean having to buy the locally produced and more expensive meat. It is reasonable to assume that sustainability criteria and animal welfare have not played a major role in the production of the very low-priced meat products.

Figure 10 **Why do meat alternatives exist?**

Reasons for eating alternative meat products



Source: Bloomberg, Union Investment

Meat substitutes were once exclusively aimed at vegetarians and vegans but this is no longer the case. Producers of modern meat-free products are now primarily targeting ‘flexitarians’. This is a term used to refer to people who still buy meat, but who limit their meat consumption and are open to new types of products that offer additional benefits in terms of the way they are produced and their health effect. The sales potential of alternative meat is enhanced significantly by this group of consumers. According to a survey in Germany, half of the population can be classed as flexitarian.

The new meat alternatives are still something of a niche product, even in the developed economies. The global market share is currently only around 1 per cent of the total meat market (see also Fig. 12 on page 17). But in the developed countries it is already far higher than this, and growing rapidly. A number of studies have suggested that sales revenue growth in this sector could be four times as high as that in the market for traditional meat products.

Demand for meat alternatives is increasing – primarily in the industrialised nations

There is also another trend that points to the potential of alternative meat. Even before meat and possible alternatives became a talking point, there had been a change in the global demand for dairy products and eggs, triggered by the rise in food intolerances. In the US, alternatives to dairy – including soya, almond and coconut-based products – already account for 13 per cent of the dairy market. There is also growing demand for egg alternatives in the US.

It is too early to tell how long it will take meat alternatives to secure a market share as large as that of meat, but the potential certainly seems to be there, especially in the industrialised nations.

4 The capital markets are developing an appetite

Successful IPO for alternative meat products start-up

The share price of Beyond Meat in the US (see Fig. 11) reflects the hopes that investors have for alternative meat products. The Californian company launched on the Nasdaq tech market in May 2019 and had gained an incredible 840 per cent by July. The hype surrounding its future potential knew no bounds. At the time of its launch, Beyond Meat was the only listed company whose revenues relied solely on the sale of alternative meat products. In the second half of 2019, however, the share price fell by around 68 per cent. The reasons for the fall included profit-taking, the placement of additional shares, and growing competition in this sector. Nonetheless, the company's share price performance for its short financial year of 2019 was still 200 per cent. Investors seem to be convinced of the future prospects of companies like Beyond Meat. However, the volatility of the share price – which has continued into 2020 – is a reminder to investors to factor increasing competition from start-ups and from established providers from the consumer goods sector into their investment decisions.

Figure 11 **Share price swings in the alternative meat segment using the example of Beyond Meat**



Source: UBS, Future of Food 1: "Is Plant-Based Meat Poised to Rebalance Global Protein Consumption?"

4.1 What meat alternatives already exist?

Of course, Beyond Meat did not invent the idea of meat alternatives. It has always been possible to have a meat-free diet and to eat different forms of protein instead. Tofu and soya have long played a key role as alternative sources of protein, particularly in Asia.

There are two types of 'alternative meat': plant-based and cell-based. The latter involves 'growing' meat from animal cells or blood products in a relatively complex process. A number of companies around the world are currently working on this. The key benefit of a market-ready product is that it would be hard to distinguish from real meat and yet would require only a fraction of the resources used in actual cattle rearing. The long-term

prospects look rosy. But currently, the costs of production and the very low production volumes make commercialisation on a large scale impossible. And the acceptance of a product whose manufacture relies to a degree on genetic engineering is far from assured, given the heated debate surrounding the issue.

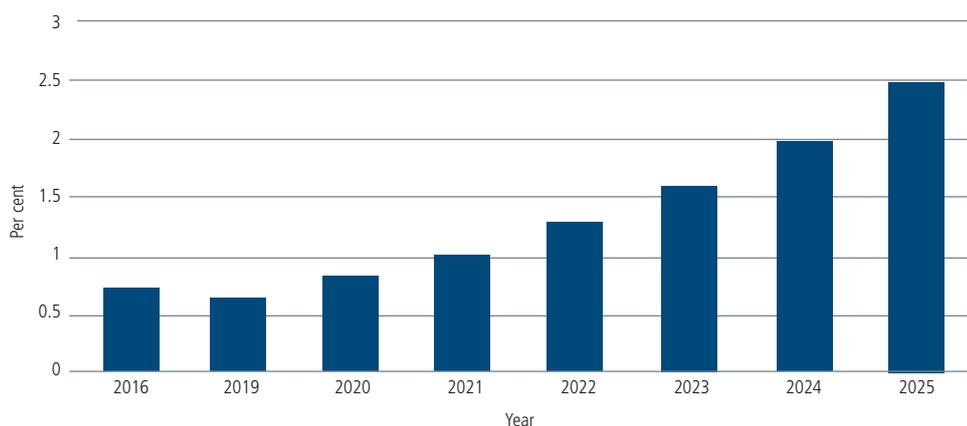
Companies that develop and make plant-based alternative meat products are already a step ahead of their competitors. Most of their products are market-ready and the costs of production and sale are substantially lower, which means they offer consumers a genuine alternative. Plant-based products may differ greatly in terms of the way they are made, but all aim to offer the consumer alternatives that are (very) similar to meat in terms of taste, appearance and the ways they can be used. The advantage of these products over meat is that their manufacture requires significantly less resources. We will focus more on plant-based meat substitutes later in this section.

Plant-based products are already market-ready

4.2 The competition is not sleeping

The growth of the alternative meat market has not escaped the notice of the established multinational consumer goods corporations such as Nestlé and Unilever. There has been a clear trend towards healthier eating for a number of years, resulting – among other things – in a reduction in the sugar content of all types of foods. Companies in the food sector are now recognising the strong growth of alternative meat products as an opportunity to polish up their ‘healthy’ image and to boost their growth rates. This is illustrated in Figure 12. The market share is still low, but the prospects for growth look extremely promising. The 2.5 per cent market share predicted for 2025 would equate to a potential sales volume of around US\$ 50 billion.

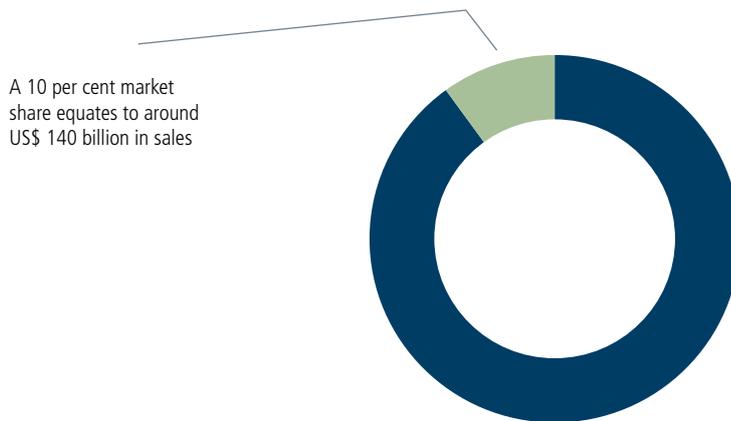
Figure 12 **Alternative meat’s share of the total meat market**



Source: UBS, Future of Food 1: “Is Plant-Based Meat Poised to Rebalance Global Protein Consumption?”

As the traditional food sector generally has moderate growth rates, the new food trend could help to generate a new growth dynamic. Barclays goes so far as to predict that the market volume for alternative meat products could reach US\$ 140 billion by 2029.

Figure 13 **Market volumes for alternative meat (forecast for 2029)**



Source: Barclays „Carving up the alternative meat market“

Established food industry conglomerates still have the advantage of decades of experience in production, marketing and sales, and are generally better placed to bear the costs of research and market launch than newcomers.

There are several reasons why start-ups such as Beyond Meat and its US competitor Impossible Foods are already successful and have been able to carve out a place for themselves in a fiercely contested market segment:

- Both companies have similar, innovative products that are not easy to copy
- They have focused on research and are continuously developing new variants, thereby increasing their sales potential
- The products are scalable – production capacity is currently the only constraint on revenue
- The companies have very slick marketing that focuses on sustainability and lifestyle aspects
- They have succeeded in establishing partnerships with large retail chains very quickly, thereby increasing brand recognition and creating a certain level of revenue security

Many of the established food manufacturers are now feeling the pressure from the new competitors. They have picked up on the trend towards reduced meat consumption and are responding with their own products.

Established providers are responding with their own products

Nestlé's meat offering has recently been further reduced through the sale of its 'Herta' brand. However, the 'alternative meat' sector was explicitly excluded from the sale because the company recognised that this segment harbours significant growth opportunities. Nestlé will continue to expand its own label ranges – 'Garden Gourmet' in Europe and 'Sweet Earth' in the US – and aims to supply a number of different alternative meat products in future.

Unilever has also reacted to the trends outlined above. Recognising the bright future for alternative meat products, the company is keen to play an active role in this sector and to expand its business. Unilever Food Solutions has thus launched its 'The Vegetarian Butcher' range, which is primarily aimed at the catering industry.

As one of the largest meat producers in the US and a major manufacturer of meat-based ready-meals, Tyson Foods should really be the arch enemy of companies such as Beyond Meat and Impossible Foods. It is therefore all the more remarkable that the company was one of the first investors in Beyond Meat before its IPO. Clearly there are no dogmatic beliefs preventing fraternisation between the two 'sides'. Quite the opposite, in fact: Tyson Foods was quick to recognise the importance of responding to changing demand and expanding its core business area. The company sold its stock in Beyond Meat shortly before the IPO – too soon, as it turned out – and set up its own division to concentrate on meat-free products. The Tyson Foods example demonstrates very clearly that companies are not engaged in ethical trench warfare. The battle for the best product – combined with the most sustainable production processes possible – is clearly top of the priority list for all the companies discussed so far.

The Canadian company Maple Leaf Foods is another example of how traditional meat producers are not only responding to the 'meatless' competition, but are taking the issue of sustainability more seriously in their own production. Maple Leaf's 'Lightlife' brand offers a plant-based alternative to its own broad range of meat products. The company has also integrated ambitious but credible climate targets and animal welfare aspects into its corporate goals.

The success of alternative meat products is partly due to the early, close tie-ins with various food retailers. In Germany, such products can now be found in the chilled sections of virtually all food retail chains. Last year, Lidl secured the rights to the 'Beyond Meat' burger, which sold out within minutes in many of its stores.

Restaurants and retailers support market launch

Many products are also sold by fast food chains such as Restaurant Brands International (which includes Burger King). These chains – that are more typically known for their unhealthy and non-environmentally-friendly products – are also seeking to hook into this future trend and secure new customer groups. Such strategic alliances enable the alternative meat suppliers to quickly target a new, younger target group at a national level. This has the added effect of shaking off the old 'health store' vibe associated with such products in the past and enabling them to become a mainstream food choice more quickly.

It is not just the fast-food chains that can benefit from the trend towards more meat-free eating and thereby potentially significantly boost their profits. The UK bakery chain Greggs enjoyed a sharp rise in profits and increased brand recognition when it introduced its vegan sausage roll.

In addition to the established providers discussed above, there are many other companies that also successfully sell products in this market segment. This shows that more sustainable food is likely to remain promising for a large number of providers.

4.3 It's all about the ingredients

In all the discussion about alternative products as meat replacements, one thing is important to remember: the overwhelming majority of products now appearing on the market are not wonderfully wholesome organic food. They are highly processed, industrially manufactured products. While it is true that the majority are plant-based and manufactured in a more resource-efficient way than cattle-rearing can ever be, they do nonetheless use a number of ingredients that are made in the lab rather than grown naturally. This type of (industrial) production is the only way to achieve different variants, sufficient scalability, and global distribution with consistent quality.

Suppliers also benefit from the new food trend

A small number of large companies dominate the market for food additives, chemical flavourings and aroma-enhancers. They could be (indirect) beneficiaries of the growth in this relatively new sector.

Symrise, Givaudan and IFF are the leading global suppliers in the flavourings and aromas segment. These substances, which may be either natural or manufactured, are increasingly used in the food industry to enhance the taste or aroma profile of food and drinks. The companies that supply them enjoy relatively constant revenue and profit growth, thanks to the oligopolistic market structure and the constantly changing demand from the consumer goods sector. They also have comparatively high and stable margins. The new products in the alternative meat segment represent an additional promising growth opportunity for them.

The Irish company Kerry is best known in Germany for its butter, but its food additives division is particularly interesting and fast-growing. Kerry produces and sells seasonings, flavourings and special dairy-based additives both to food producers and to pharmaceutical companies. Last year, it acquired the Dutch company Ojah in order to be able to respond quickly to the growing demand for alternative meat products. Kerry also has its own alternative meat brand, 'Naked Glory', so it is now in a position to be able to supply another promising customer segment with its products.

The Dutch speciality chemicals company DSM is an established player in the area of food additives for animals and people. The company's product range includes a number of vitamins, as well as Omega-3 fatty acids. Its customers include livestock farming businesses and DSM could therefore suffer in the medium to long term if fewer animals are bred for food – such as in the scenario imagined by RethinkX at the start of this

paper. But the company recognises that the carbon footprint associated with livestock farming is too high and is therefore working on feed additives that will help to lower the CO₂ emissions associated with this sector.

4.4 Who has fallen by the wayside?

The changing patterns of demand offer opportunities for future growth but, at the same time, some companies whose core business lines are in the highly competitive retail and food sector run the risk of losing market share if they fail to adapt quickly enough to the new environment.

Being too slow
to react can cost
market share

A few years ago, food industry giants Kellogg's and Kraft Heinz were established providers of products in the vegetarian burger segment. But they have lost substantial market share to suppliers such as Beyond Meat and Impossible Foods. What happened? Both companies have the necessary know-how, sufficient production facilities and established sales channels, but consumers have turned their backs on them. With their more targeted marketing and a clear focus on alternative meat products, the newcomers to the market have succeeded in pushing the dominant providers off the top spot.

It is not just the food producers that have to respond to changes in purchasing behaviour. Retailers also need to adapt. Starbucks plans to start selling sandwiches containing alternative meat in its coffee shops. The large American retailer Costco, in contrast, has been more reluctant than some of its competitors to embrace the trend towards more meat alternatives. And it invested heavily in a meat processing operation just a few years ago. Costco's reliance on meat products is therefore relatively high.

5 Conclusion

Despite its harmful impact on the environment, on health, and on animal welfare, meat-eating is not a thing of the past. The global structural demand for meat products will continue to rise in the immediate future. The prospects for selected companies in this sector – which has its problems from a sustainability perspective – remain good in the short term. Meat substitutes or alternative forms of protein will not replace meat any time soon – certainly not completely. However, the demand for alternative meat products will grow considerably faster than demand in the traditional market for meat.

Structural changes in the food sector – on both the demand and the supply side – are becoming more marked. They are triggered primarily by dietary changes, especially among younger consumer groups in the industrialised nations.

At the same time, the new plant-based alternative meat products have already reached market readiness. In the longer term it even seems conceivable that, in some countries, the negative effects of conventional meat production could lead to higher prices for traditional meat products via tighter regulation. This would give an additional boost to the growth of alternative meat products.

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