What is the role of plant-based foods in future diets?

And how might this help us to meet the nutritional needs of 9 billion people in a way that is affordable, healthy and good for the environment?
About Forum for the Future

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Executive summary

In the UK a growing proportion of the population is going “flexitarian” – consciously eating less meat in favour of a more plant-based diet. Women and younger people (aged 18-34) are the main proponents of flexitarianism. Spending by women in particular will help to make this diet a part of mainstream British food culture, given that 68% are mostly responsible for household food shopping\(^1\) and women spend around 22% more than men on shopping trips.\(^2\)

There are a host of ample, and concerning, trends demonstrating the (growing) negative impacts of livestock production on our health (e.g. antibiotic resistance, cancer risks from processed meat), on the environment (contributing to climate change and water stress) and on billions of factory-farmed animals.

As people become more aware of these issues, demand is growing for vegetarian and vegan products that provide good nutrition without having to rely on meat or dairy. While in the US there is a boom in investment and innovation into alternative protein products, in the UK there is still ample opportunity for retailers and food manufacturers to cater to this growing segment.

The food industry can help to accelerate this trend which has the potential to play a major role in reducing carbon emissions from food production. This ranges from product reformulation and new product development, to mobilising consumers (e.g. raising awareness and skills in plant-based eating), through progressive advocacy (such as lobbying for progressive national health legislation) and through their buying power (e.g. in favour of more plant-based ingredients) that can help to reshape supply chains.

1 The global context

Our food system is highly interconnected and so the dietary choices we make in one place have far-reaching implications on the environment, societies and economies around the world. This is particularly true when it comes to the growing appetite for meat and dairy around the world – particularly in the newly formed middle classes in Asia. This demand for animal protein is expected to grow significantly with the global population on course for over 9 billion by 2050.

Despite this, the planet will stay the same size. Around a third of the Earth’s croplands are used to grow feed for livestock, as is a third of all fish caught from the sea, while generating close to a fifth of our greenhouse-gas emissions. Or, in other words, our love for eating animal proteins is a bigger cause of climate change than the world’s planes, cars and other forms of transport combined.

At the same time there are signs in Europe of a shift towards more plant-based diets. More people are becoming vegans, vegetarians, or ‘flexitarians’ - people who follow a primarily vegetarian diet but occasionally eat meat or fish.

Ensuring that people have the protein they need within environmental limits is one of the critical questions for the future. Protein is essential for human health. It provides essential amino acids and a range of important micro-nutrients. Yet there are vast inequalities in protein intake in the world.

According to a 2015 Chatham House Report “Changing climate, changing diets”\(^3\), people in industrialized countries consume on average around twice as much meat as experts deem healthy (and consume too many calories in general). In developing countries obesity is prevalent, but this exists alongside deficiencies in protein and essential micronutrients as access and affordability of nutrient-rich foods is more limited.

In this paper we go through problems associated with high levels of protein consumption, before examining the drivers of greater levels of plant-based diets in Europe, and the opportunities for food companies to meet growing demand for plant-based ingredient choices.

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\(^1\) Ipsos Global Trends Survey, Ipsos Mori, 2014. [https://www.ipsos-mori.com/researchpublications/researcharchive/3416/Tradi
tional-gender-

\(^2\) Brands Risk Losing the Woman of Tomorrow! Neilson, 2016

1.1 **Key issues associated with high levels of meat consumption**

To ensure an adequate source of nutrition for all over the long term, it is important to look at both the challenges surrounding food production as well as its impact on health.

Below we run through some of the key challenges around animal protein that, taken together, create a strong argument for a shift to more plant-based diets for consumers, food producers and retailers.

**Effect of meat on health**

Perhaps the most powerful personal motivator to continue reducing meat is the increasing evidence of some of the health benefits of a plant-based diet and some of the negative health impacts of eating too much meat.

In 2015 The World Health Organisation classified processed meats – including ham, salami, sausages and hot dogs – as a class 1 carcinogen, meaning that there is strong evidence that processed meats cause cancer. Red meat, such as beef, lamb and pork, has been classified as a ‘probable’ cause of cancer.4

Some 45% of antibiotics in the UK and 70% in the US are used for livestock rather than humans.5 Antibiotic overuse in human and animal medicine contributes to antibiotic-resistant infections, which cause 25,000 deaths per year in the EU alone.6 A recent study found British supermarket chicken and pork to contain extremely high levels of E.coli resistant to essential antibiotics for treating serious human E. coli infections. 7

These issues are intensifying, which will only increase awareness of the need for diets lower in meat among consumers and, in turn, the numbers of people becoming flexitarian, vegetarian or vegan. Demand for the food industry to source and sell more plant-based, sustainable food to UK consumers is likely to increase. Furthermore, the industry can and should play a proactive role in helping to accelerate this trend.

**Health benefits of a plant-based diet**

On the other hand, there is a large body of evidence showing the many health benefits of a diet rich in plants. This year the UK government released updated nutritional guidelines8 which recommend a proportion of 40% fruit and vegetables (up from 33% in the earlier guide), and that protein is primarily from plants (recommending beans, pulses, fish, eggs and ‘other proteins.’).

Benefits of a plant-based diet include reduced saturated fat, fibre - which increases satiety and reduces overeating, cholesterol benefits, and high levels of vitamins and minerals, and have a lower energy density so you can eat more of them and fill up without consuming too many calories.

A variety of different studies (experimental & observational) have provided evidence for a link between plant-based eating and healthier blood pressure, healthier blood cholesterol, lower body weight, better blood glucose management, lower incidence of coronary heart disease and a lower risk of developing type 2 diabetes, among other benefits.

Furthermore the American Association of Cancer Research recently examined the association between different plant-based diets among 69,120 participants and found that “vegetarian diets seem to confer protection against cancer, and vegan diet seems to confer lower risk for overall and female specific cancer than other dietary patterns.”9

A common concern about plant-based diets is that people won’t get the complete range of amino acids from plant proteins. This can be the case if the individual doesn’t have the right dietary knowledge to source

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4 [http://www.who.int/features/qacancer-red-meat/en/]
7 [http://blueandgreentomorrow.com/2016/09/05/uk-supermarket-meat-found-contain-shocking-amounts-antibiotic-resistant-e-coli/]
8 Wide [https://www.gov.uk/government/publications/the-eatwell-guide]
9 The Rise of the Plant Based Diet, Dr Sarah Jarvis, CN Focus Vol.8 No.3 October 2016
their protein from plants. Pulses, including chickpeas, kidney beans, black beans, white beans, navy beans, fava beans, and split peas all provide alternative sources of protein that can substitute animal products.  

**Environmental impact**

General public awareness of the environmental issues brought about by production of meat and dairy is increasing, particularly with the recent success of documentaries like ‘Cowspiracy’ which highlights these disastrous consequences:

Agriculture takes up two-fifths of total global land use. Of the total plant protein produced, less than half is used for human consumption. This includes high-quality soy protein which could otherwise be used to feed humans. The shift towards industrialised animal farming systems creates significant demand for grain and other plant proteins as feed for animals, as well as contributing to the challenges of waste, pollution, deforestation, greenhouse gas emissions and soil degradation.

Producing animal products uses vast amounts of water (a gallon of milk has the same water footprint as two months of showering) and livestock production is associated with 14.5% of all human-caused greenhouse gas emissions.

A general shift in diets away from meat therefore has the potential to significantly reduce the environmental impacts of food production, an urgent challenge for an industry which is already experiencing the impacts of climate change on global supply chains.

**Animal and human rights**

The ethics of eating meat tend to be the main initial reason why people start to eat less meat.

Around two in every three farm animals are farmed industrially indoors (over 50 billion every year). These systems prioritise efficiency, and animals are often raised in intense confinement. Industrial animal farming is highly dependent on large quantities of imported inputs, such as grain-based feed, water, energy and medication.

Violations of labour rights are sometimes present too in the sector. Poor working conditions have been reported in the UK meat and poultry processing sector, and there are widespread recent reports of human rights issues in the fishing industry – notably in Thailand where human trafficking and slavery persist.

Whilst food companies are making considerable efforts to ensure their meat and fish is ethically sourced, there is still a considerable way to go to ensure the fair treatment of workers around the world. It should also be noted that human rights issues are not confined to the meat, poultry and fish industries but occur within other agricultural sectors globally.

### 2 Changing consumer behaviour in Europe and the UK

In many global cuisines, meat is not only a staple and the primary source of protein, but thought of as the most important element of a meal. Terms separating out carnivores from vegetarians have created the impression that either one is firmly for meat, or against it. This dynamic is changing. On the one hand, protein innovations – from cultured meat to plant-based alternatives – are entering the market, and on the other, people are adopting ‘flexitarian’ diets, guided by awareness of the environmental and health impacts of different food sources, as well as other personal considerations.

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10 Ibid.  
14 A 2010 report by the Equality and Human Rights Commission into abuses of workers’ rights in the meat processing sector, supplying 80% of UK supermarkets, found widespread evidence of physical or psychological abuse, poor conditions and long hours. This was due in part to the fact that 70% of agency staff (a third of the workforce) were migrants. [https://www.equalityhumanrights.com/en/inquiries-and-investigations/inquiry-meat-and-poultry-processing-sectors/download-inquiry-report](https://www.equalityhumanrights.com/en/inquiries-and-investigations/inquiry-meat-and-poultry-processing-sectors/download-inquiry-report)  
The recent growth in vegetarians, vegans and flexitarians may signal an acceleration of a steady trend in Western Europe over the last two decades; according to figures from the UN Food and Agriculture Organization, Western Europeans ate almost 10% less meat in 2009 than in 1990, with per capita consumption falling from 95.5 kg to 87 kg.16

**Flexitarianism – a major shift**

A new breed of 'flexitarians' are actively reducing their consumption of meat (particularly red meat). Between 24% and 36% of people in the UK, France and Germany now consider themselves to be 'flexitarian' (or 'semi-vegetarian'), according to a study by fragrance and flavour house Mane.17

In the UK meat consumption appears to be falling across a significant proportion of the population: 40% agree that 'These days I eat less meat than I used to do' – rising to 45% of women. A third of people are ‘actively choosing to eat less meat’ (39% of women) and 28% of 18-24 year olds and 27% of all women agree that ‘by 2025, my diet will probably be mostly meat-free’.18

The trigger for people eating fewer animal products is often ethical concerns, however, for some health and fitness benefits are the primary draw. This movement is being driven by women and people aged 15 to 34. Given that women remain the primary grocery shoppers in the majority of households, grocery retailers and suppliers will need to respond to the growing demand for diets richer in plants and lower in animal products. As such, public opinion towards eating meat is clearly shifting and moderation is becoming mainstream. A majority (52%) of under-35s agree that 'eating a full English breakfast is bad for you'. A third of adults (32%) believe that 'by 2025 parents will generally not give hamburgers or sausages to their children'.19

The environmental damage linked to meat production is now widely acknowledged in the UK. Some 40% of consumers agree that 'it would be better for the wellbeing of our countryside if adults in Britain were generally to eat less meat' – rising to 44% among 16-24s. Some 36% now agree that ‘a meat-free diet or one where we eat less meat is better for the environment’ – rising to 48% of 16-19 year olds and 40% of 16-24s.20

The upshot of this trend is that eating more plants for ethical, environmental or health reasons is no longer the behaviour of a niche of consumers – and that a more sustainable food culture may be emerging in the UK.

**Tipping points**

A number of factors have contributed to flexitarian eating hitting the mainstream consciousness.

**Media, chefs and peer influences**

Early adopters of the trend – perhaps turning flexitarian a number of years ago – may have been influenced by a few notable documentaries which tackled the three primary motivations for quitting meat and dairy — animal ethics, health and the environment. The Earthlings Trilogy (2005), narrated by Joaquin Phoenix takes on animal ethics; Forks Over Knives (2011) posits that humans can control or reverse most degenerative diseases, such as diabetes, heart cancer and obesity, by rejecting animal-based and processed foods; and Cowspiracy (2014) investigates the impact of animal agriculture on the environment and received widespread attention when a cut was released by Leonardo Di Caprio on Netflix.

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18 We Will Live As We Will Eat: Anticipating the future power of sustainability amid our shifting food culture, James Murphy and Martin Thomas, 2016. [http://www.slideshare.net/DissidentBiz/we-will-live-as-we-will-eat-62766219](http://www.slideshare.net/DissidentBiz/we-will-live-as-we-will-eat-62766219)
19 Ibid
20 We Will Live As We Will Eat: Anticipating the future power of sustainability amid our shifting food culture, James Murphy and Martin Thomas, 2016. [http://www.slideshare.net/DissidentBiz/we-will-live-as-we-will-eat-62766219](http://www.slideshare.net/DissidentBiz/we-will-live-as-we-will-eat-62766219)
Similarly, a number of affluent urban consumers in the UK have been influenced by food writers such as Michael Pollan and chefs such as Yotam Ottolenghi, Thomasina Miers and Hugh Fearnley Whittingstall who have championed vegetarian eating. More recently a spate of chefs and food bloggers have continued this trend such as Deliciously Ella, Hemsley and Hemsley, Jack Monroe and Anna Jones.

As a researcher at Delft University of Technology puts it “this meat-reduction option fits with an era in which the 'consciousness movement' increasingly influences mainstream culture. People pay more attention to the origins of their food, value their connection with nature, and generally show more concern for their health and well-being, including food habits and body awareness. We see this for example in the countless yoga studios popping up in big cities, the 'hipness' of organic food, the super foods that are nowadays also found in conventional supermarkets, and struggling fast food corporations like McDonald's.”

However, favouring plant-based eating is not the preserve of the middle class, yoga-mat toting, modern consumer. Mainstream consumers across all social classes are embracing plant-based eating, strongly influenced by social media, particularly Facebook. The 'me too' effect of social media should not be underestimated. And, once one member of a household (typically female) becomes a part or full-time vegetarian, the rest of the household may follow due to convenience – after which plant-based meals soon becomes part of the whole household’s routine.

A few quotes from the author’s friends and family who now consider themselves flexitarians illustrate the range of drivers:

"Amy's family are veggies so I ate less meat and feel much healthier for it but find it hard when I smell chicken. LOL."

"Lazy vegetarian wife - so I ain't cooking 2 dinners for one sitting ;-) oh and Quorn does a good job with the right extras #smokedpaprika #redwine #meat4breakfast."

"Digestive happiness and cost! Meat is expensive, and good quality, ethical and organic meat is even more so (as it should be, and what we should aim to eat if we are still eating meat) so dropping meat reduces our bill. But, bacon and chicken. Sigh."

"I still eat some meat but I have to say I feel that today it's less of a question of 'why do you eat less meat' rather than 'why wouldn't you eat less meat?' For me it has multiple positives - less environmental impact, better veggie options and quality of food in general, huge impact on digestion and health, not to mention animal welfare considerations."

Additional factors that may help to sustain and perhaps accelerate the trend at a political and industry-wide level are government health guidelines and fiscal measures, and civil society action. This is less likely to influence the mainstream consumer, but rather increase pressure on governments, public institutions and companies to do more to reduce our appetite for animal products:

**Better guidance from governments**

The UK Government recently released its Eatwell Guide containing dietary recommendations, and advising people to “Eat less red meat and processed meat”. Other governments have gone further, such as the Swedish government which has formed a working group to discuss the possible implementation of a ‘meat tax’ aimed at reducing the environmental impacts of the sector. Similar moves are not beyond the realms of possibility for the UK.

**Civil society mobilisation**

Organisations from across civil society are starting to collaborate in recognition of the concerted effort needed to reduce overall meat consumption – this being a topic that has a bearing on outcomes for health, environment, resource use, social justice, animal welfare, and international development. One example is the Eating Better Coalition – a broad alliance of UK national organisations working together to "help people move towards eating less meat and more food that's better for us and the planet, as part of the vital task of creating sustainable food and farming systems.”

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2.1 **Barriers to more plant-based diets**

Despite the shift in consumer attitudes, there are a number of barriers slowing the shift towards plant-based diets. Meat is a key part of the culinary culture in many places, and consumers lack knowledge and straightforward information about the nutritional and environmental benefits of plant-based proteins in particular.\(^{25}\) Plant-based proteins are seen by many people as unattractive and hard to prepare,\(^{26}\) and customers don’t have access to a wide range of tasty, affordable alternatives.

And, critically, there is unbalanced regulatory and financial support for plant-based and alternative proteins. Food policies tend to serve the needs of the livestock sector, whereas similar funding and subsidies are not available to other food sectors.\(^{24}\) Consumer support for the livestock sector is directly linked to the romantic representation that is made of the industry in the media – for example showing images of grazing cows and free-range chickens that do not accurately portray the industry as it is today.

2.2 **Response from the food industry**

As people move to more plant-centric diets, they seek greater choice than currently available when eating out or shopping for groceries.

The US is at the centre of the recent explosion in innovation of plant-based alternatives. Plant-based alternatives to meat include soy, nuts, mushrooms and pulses with a taste and texture on a par with real meat, thanks to advances in food technology. Sales are soaring for what were once niche products such as almond milk and veggie burgers. In 2016 consumers can eat an ‘Impossible Burger’, a plant burger that looks, feels, tastes and cooks almost like the real thing. They can use Just Mayo – a mayonnaise-like product that contains no eggs. And, buy not just almond or soy milk, but Ripple Foods milk made from peas which is touted to taste far more like its dairy-based cousin.

Large amounts of investment have poured into scaling up US companies developing plant-based alternatives. PowerPlant Ventures this year closed a $42 million fund aimed at funding plant-centric companies. The fund’s goal is to leverage technologies that tap into plants’ benefits and various applications to support what it describes as the “next wave of better-for-you food companies and brands.

The innovation and growth of plant-based proteins is taking place in the UK, albeit not to the extent seen in the US. Quorn saw a 20% increase in sales over 2013 and 2014. According to marketing controller at Alpro UK: “[plant-based foods have] moved from a niche market sector catering for those with allergies and intolerances to one with more mainstream appeal, offering what consumers now see as healthy lifestyle choices.”

It may only be a matter of time until we start to see pea-based milk and high-protein pasta hitting supermarket shelves. The market for pea protein is forecast to grow at a compound annual rate of 8.8% to 2020\(^{26}\) mainly driven by the increasing awareness among food & beverage manufacturers and growing consumer demand for pea proteins about their high nutritional profile. The global nuts and seeds market is expected to grow annually by 1.7% for nuts and 10% for seeds for at least the next five years according to a 2016 survey of 450 dieticians.\(^{26}\)

The majority of this growth is in the US, but is likely to shape the UK market in the years to come. As such there is still ample opportunity for UK grocery retailers and manufacturers to be first to market in offering new products and, potentially, partnering with some of the many start-ups in this dynamic new market. This

\(^{22}\) “Dutch researchers point out that meat is a vital part of culinary cultures in western Europe and many people see meat as an essential part of a meal.”

\(^{23}\) “There is clearly a need for more work to be done to improve education around how to prepare interesting and enjoyable meals using more efficient livestock or plant-based foods as the protein-rich main ingredient. Increased education will not change behaviour by itself, but providing this knowledge is a fundamental part of helping increase diversity.”

\(^{24}\) “In the EU, cattle subsidies alone exceeded 731 USD million, equivalent to 190 USD per cow.”


\(^{26}\) What’s Trending In Nutrition Survey, Today’s Dietician, 2016 http://www todaysdietitian.com/newarchives/0816p40.shtml
could include options such as ‘half and half’ products, with 50% red meat and 50% plant protein; more vegetarian options on menus offering high protein and whole grain content; and, meat substitutes that are plant-based but offer the taste, texture and nutritional qualities of meat.

Innovation can currently be found in the UK food-service sector. In the UK the past year has seen Pret a Manger launch a trial vegetarian store in London, and introduce two vegan specials during summer months, while Wetherspoon pubs have started a vegan menu. Chain restaurant Zizzi’s offers vegan pizza options, and Costa Coffee has taken up the vegan trademark for products. Catering company Sodexo teamed up with conservation charity WWF to develop and pilot a set of 10 sustainable meals – with plant-based foods accounting for at least two thirds of the volume of each meal.

3 What does this mean for food businesses?

Food brands and retailers can contribute in several ways towards a shift to plant-based diets, and meeting the future nutritional needs of the population. They fall into four areas:

Product range

While there is burgeoning interest in plant-based eating, there is still unmet demand for new products and ingredients. This offers opportunities for food businesses in the UK where the availability of meat and dairy substitutes still lags behind the US. However as well as offering substitutes, food manufacturers and retailers should also evaluate opportunities such as:

- Reformulating existing products to provide a greater ratio of plant protein (e.g. using pulse-based additives)
- Investing in or collaborating with companies offering plant-based meat substitutes
- Introducing more exciting flavours and ingredients within existing plant-based products to attract a larger number of consumers
- Making products available to purchase at an affordable price for consumers

Mobilising consumers

Brands and retailers can mobilise consumers to eat more diverse, plant-rich diets through:

- Brand-led campaigns, highlighting the nutrition and sustainability benefits of a plant-based diet
- Collaborations with related brands or retailers
- Supporting national campaigns e.g. veg sandwiches during British Sandwich Week (championed by advocacy group Meat Free Mondays during British Sandwich Week in recent years after finding a dearth of options that didn’t contain animal products).
- Promoting cuisines and recipes where the veg is the ‘star’ of the meal and / or helping people to make the transition from meat to plants through accessible recipes and suggestions. Collaborations with pro-veg chefs could be particularly effective.

A recent example of consumer mobilisation is Ella’s Kitchen Veg for Victory multi-channel campaign aimed at helping parents to wean children on vegetables which is shown to lead to people eating more veg later in life. This included a competition with Tesco to win products, and was based on a review of evidence by the British Nutrition Foundation commissioned by Ella’s Kitchen.

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Progressive advocacy

Food brands can achieve broader impact by aligning with government and NGO-led initiatives. This could include:

- Supporting and implementing national health guidelines in product ranges and through marketing
- Involvement in campaigns such as Meat Free Monday or National Vegetarian week.
- Promoting plant-based diets and cooking via schools programmes
- Commissioning and promoting academic research that makes the case for plant-based diets

Buying power

Finally, retailers and food manufacturers can influence demand for plant-based ingredients through buying practices – via supplier requirements. Where supply is not available or sufficient, new partnerships and collaborations with retailers or manufacturers can be formed to develop new solutions at scale.

To sustain and accelerate the much-needed shift to more plant based diets will require continuous, consensual and consistent messages from food experts, NGOs and governments. The food sector as whole has an enormous role to play in making it straightforward, affordable and desirable to follow a healthy, plant-based diet and to collaborate with government and civil society to change dietary norms.

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