A comprehensive study of 'Vegan Meat' and the consumer perception regarding the product

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CERTIFICATE

This is to certify that the work titled **'A comprehensive study of 'Vegan Meat' and the consumer perception regarding the product'** as part of the final year Major Research Project submitted by Ananya Mishra in the 4th Semester of MBA, Delhi School of Management, Delhi Technological University during January-May 2021 is her original work and has not been submitted anywhere else for the award of any credits/degree whatsoever.

The project is submitted to Delhi School of Management, Delhi Technological University in partial fulfilment of the requirement for the award of the degree of Master of Business Administration.

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DECLARATION

I hereby declare that the work titled **'A comprehensive study of 'Vegan Meat' and the consumer perception regarding the product'** as part of the final year Major Research Project submitted by me in the 4th Semester of MBA, Delhi School of Management, Delhi Technological University, during January-May 2021 under the guidance of Mr Abhinav Chaudhary is my original work and has not been submitted anywhere else.

The report has been written by me in my own words and not copied from elsewhere. Anything that appears in this report which is not my original work has been duly and appropriately referred/cited/acknowledged.

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Sincerely,
Ananya Mishra
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ABSTRACT

Like every other species residing this planet, human or the Homo sapiens are also outcome of years of evolution but one striking feature that separates the human kind from all other forms of life is the presence of an evolved conscience. The brain separates the humans from all other life forms and this brain holds the capacity of making things better than what they already are. We can call this capability innovation.

One such innovative product that has come to life in past decade is the 'Vegan meat'. It is an oxymoron of sorts to say vegan and meat together but the fact is that this product is made to mimic the behaviour of animal meat so that people find an alternative to the conventional meat that they are used to consuming.

There are many companies that have fully immersed themselves in the research and development of this product. The most prominent ones of them are Beyond Meat and Impossible Foods.

Now, this product is still in its initial phases. If we talk in respect of the Product Lifecycle Curve then it can be safely placed in the growth area. The products which are in the growth phase face many challenges in all the facets of the business. The main concern in this study is only with the overall perception of this product and strategic analysis of the prospects regarding the same.

In indian markets, this product is still very new and largely unknown. Only one food chain, that is Dominos, has introduced it in Indian markets that too in a very restrictive way so as to understand the initial trends. Thus, there are a lot of unknown factors attached with the product that is the whole aim of this study- try to analyse these unknown factors and make general predictions for a better reachability and marketing.

With the rise in human population, the demand for food is only surging up and up, and this particular food category - the vegan meat alternative might become one important alternative in the future, if properly marketed.

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CHAPTER 1

Introduction to Plant Based Meat

Plant based meat has always been seen as a niche product for the vegans and vegetarians as a close enough substitute for the meat products but it has never been seen as a replacement for meat itself. According to the United Nations Food and Agriculture Organisation, thirty-four percent of global food protein supply comes from livestock and it supports the livelihood of at least 1.3 billion people worldwide. But the downside of livestock rearing for food is the negative environmental impact that it has. The reason for that being the growing population which needs to be fed. Raising livestock generates 14.5 per cent of global greenhouse gas emissions that are very bad for the environment. About 92 per cent of the fresh water is used for farming purposes, and 1/3rd of it is used for rearing livestock and manufacturing animal products. Livestock farming creates a huge carbon footprint and has a very high global warming potential. [1]

During a sabbatical in 2009, Stanford University Professor, Dr. Patrick O. Brown decided to switch the course of his career to address the urgent problem of climate change. In particular, he wanted to make the global food system sustainable by making meat, fish and dairy from plants — which have a much lower carbon footprint than meat, fish and dairy from animals. [2] Patrick brought together a team of top scientists to analyse meat at the molecular level and determine precisely why meat smells, handles, cooks and tastes the way it does. [2] And thus Impossible foods was born.

The company was founded on 16 July 2011, headquartered at Redwood City, USA. They launched their debut product, Impossible burger, in 2016. Primary markets for the company as of now are USA, Canada, Macau, Hong Kong and Singapore. Their first large-scale food manufacturing site is located in Oakland, California. In July 2019, they announced a co-manufacturing collaboration with OSI, a long-time supplier of McDonalds, providing additional manufacturing capacity for the award-winning Impossible Burger. [2]

Their flagship product, Impossible Burger, smells, handles, cooks and tastes like ground beef from cows. The Impossible Burger is sold at restaurants in the United

States, Hong Kong, Singapore and Macau. It's available at many restaurants, and is also available in select grocery stores in the United States. [2]

The Impossible Burger, is made almost entirely from common crops: wheat, corn, soy, coconut and potatoes. But a key ingredient, heme, the molecule that gives meat its bloody taste when raw and creates the intense, meaty flavours and aromas when it's cooked, isn't as easy to get. The major source of heme in meat is the protein myoglobin. Soybeans make a functionally identical protein known as leghemoglobin. For the scalability of Impossible meat, scientists at Impossible Foods engineered a type of yeast to make soybean leghemoglobin. They grow this yeast in fermenters like those one would find at a brewery, but instead of making beer, they get lots of leghemoglobin, and can make it at a cost that enables them to sell burgers at a competitive price.

Beyond Meat is a Los Angeles-based producer of plant-based meat substitutes founded in 2009 by Ethan Brown. The company's initial products were launched in the United States in 2012. The company has products designed to emulate beef, meatballs, ground meat, and pork sausage and patties. [3] The company began selling its plant-based chicken products in Whole Foods supermarkets across the US in April 2013. In 2014, it developed a simulated beef product. [4]

The People for the Ethical Treatment of Animals named Beyond Meat as its company of the year for 2013. In 2014, Beyond Meat expanded its presence from 1,500 to 6,000 stores across the US. [4] Walmart started selling Beyond Meat products in 2015. [3]

In June 2018, Beyond Meat opened its second production facility in Columbia, Missouri, resulting in a three-fold increase of the company's manufacturing space. The company claimed to have 27,000 different points of distribution for their products in the United States, and was rolling out their products to fifty international markets, partnering with Tesco in the UK and Tim Hortons and A&W in Canada. The same month, they opened a 26,000-square foot R&D lab in El Segundo, California housing nearly 100 employees. In 2020-1, the company is opening a production facility in Shanghai. [3]

In July 2019, Dunkin' Donuts announced that they would begin selling breakfast sandwiches using the Meatless Sausage product in Manhattan, with plans for national distribution beginning on November 6, 2019. In 2020, Beyond Meat launched an e-commerce site to sell products directly to consumers. [3]

The mission of replacing the need for animals as a global food-production technology by 2035 is commendable but there are underlying problems associated with this mission that impossible want to make possible. Changing the consumer taste and preferences being the biggest hurdle of all. The pleasure derived from eating certain foods is very deep seated and holds sentimental values. It is also sometimes linked to religion and festivals which makes it as integral part of social interactions of many communities throughout the world. Next, there are cost implications associated with the Impossible burger as well. Only 10% of the US population has even tried an Impossible burger ever. A challenge right now is to at least make the other 90% try out this burger. And this is only about US population. There is a much larger world population of meat consumers that might have not even heard about the product. Other than that, 1 pound of impossible ground beef costs about $10-$12 whereas traditional ground beef costs $4-$6. Economies of scale will eventually bring down the cost but achieving that is also a big challenge. The other challenges that lays in front of them is the replication of meat-eating experience in terms of the bones and other tissues that are also relished by meat eaters. All in all, there are a plethora of challenges before Impossible can actually make replacing meat entirely, possible.

1.1. Competition

The plant-based meat startups face stiff competition from the meat, beef and poultry businesses. As the plant-based meat selling companies try to make their mark in the industry, the meat businesses refuse to back off. Adding to the challenge of influencing the consumer's behaviour, the meat companies have also stepped into the plant-based meat market. Tyson Foods, a major meat selling brand across the world, started a new brand line called Raised and Rooted for selling plant-based and blended food products for stores and restaurants; but they have labelled their plant-based products as 'alternative protein' and not 'meat'. Tyson started the sale of their first alternative protein product - nuggets, made of pea protein, in 2019 and announced their plans of expanding the product line under Raised and Rooted. Justin Whitmore, the head of alternative protein business of Tyson, says that the company will keep investing millions for its original meat business and he is confident that his loyal consumers eating the alternative protein products will also continue to consume Tyson's actual meat products. JBS, the largest meat selling business in world, also entered the plant-based meat market through its plant-based burgers and choritos in 2020. "We're not saying that meat is bad," says Darcey Macken, CEO of Planterra Foods, [5] the JBS USA's plant-based subsidiary where Ozo and other plant-based foods are being developed. "People getting their heads wrapped around plants can be for all different motivations, whether it's about earth

and sustainability or just not eating animals." [5] They made their debut from grocery stores of Albertsons, Safeway, and Kroger at different locations in US. Amid raised meat supply fears during pandemic in June 2020, the Planterra products saw impressive demand from meat consumers too. The agricultural giant, Cargil Foods, also joined the bandwagon of fake-meat startups in February 2020. They started off with a plant-based burger which was sold at groceries and restaurants which, according to Cargil, would have the benefit of enjoying their reliable supply chain and scale. Quoting Brian Sikes, the chief of global protein and salt business of Cargil, "Whether you are eating alternative or animal protein, Cargill will be at the center of the plate." The news of Cargil coming up with plant-based burger had trickled down the shares of Beyond Meat, by 3% at end of day. Smithfield, largest in the world pork selling company, launched its subsidiary - Pure Farmland – which included eight plant-based meat products like burgers, meatballs, breakfast patties, and ground beef style "protein starters". Pure Farmland also had under its umbrella vegan cheese, dairy-free cheddar with burger, and dairy-free parmesan with meatballs. This marked a first instance when a global pork producer had introduced plant-based meat as well as dairy food items both at the same time. Smithfield's new product range also had a noble appeal as it tied up with the American Farmland Trust to which they donated an amount equal to the cost of protecting one square foot of land for every single unit of Pure Farmland product sold. Several other meat selling companies like Purdue Farms, Hormel Foods, and Nestlé have also rolled out plant-based food products to keep up with the changes in consumer preferences for meat eating. This raises concern on part of Impossible Foods and Beyond Meat - the two pioneers of plant-based products in US – as they are new in the market, whereas, the meat selling giants entering the plant-based food market enjoy their previously established image and loyalty of the consumers.

Impossible also faces competition from Beyond Meat, which launched in 2009, two years before Impossible. Beyond's products are quite similar to those of Impossible's except for the fact that they do not have heme in them and are majorly based on pea protein. Beyond Meat even started its IPO in May 2019 with a share price of $25 and has a present market cap of $12.01 billion. The company disclosed its plans of investing the proceeds from the IPO in manufacturing facilities, research and development, and sales and marketing. In contrast, Impossible is still a Private company and holds a valuation of around $4 billion as of August 2020. This plight of the situation makes it evident that there are many more milestones to achieved and many ore hurdles to be crossed for Impossible to have an edge over other players in the market.

1.2. Market Prospects for Vegan Meat

Even after all the competition in the market, this food category still stands a chance for bright market prospects if tapped carefully. Looking at the US meat industry for the last 5 years, there has been a significant decline of almost an average of 0.2% Year-on-year from 2015 to 2020. Even, there is an expectation that number of businesses in meat, beef and poultry industry will decline further after 2020 by another 1.2%. It has also been seen that the entire plant-based food market across all categories has grown by 28.7% from 2017 to 2019. Among all these categories, plant-based meat market has grown a whopping 37.8% for the same period (See Annexure I & II). Out of all the plant-based food category, plan-based milk market is the most developed of all followed by plant-based other dairy products and plant-based meat products, respectively. Moreover, in the plant-based meat category, the recorded sale from 2018-19 was more than 208 million units and the numbers are further expected to expand. The plant-based meat market has the opportunity of another $12 billion as it has the ability to reach a market parity with plant-based milk market which stand at a size of 14% of total retail milk market (See Annexure III). Being a part of such a booming industry, Impossible, Beyond meat and others can surely make its strong place in the market as one of the successful players, if not capture the entire traditional meat industry.

1.3. Segmentation Targeting and Positioning

The mission statement for impossible foods states that they want to "replace the need for animals as a food-production technology – globally, by 2035." They succumb to this mission because they want to target world's environmental problems by changing the way food is sourced. They inevitably say that animal agriculture is an unnecessary and destructive practice. With the increase in global population, the global meat consumption has only surged, with catastrophic impact on climate, water resources, biodiversity and ecosystem integrity.

Despite being a food company, the market segment that impossible wants to hit is that of a sustainable product. Their innovation in the way of producing their plant-based meat has tried to create a new segment in the markets. If vegan food, vegetarian food and non-vegetarian food are the existing segments, then Impossible can be called a sustainable non-veg replacement segment as the founder and CEO, Patrick O. Brown said in a short documentary by the YouTube channel CNBC make it that the people who love meat, dairy and fish are not going to stop eating what is source of pleasure in their daily lives. The company wanted to start off with a beef alternative since cows are the most harmful type of livestock for the environment. The Impossible

meat is comparable to 80% lean 20% fat ground beef. Impossible typically wants to target ardent meat eaters with its plant-based meat. Basically, the people who eat meat and can't stop or don't want to stop because it's simply good and something which they have been preferring for all their lives. Patrick himself agrees that plant-based products have a very small percentage of market as compared to the meat products and don't find a point in competing for that tiny share of market. Whereas, he finds the growth potential in the omnivore market. In US plant-based meat sales amounted to $622.6 million in 2019 whereas traditional meat sales amounted to $61.4 billion in the same period. Their biggest challenge right now is to communicate to the meat lovers that they should try out the Impossible burger since 90% of the American population has not even tried it once. (the population being 328.2 million in 2019). Patrick says in his interview with 'CNBC make it' that the most important message they need to send to the consumers is that uncompromisingly delicious meat doesn't have to come from animals anymore.

Consumer Electronic Show or CES is an annual trade show organised by the Consumer Technology Association (CTA). Held in January at the Las Vegas Convention Center in Las Vegas, Nevada, United States, [6] the event typically hosts presentations of new products and technologies in the consumer electronics industry. [7] On January 9, 2019, The New York Post published an article with the headline "How a veggie burger stole the show at CES 2019" and further continued to say that the most impressive product launch at CES 2019 isn't a drop or a smartphone but a veggie burger. Demand thereafter skyrocketed in 2019 in every category in which they do business - large fast-food chains, individual restaurants, colleges and universities, corporate campuses, theme parks and more. Celebrities also pitched in to help Impossible scale up its manufacturing capabilities. Thus, Impossible converted a plant-based food into a foodie sensation. Their market strategy so far has been to make a premium product that is hard to get, exclusive and desirable and then create an affordable version for the mass market and become a household name.

Their study suggests that by choosing one 12-ounce pack of Impossible over meat from the cow, a consumer will spare 20.3 pounds of carbon dioxide, 1.1 trees worth of land and 66.9 gallons of water. For Impossible Foods, a sale only counts if it comes at the expense of an animal-derived product. So, the basic idea here is complete shift of consumer preferences when its comes to non-vegetarian food items. Now that's definitely a tough feat to achieve since food is not only a means of satisfying the hunger but also a source of pleasure and is an essential part of social lives. Modifying the basic fabric of the food behaviour of humans replacing it with another item completely in the stipulated time frame of 15 years (from 2020 to 2035) is not an easy task. Even their current line of product as of 2020 which comprises

three products that are Impossible burger (ground beef), Impossible pork and Impossible sausage, they cannot aim to fulfil all the meat-eaters' requirements since meat is consumed in many more forms and from many other sources. Considering their flagship product, the Impossible burger which is a beef replacement, considerable success can be achieved in major beef consuming nations like United States, China and Brazil (ranked 1st, 2nd and 3rd in beef consumption respectively in 2018, refer Annexure VI) whose combined consumption sums up to approximately 50%. But the hurdle still there in reaching out to these markets is the form in which Impossible meat is sold since not everyone consumes only ground beef and purchases them in factory processed packets. Moreover, beef export is essential part of economy for many countries. According to the United Nations Food and Agriculture Organisation, pork is the most widely eaten meat in the world (36%) followed by poultry (33%), beef (24%), and goats/sheep (5%). [8] Thus, to target the worldwide meat requirements and replacing them with sustainable alternative, the existing product line does not suffice.

Fig 1. Various brands of plant based meat at display (Source: marketwatch.com)

Fig. 2. Assortment of products manufactures by Beyond Meat to provided alternatives to various forms of meat. (Source: engadget.com)

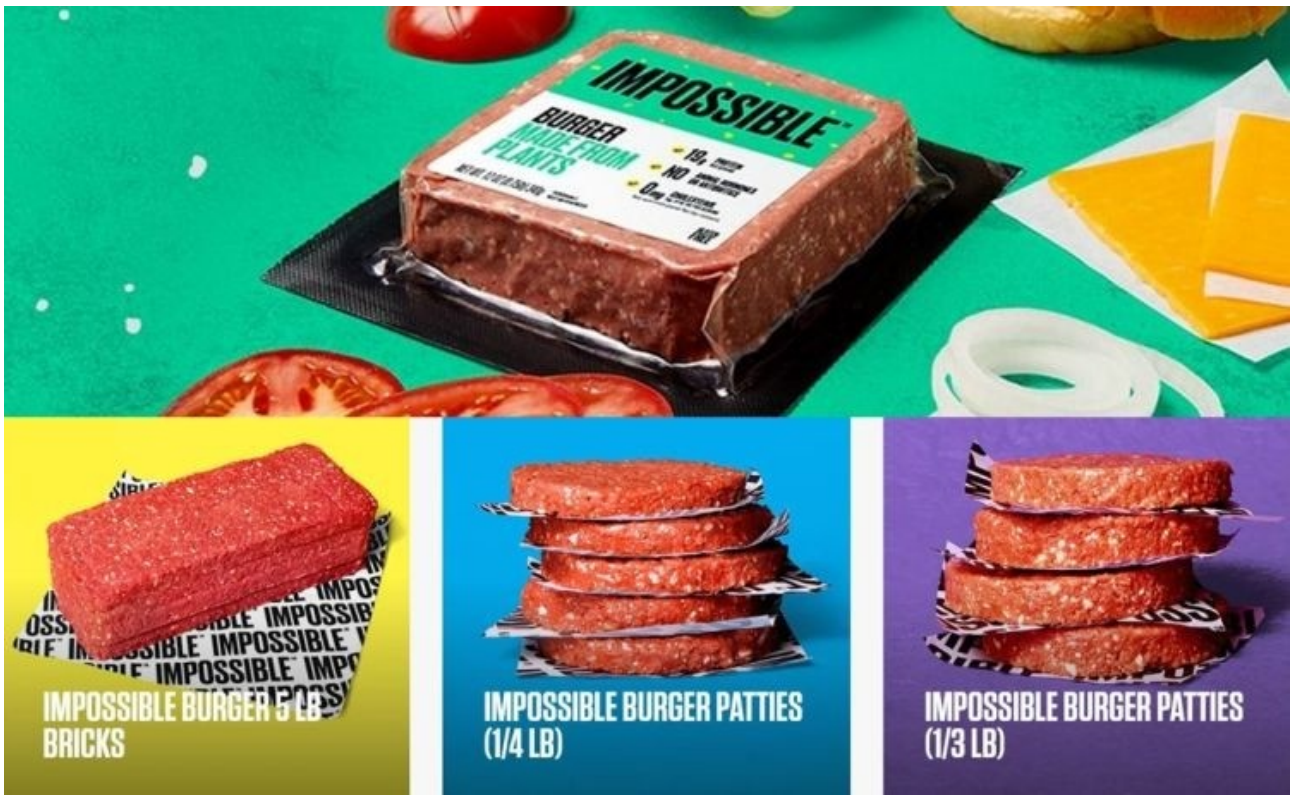

Fig. 3. Assortment of products produced by Impossible foods. (Source: foodnavigator-usa.com)

Fig. 4. Impossible food's flagship product: Impossible Burger (Source: venturebeat.com)

Fig. 5. Impossible's collaboration with Burger King to produce Impossible Whopper (Source: techcrunch.com)

CHAPTER 2

World Meat Consumption - Analysis by Food & Agriculture Organisation of the United Nations

2.1. Market situation [11]

World meat production decreased to 325 Mt in 2019, mainly due to the impact of African Swine Fever (ASF) in China. The ASF outbreak also spread into a number of African, Central European, some East Asian countries – Democratic People's Republic of Korea, Korea and Mongolia, and to some South-East Asian countries – Cambodia, Indonesia, Lao People's Democratic Republic, Myanmar, The Philippines, Timor-Leste, and Viet Nam. China's overall meat output is approximated to have fallen by 10% in 2019, reflecting a decrease of at least 21% in pig meat production, which was to some extent offset by higher production volumes of other types of meats. However, higher meat production in Argentina, the European Union, Turkey, and the United States culminated in limiting the global decline of meat output to somewhat less than 2% for 2019.

In countries where meat output keeps on rising, productivity gains are the main factor. In the United States, for example, increased anima; carcass weights have resulted in the growth. In the European Union, total meat output is also expected to expand despite a decline in bovine meat production. In Argentina, meat production rose primarily to meet increased foreign demand.

Measured by the FAO Meat Price Index, average prices in 2019 were 5.6% higher than in 2018, with pig meat, in particular frozen pig meat, recording the steepest rise due to China's surge in import demand. Poultry and bovine meat prices also strengthened due to stronger Asian demand, while limited supplies from Oceania supported the continued strength of sheep meat prices.

Global meat exports increased to 36 Mt in 2019, up 4% from 2018. The bulk of this increase is attributed to increased imports by China due to ASF-related production losses. China's overall meat imports increased by 62% (around 2 Mt) across all meat categories in 2019. On the export side, much of the expansion in global volumes came from Argentina, Canada, the European Union, Thailand, and the United States.

2.2. World Meat Prices [11]

At the global level, the last year's outlook projected that meat production and consumption to reach a low point in 2020 as a consequence of the multiple outbreaks of AFS across Asia. This was also substantiated by the Corona Virus outbreak. In the early years of the outlook period, the overall growth in global meat output will be impacted negatively by a decline in availability of , only partially offset by higher production volumes of other meat types.

Growth in consumption of meat over the next decade is projected to increase by 12% by 2029 when compared to the base period. However, over the medium term, growth rates will decrease in response to slower income growth in several regions, ageing populations, and a levelling off in per capita meat consumption in high-income countries as a result of saturation and dietary preferences for higher quality meats. In light of these factors, global consumption per capita is projected to increase to only 34.9 kg retail weight equivalent (r.w.e.) by 2029, an increase of 0.5 kg r.w.e., slightly more than 1%, compared to the base period. Virtually all of this increase per capita is attributed to higher consumption of poultry meat.

The global expansion in meat supply is expected to increase by 40 Mt c.w.e. by 2029, when compared to the base period. Over the course of the outlook period, a combination of herd and flock expansion in the Americas and the European Union regions as well as increased productivity will support a supply-driven market. Developing countries are projected to account for most of the total increase in production, poultry meat remains the primary driver of growth in total meat production.

Animal disease outbreaks, sanitary restrictions, and trade policies will remain the main factors that drive the evolution and dynamics in world meat markets. Uncertainties related to existing or future trade agreements over the outlook period (e.g. the United Kingdom's exit from the European Union) could change meat trade patterns. In the short term, the magnitude and duration of the impact of the current outbreak of COVID-19 is uncertain but meat production (including both slaughtering and processing) and consumption patterns, especially those of food services, are expected to be affected. Other factors that could influence the meat outlook over the medium term include changing consumer preferences and attitudes towards meat consumption in view of its impact on health, the environment, animal welfare, and global greenhouse gas (GHG) emissions which may lead to more modest demand growth.

2.3. Growth of meat production by region and meat type [11]

Brazil, China, the European Union, and the United States are projected to produce nearly 60% of global meat output by 2029. Production growth in Brazil will continue to benefit from an abundant supply of natural resources, feed, grassland availability, productivity gains and, to some extent, the devaluation of the Real. Production in China will benefit from growing economies of scale as small production units grow into larger commercial enterprises. Production in the United States will benefit from strong domestic demand and higher slaughter weights in a low feed cost environment. The overall meat production in the European Union will remain stable reflecting a small reduction in domestic demand for both beef and pig-meat, while in African countries the ratification of the African Continental Free Trade Agreement, under which more than 90% of products traded within Africa will be duty free, is expected to promote additional meat production.

Global beef production will grow over the outlook period, particularly in the main producing countries of the Americas such as Argentina, Brazil and the United States. Developing countries are projected to account for 81% of the additional beef produced by 2029, when compared to the base period. The majority of this expansion should occur in Argentina (despite the export tax on beef), Brazil, China, Pakistan, Sub-Saharan Africa, and Turkey. In developed countries, production is projected to be 4% higher by 2029 compared to the base period; this increase will be mainly due to high growth in Canada and the United States. Beef production in North America will be supported by both higher carcass weights, resulting from low feed costs, as well as increased slaughter numbers as herd rebuilding lead to higher livestock numbers.
Beef supply will remain tight in Australia over the short term as a result of the drought conditions that have prevailed over the past few years. A gradual recovery in production is expected to follow, however, the herd rebuilding is expected to take some years. In the European Union and the United Kingdom, a downward trend in beef production is expected as dairy cowherds, which make up approximately two-third of the beef supply, will decrease following productivity gains in the milk sector. Other factors limiting the growth potential of this sector in the European Union are a reduction in suckler cowherds due to their low profitability, escalating competition in export markets, and declining domestic demand. Furthermore, it is projected that demand will shift as consumer taste changes to include more processed meat and ready-to-eat meals.

2.4. Main issues and uncertainties [11]

Trade policies remain a major factor affecting the dynamics of world meat markets. The implementation of various trade agreements over the outlook period could diversify or consolidate meat trade considerably. Unilateral and/or unexpected trade policy decisions are another risk factor in the projections. Domestic policies also influence the competitiveness of meat producers. Argentina introduced a temporary meat export tax in 2018, which is expected to negatively affect the country's competitiveness on the world meat market. Ongoing trade negotiations between the United Kingdom and the European Union will also influence the various meat markets.

Animal diseases have disrupted poultry, beef and, pig meat markets and this is likely to continue over the outlook period. The medium-term impact of ASF on global pork production is uncertain, but measures to contain this outbreak are assumed in this Outlook to depress global pork production in the next five years. The medium-term impact of ASF, however, may be more or less severe than currently anticipated.
In the short term, the magnitude of the impact and the duration of the COVID-19 outbreak are uncertain. Labour supply and transportation problems could hinder the marketing chain and affect meat production (including both slaughtering and processing). This outbreak will also impact, in the short term, consumption patterns, in particular out-of-home consumption which in turn will impact demand for high value meat cuts usually consumed in restaurants. In addition, the threat of market-ready livestock that cannot be traded or processed given the current labour shortage could result in severe economic fallout in rural communities and a major animal welfare challenge. Finally, the duration of the economic slowdown and its impact on income growth is likely to dampen meat demand, which has a high income responsiveness, for part of the projection period.

Aggregate consumption of meat has been on a continuous upward trajectory, driven by population and income increases. However, the pattern for individual meat types has not been homogenous. Differences in relative prices, combined with growing health and environmental concerns have led consumers to gradually decrease the share of red meat in their meat consumption, while increasing the share of poultry. There is evidence that growth rates in meat consumption are declining in response to slowing income growth rates. Many high income countries are reaching saturation levels in terms of per capita consumption.

Changing consumer preferences, such as the rise in vegetarian or vegan lifestyles,

societal concerns such as the negative impact of meat production on the environment, and other several socio-cultural aspects like religion or cultural norms – will also have an effect on the overall future of meat consumption.

Climate change, obesity, technology advancements and changing consumer lifestyles are also important factors, more importantly as they cast an influence over policy initiatives and shifts towards environmentally sustainable consumption patterns. The increasing attention of consumers to animal treatment and how meat is produced (with a growing preference for organic meat and meat products) are relatively new factors that are difficult to assess at this point in time due to lack of enough evidence supporting the same. If adopted by an increasing share of the population, however, they could affect global meat markets, although the extent to which consumers are willing and able to pay a premium for such goods is unclear. In many developing regions, affordability remains a primary concern when it comes to any consumer good and food items also fall under this imperative.

2.5. World Beef Consumption - Per Capita

The world consumed 129.5 billion pounds of beef in 2016. Uruguay consumed the most beef per capita in the world in 2016 followed by Argentina and Hong Kong. All three countries consumed more than 100 pounds of beef per capita. The United States consumed the 4th most beef per capita in the world in 2016. Ten countries consumed more than 50 pounds of beef per capita: Uruguay, Argentina, Hong Kong, United States, Brazil, Paraguay, Australia, Canada, Kazakhstan & Chile. [12]

World Beef Consumption By Country				
World		129,472,923,360	7,432,663,275	17.4
Rank	Country	Consumption	Population	Per Capita
1	Uruguay	427,696,280	3,444,071	124.2
2	Argentina	5,269,041,800	43,847,277	120.2
3	Hong Kong	839,960,220	7,346,248	114.3
4	United States	25,714,687,680	324,118,787	79.3
5	Brazil	16,532,445,380	209,567,920	78.9
6	Paraguay	489,425,640	6,725,430	72.8
7	Australia	1,580,712,540	24,309,330	65.0
8	Canada	2,094,389,000	36,286,378	57.7
9	Kazakhstan	981,055,900	17,855,384	54.9
10	Chile	952,395,840	18,131,850	52.5
11	Israel	396,831,600	8,192,463	48.4
12	Switzerland	388,013,120	8,379,477	46.3
13	Turkey	3,571,484,400	79,622,062	44.9
14	New Zealand	178,574,220	4,565,185	39.1
15	Costa Rica	189,597,320	4,857,218	39.0
16	Colombia	1,834,243,840	48,654,392	37.7
17	South Africa	1,990,771,860	54,978,907	36.2
18	South Korea	1,728,422,080	50,503,933	34.2
19	Bosnia	121,254,100	3,802,134	31.9
20	Mexico	3,979,339,100	128,632,004	30.9
21	Kuwait	121,254,100	4,007,146	30.3
22	Lebanon	176,369,600	5,988,153	29.5
23	Russia	4,221,847,300	143,439,832	29.4
24	Gabon	46,297,020	1,763,142	26.3
25	Oman	116,844,860	4,654,471	25.1
26	Dom. Republic	238,098,960	10,648,613	22.4

27	Macedonia	46,297,020	2,081,012	22.2
28	Japan	2,645,544,000	126,323,715	20.9
29	Pakistan	3,672,896,920	192,826,502	19.0
30	Malaysia	579,815,060	30,751,602	18.9
31	Ukraine	831,141,740	44,624,373	18.6
32	UAE	167,551,120	9,266,971	18.1
33	Belarus	169,755,740	9,481,521	17.9
34	Egypt	1,536,620,140	93,383,574	16.5
35	El Salvador	97,003,280	6,146,419	15.8
36	Saudi Arabia	498,244,120	32,157,974	15.5
37	Peru	480,607,160	31,774,225	15.1
38	Jordan	114,640,240	7,747,800	14.8
39	Honduras	116,844,860	8,189,501	14.3
40	Taiwan	324,079,140	23,395,600	13.9
41	Singapore	77,161,700	5,696,506	13.5
42	Venezuela	407,854,700	31,518,855	12.9
43	Nicaragua	79,366,320	6,150,035	12.9
44	Philippines	1,294,111,940	102,250,133	12.7
45	Angola	324,079,140	25,830,958	12.5
46	Algeria	502,653,360	40,375,954	12.4
47	China	16,916,049,260	1,382,323,332	12.2
48	Guatemala	191,801,940	16,672,956	11.5
49	Iran	890,666,480	80,043,146	11.1
50	Libya	48,501,640	6,330,159	7.7
51	Vietnam	542,336,520	94,444,200	5.7
52	India	5,291,088,000	1,326,801,576	4.0
53	Congo	50,706,260	79,722,624	0.6
Source: FAS/USDA (pounds)				

Fig. 6. World beef consumption by country (Source: beef2live.com)

CHAPTER 3

Analysis of Indian Market

3.1. Features of Indian Market

There are very distinct features of Indian market which attracts all the consumer product based companies to set up their market base in this country. To highlight a few the reasons could be,

- Very large population
- Presence of a distinct middle class
- Freedom to sell the products
- Diversified customer preferences

Relating to the product under consideration, there are a few more distinct characteristics that may govern the success of this product,

- High percentage of vegetarian population
- Beef ban in most of the Indian states
- Influence of western culture

Now these are mostly the positive factors that we are considering so far. On the cons side also there are a few factors which should be considered too,

- Existing food habits
- religious factors which dictate the food habits
- Perception towards new food products
- Distribution of product and reachability
- Percentage of illiterate population

So overall, the scenario in the Indian market can be a mix of factors and thus nothing conclusive can be said without a proper study.

With the help of another classmate, I tried to conduct a survey with some basic questions trying to capture the sentiments. Even though we were not able to collect a large number of responses, still we have managed to have above 100 data points,

which can give some sort of analysis, although more data points would have only benefitted.

3.2. Study of Indian population - From a food retailer's perspective

The present day market situation makes it is difficult for companies to succeed if they adopt an undifferentiated marketing strategy. In fact successful companies are the ones that modify their marketing tactics and customise them according to the needs of their customers. [9] Dominos Pizza, operated by Jubilant foods, is the first ever quick service restaurant in India to have introduced the plant based meat in their menu. The call it the 'Unthinkable Pizza', which is available in major cities like Mumbai, Delhi NCR and Bangalore. Owing to this move, we will also do some analysis on how Dominos has gone about with its segmentation, targeting and positioning and how it can be done by these plant based meat companies.

Segmentation

Segmentation helps the companies in focusing on specific targets and also reduce the overall cost.

Dominos has seen a positive growth in the Indian fast food market by focusing on the segment of middle-class young consumers. These vibrant students and working professionals with little time on their hands to cook and with an attitude to experiment [9] are the most suited type of customer base for Dominos. Pizzas serve the purpose of a social food as well since it is often enjoyed in a company of friends and family. As we can see from this strategy opted by dominos where they have focussed on the more risk taking, younger population, same can be the target for plant based meat companies as well since this is the population which is more technologically informed, sensitive around environmental issues (which will be discussed more in depth later) and ready to adapt.

Targeting

Dominos has been successful in India by customising its menu to suit the Indian sense of taste by using local flavours and garnishing. [9] The indian way is either being pure vegetarian or to be non-vegetarian. There is no such concept of veganism in India, thus there doesn't exist a product which needs to mimic the non vegetarian counterparts. Also, it is to be noted that Indians do not consume beef as it is done in USA for that matter. There are many religious

connotations as well in the food habits of Indians since Hindus do not prefer beef and Muslims do not prefer pork, both put together, comprise the majority of population. So, to suit the indian taste and preference, there has to be a target on the risk takers and the health conscious. Since, such products are not naturally preferred by Indian customers. For comparison, we can look at the example of Tofu which is not a hit in Indian market since its counterpart, Paneer is already a much preferred product and people do not see any harm in consuming Paneer or any benefit in replacing Paneer by Tofu.

Positioning

Positioning has to be clear , customer oriented and specific. [9] The positioning of plant based meat cannot be in any arbitrary segment which is somewhere in limbo between soya chunks and meat. This is a product which is not meant exclusively for vegetarians or non-vegetarians. It has its own say - a sustainable, healthy and holistic source of protein. So, to just make the product be seen as casual pleasure and something exciting will kill its prospects in the long run. The position has to be such that customers actually treat it as a staple in their pantry and repurchase it as they would repurchase their grains and vegetables.

3.3. Data analysis

Demographic

In our data, 46% of the responses are from the age group of 21 to 25 years, 21% in the age group 26 to 30 years, 15% in the age group of 31 to 40 years and 16% in the age group more than 40 years. The smallest demographic group is 16-20 years old with 2% responses, so merging them with the 21 to 25 years age group might give more reliable results.

45% of the respondents are females whereas the rest 55%, males.

The most important category of this study is that whether the respondent is vegetarian or a non vegetarian. 30% of the respondents are pure vegetarians whereas the rest 70% are non vegetarians which is also a very good reflection of the actual distribution of vegetarians and non-vegetarians in India and is in accordance with the other large scale surveys conducted by Food and Agricultural Organisation and the likes. Out of the 70% non-vegetarians, 25% identify themselves as hardcore non vegetarians and the rest 75% as occasional non vegetarians. This is an important differentiation since that depicts the affinity of the individuals towards eating meat and thus the possibility

whether they will consider the plant based alternative or not.

The meat eaters among the respondents also have different meat eating habits based on the frequency of consumption. 10% of the non-vegetarians said that they consume meat on a daily basis, 30% said their consumption is twice in a week, 24% say once a week, 14% say once in two weeks 10% say once in a month and the rest, are even less frequent meat eaters. Having this information helps us to further categorise the likelihood of the respondents to switch to vegan meat options since 35% of the total respondents have specified that they love eating meat items and it comprises mainly the people who are daily, bi-weekly, weekly consumers. This affinity towards meat eating makes it more difficult for the switching to vegan options from their beloved meat options. Those who consume it much less often, find themselves in a neutral position where they are not very sensitive about eating meat. This also brings into perspective the utility of the product being considered, and thus the elasticity of demand for substitute goods since here, the price becomes an important factor, apart from the ethics related to meat consumption.

The respondents were asked that if they know that the plant based meat tastes just like normal meat then would they like to have it and 44% of them said yes to it, out of which only 11% were vegetarians and rest 89% are non-vegetarians who eat meat on a much frequent basis. This result is actually positive for the motive of the companies like Impossible foods, who want the meat lovers to switch to their vegan product as they want the sales to come at a cost of actual meat, he reasons for which are more inclined towards environmental causes about which we will discuss in later section. 37% of the total respondents answered the same question with a maybe. This opens up the possibilities but not very well defined. Rest, 19% said they won't be trying the product even if it is similar to the meat, and the reasons for that can be varied. Mostly this answer came from the people wo either do not consume meat at all or those who consume it less often which can be justified very well.

Product Perception

39% of the respondents say that they are not aware of the plant based meat while the other 61% are aware of it. This is a positive sign for the popularity of the product since it is not even readily available in Indian markets yet people seem to have the awareness about the same.

The perception of the consumers regarding a product is as important as the feedback. Because when the product is perceived to be something good, the sentiment around it becomes the same. This also reflects in the share prices of such companies whose

products are perceived to be good, no matter if the perceiver has even tried it or not. Through the questionnaire, a general perception of the product was also tried to be understood since almost none of the respondents have actually tried the plant based meat.

Out of the 61% people who said they were aware of the plant based meat, 68% people had the opinion that it tastes similar to actual meat. This olds an extra importance because in the end, taste becomes the priority when it comes to food items and with products which are actually trying to mimic something else, this is even more important since, this gives one favourable head-start to make the further claims that this product comes with.

32% of the total respondents consider it to be high in protein content. The health perspective works really well in the food industry, that is why brands like bourn vita market their drinks as health mix, even though it has more than recommended amount of sugar in it, still people consider it to be healthy for them and for the children of growing age. So, in the end its the perception which matters in such cases. Thus, a perception of high protein content again is favourable for the brand but the percentage of people who think that are considerably low.

34% of the people consider that these are lab made but are safe for consumption. This is very important point regarding the plant based meat because one very crucial debate around the product is regarding its artificial nature or the 'unnatural' nature. There are many people who would rather consider eating the regular animal derived meat rather than something which is artificially produced to mimic the meat. 34% people considering it safe is a huge first step but still there is a long way to go to make the rest of the population agree upon its safety just like they consider other food items like canned food or frozen food safe for consumption.

Only 11% of the people are concerned about the high sodium content of the plant based meat, although this number is not very reflective of the actual understanding of people regarding this product since it is not very popular in the markets as of now and people generally become aware of such issues at a little later stages.

Product prediction

Talking about the motivation of people for trying out plant based meat, 37% said that the major factor would be the positive impact on the environment. The companies have tried to place this product in environment friendly, sustainable product and that clearly is resonating well with the audience. Environmental sustainability is discussed

in depth in the following section but the bottom line is, people are believing in the narrative about this product being more environmentally viable.

But the biggest category is 'just to explore' since 51% of the respondents believe that is the biggest motivation why people go for this product. Curiosity is a big factor when it comes to trying out new things, whether it is trying an new brand of detergent or tomato ketchup. People want to see what this new product is all about and sometimes they also stick to the new product if they find it better than the one they were already using. Raising the curiosity and building the hype has been one of the major marketing techniques that impossible food has been using and turns out more people buy into this reason than anything else. About 25% people are also concerned with the protein content of the product and think that it would be a driving factor and a much smaller chunk of vegetarians think that this will allow them to try meat without actually eating the 'meat'.

Answering to the likelihood of plant based meat being competitive to the actual meat, 70% of the respondents are of the opinion that it might. This response shows the uncertainty involved and the perception of people is also likely to sway with the uncertainty. 17% believe that it is very likely for plant based products to be competitive and 3% believe that it will absolutely give a tough competition. But given the percentage of such people who believe in the absolute supremacy of plant based products is so low, it does not convey any substantial sentiment perception. There is also a 10% chunk which believes that this product will not at all be able to compete with meat products and this shows the percentage of customers who will not budge to any claims of plant based meat, and rather act as a strong opposition.

Taking about the customer perception on what would be the reason of success for this product, if it does succeed, 45% of people believe that it is dependent on the marketing of the product. And this is a very likely factor also because the product sales do not depend just on the benefits or claims that it offers but also on how it is marketed and since this product is in the initiation /growth phase, aggressive marketing is needed to make the consumers aware.

28% of the people believe that its success is dependent on the environmental concerns and definitely, this seems to be an important narrative encircling this product and also it is an identifying character for the whole shift from meat industry to vegan meat. 27% people say that it will be totally dependent on the consumer's taste and preferences and how they would want their food habits to be.

Finally talking about the preferred customers for the product, 42% believe that anyone can be the customer, 38% believe that vegetarians will be the customers, 18% believe that non vegetarians will be the primary customers and 2% say no-one.

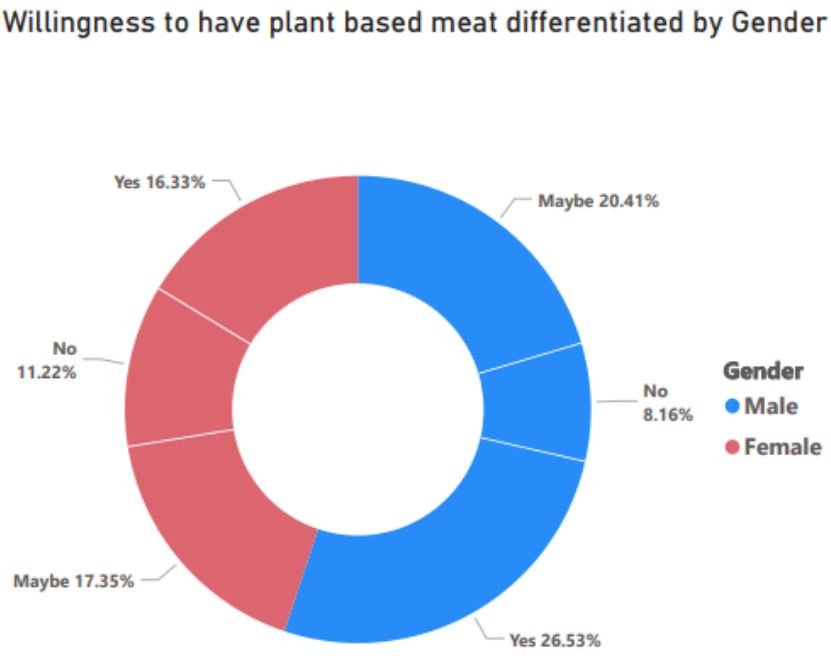

Fig. 7. Willingness to have plant based meat differentiated by gender

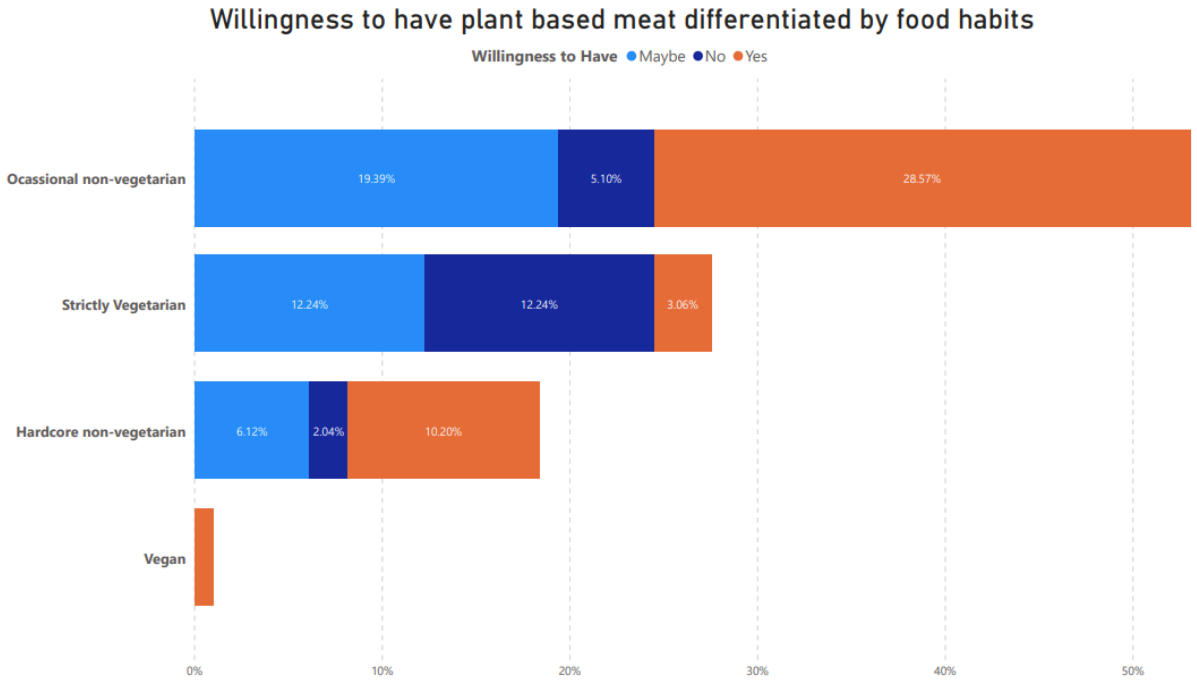

Fig. 8. Willingness to have plant based meat differentiated by food habits

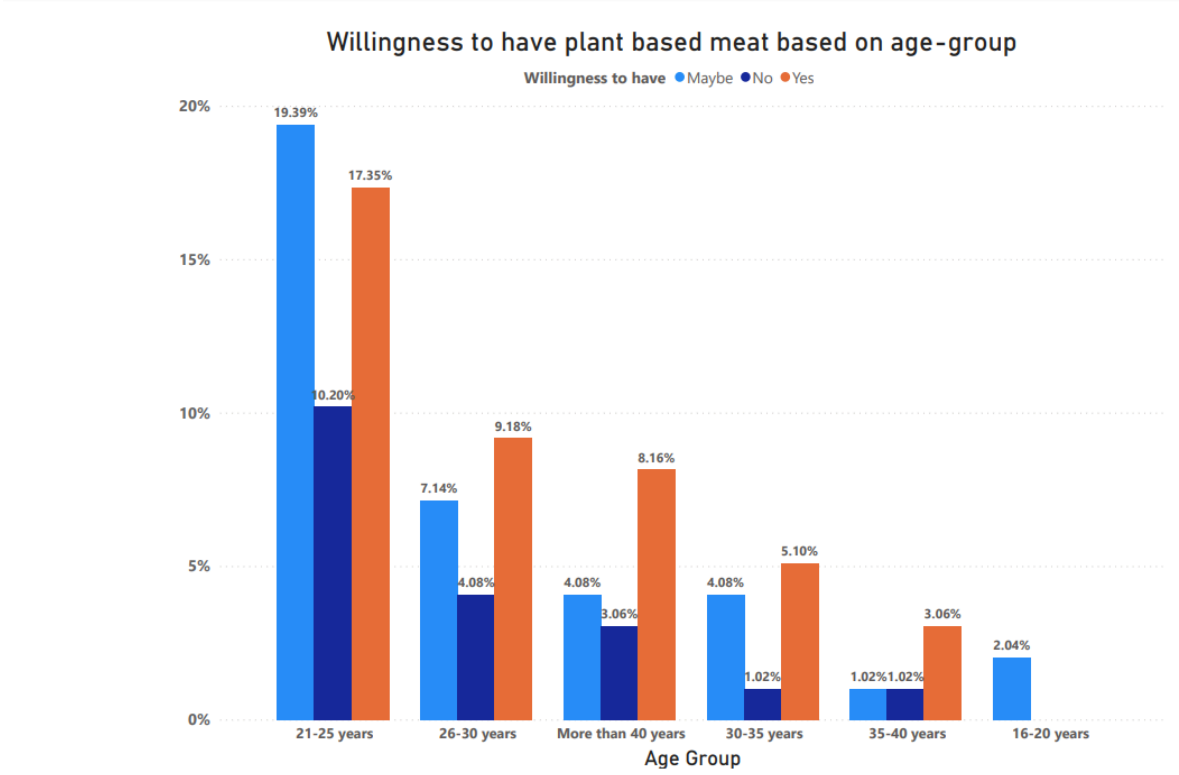

Fig. 9. Willingness to have plant based meat differentiated by age group

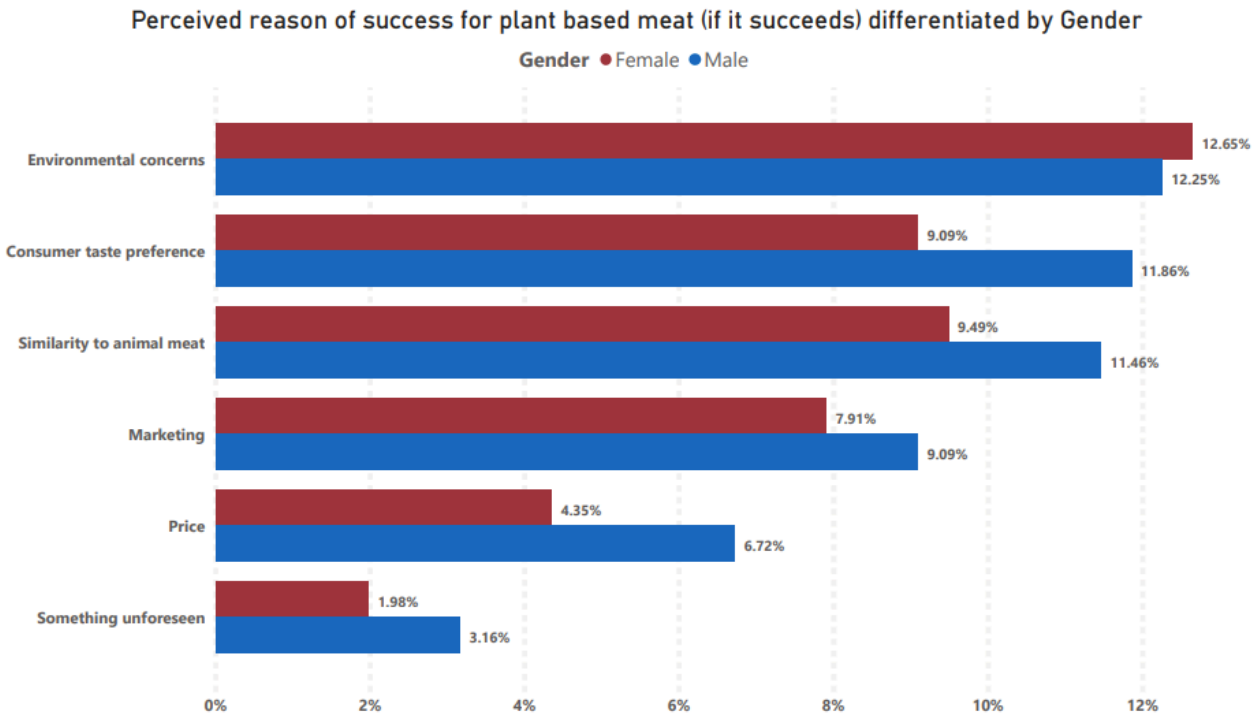

Fig. 10. Perceived reason for success of plant based meat differentiated by gender

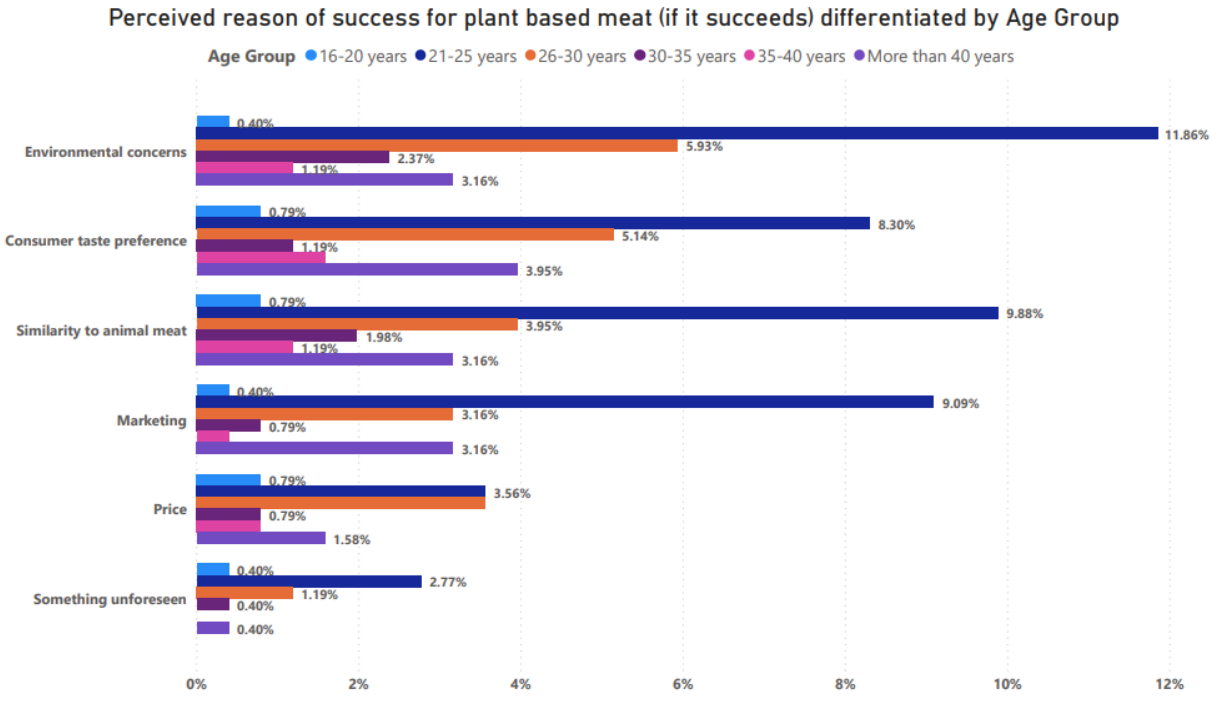

Fig. 11. Perceived reason for success of plant based meat differentiated by age group

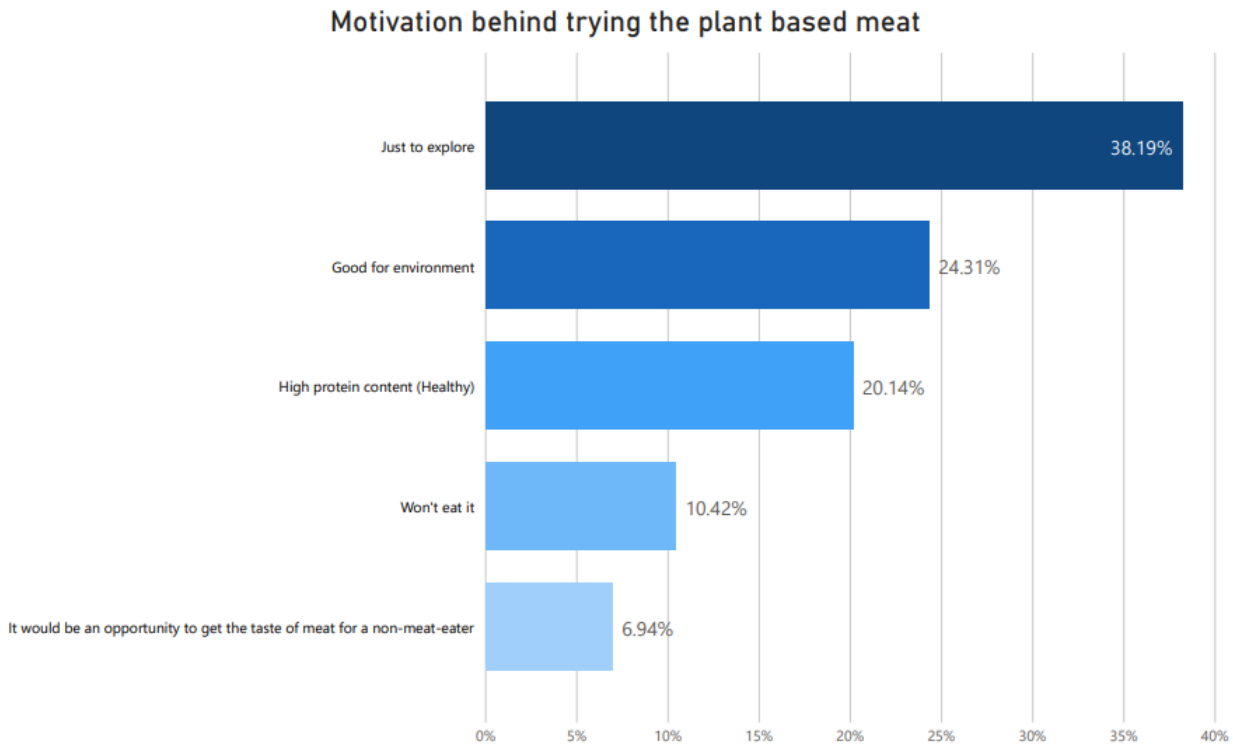

Fig. 12. Motivation behind trying out plant based meat

CHAPTER 4

Vegan meat & environmental sustainability problem

Meat consumption is not a new concept by any means. The meat consumption by the humans dates back to prehistoric ages when man first became a hunter gatherer. Farming came much later than hunting and meat consumption. Fast forward to today, we as human race have chosen consume a lot of meat. Exact numbers are hard to estimate but we can say that roughly 85-90% of world population consumes non-vegetarian food in some forms. Some countries have strong cultural or religious traditions that promote vegetarianism, such as India, while other countries have secular ethical concerns, including animal rights, environmental protection, and health concerns. A 2007 study by Raluca Andrea Ion from the University of Bucharest published in the Russian journal Economics of Agriculture corroborates these results, listing the different factors in order of overall preference: [10]

- To eat a healthier diet in general
- To reduce the suffering of animals on farms
- To eat cheaper foods
- To reduce impact on planet/environment
- To reflect spiritual or religious beliefs [10]

Most people choose to become vegetarians because of a moral concern with animals and to eat a healthier diet. The environment shows up as a lower concern. [10]

Veganism is a term for absolute vegetarianism which requires no consumption of any animal product like dairy or honey.

Now, whatever we eat, the end goal is just one - nutrition. Food is the ultimate fuel for our bodies. It is finally broken down into smaller molecules like glucose and peptides and that is needed for all the functions - voluntary or involuntary that our body does throughout the day.

If you look close, there is a very close connection between what people eat in any geographical location to what is available there. Many areas are good for farming of certain types of crops and thus whatever the land there produces is consumed by the

people residing there and there are some areas which are not suitable for agriculture and thus, animals become the primary source of food in such places.

Global meat production was 325 Mt in 2019. In the recent times, we have heard one more thing with respect to the meat industry - particularly beef industry. According to Forbes, according to the data presented, the meat and dairy industries create 7.1 giga tons of greenhouses gases annually—that's 14.5% of total man-made emissions. The claims are based on the facts that cows produce a lot of methane as a byproduct of their digestion and a lot of other greenhouse gases like CO2 are emitted in processing of the meat, and additional emissions take place in the production of feed for the animals and not to forget the supply chain.

And now comes the another side of the story - the meat like but environment friendly plant based meat. Hearing about it first it sounds like an outright oxymoron! How can meat be plant based? But there are companies like Impossible foods, beyond meat and many others are selling this product successfully in the market and one theme which is common across all these products is that they are 100% plant derived and eco-friendly. Texture, appearance and flavour: These are the elements of meat that the new vegan alternatives from Impossible Foods and Beyond Meat are trying to capture, with varying degrees of success.These products contain Soy and potato protein, Pea, rice and mung bean protein for Texture, Coconut sunflower oil and canola oil as fat source and for colouring, leghemoglobin or beet extract.

These companies want to entice the hardcore meat lovers to try out their products and thus help them to stay competitive against regular animal derived meat. The reason for that competition being, if the existing beef eaters/meat eaters continue eating meat as they normally do, the scope of repurchase of the vegan counterpart will go down and thus it will impact the whole profitability of the company since one time purchases can bring popularity but regular customer base is required to make it perpetual source of fixed income. Other than that, since the companies working in this field mainly focus on the environmental sustainability, thus the overall chance in the global impact of greenhouse emissions from cattle can only be seen if the cattle meat is completely related by vegan meat. There are only a few studies that indicate that livestock rearing results in greenhouse gas emissions and those studies are heavily being countered in current scenario since the vegan meat industry is gaining more popularity among the general mass of people.

To get a picture of eco-friendliness of the various types of meat, lets look at this graph.

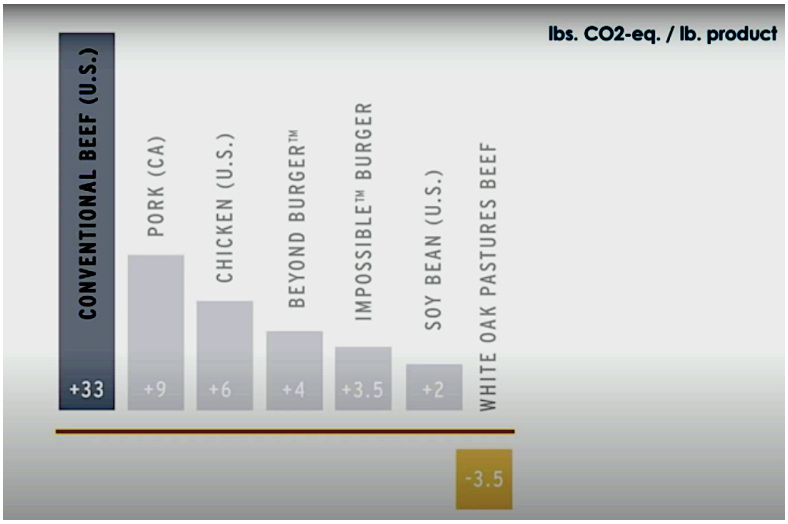

Fig. 13. Carbon footprint of various agricultural products (source: Savory institute)

We can clearly see that beef is producing the largest carbon footprint of all the other options but there is one form of beef which actually has a negative footprint! Now this is counterintuitive too. How can variants of same product have different environmental impacts? The answer lies in the method of production of the beef. Also, we must notice here that the impossible meat and beyond meat have a positive 4 and 3.5 carbon footprint respectively and thus, they are also not carbon neutral - meaning they also cause some cause of emission, if not as high. So the conclusion here is that meat that is produced through certain ways - more specifically industrially produced meat - is bad for the environment and if theoretically the consumption and production of this variety is reduced and instead people start consuming plant based meat then there could be some positive environmental impact. But now comes the question of consumer choice and preference!

1 pound of Impossible ground beef costs about $10-$12 whereas traditional ground beef costs $4-$6 . This is not much of a driving factor for the consumers to shift from their tried and tested natural meat option to lab made meat imposter. Moreover, food has much of a social and emotional value rather than logical analysis to save the planet. If there are strong marketing campaigns and a huge social shift, along with the price change then maybe the meat consumers actually shift to this food option, but without it, the other scenario is that this product becomes a popular option among a niche of customers and since the company does not want to get into losses, they sell it to the vegetarians and vegans, and the meat consumption remains what it originally

was, with maybe very little changes, the carbon footprints still remain the same with one increase that is coming from these new products.

Now why we are discussing this is because these companies equally claim about the benefits of its consumption on the environment and I am here worried what if it starts having a negative effect instead of positive, even if in smaller proportion?

The environmental claims of this product totally depend on the replacement of industrial meat with this meat and in that regards, all industries produce tonnes of greenhouse gases so putting up all the blame on beef is also not right. If it is successfully able to change the human preference to vegan alternatives, not only will it be beneficial to the environment a little bit but also good for the animals who get killed in the process but the question is, is it even a possibility? Since for so many people out there, meat is the cheaper source of nutrition and until this shift occurs on a global scale, claiming for environmental benefits is just another marketing gimmick without any actual effects.

If we really need to control the greenhouses then we need to stop burning the fossil fuels. Thats the elephant in the room when it comes to global warming and all industries - whether meat or textile or electronics - all have equal hand in it.

CHAPTER 5

Recommendations and Conclusion

5.1. How meat consumption throughout the world affect the vegan meat market [11]

According to the Food and Agricultural Organisation, growth in meat consumption is projected to increase in developing regions due to high population levels and growth rates. It is expected this will result in an overall growth in the volume of meat consumption in developing countries approximately five times that of developed countries. This is particularly relevant in Africa and Asia, where growth rates are expected to be higher over the outlook period when compared to the past decade. The ratification of the African Continental Free Trade Agreement is projected to positively impact on trade flows within the continent due to the additional consumption resulting from lower prices. Gains in per capita consumption are expected to remain small, however, as income growth occurs from a small base. Nevertheless, high population growth implies that total consumption growth will be faster than for any other region, despite limited and sometimes negative gains in per capita terms. Growth in meat consumption in Asia will stem from a combination of increased availability as the ASF outbreak abates, in addition to increased consumption per capita due to rising incomes, declining meat prices in real term, and trade liberalisation.

At the country level, change in per capita meat consumption varies widely among countries and meat types over the projection period. Global meat consumption per capita is projected to increase slightly by 0.4 kg r.w.e. (retail weight equivalent) compared to the base period. Consumption levels in the higher income regions are, in some cases, close to saturation. This Outlook projects that annual growth in per capita meat consumption in developed countries will be 0.24% p.a., one-fourth of the annual growth rate of the preceding decade, but 0.8% p.a. in developing countries, double that of the preceding decade.

How consumers spend their money on food is also changing. In high-income countries, increases in food expenditure per individual are shifting from the purchase of fresh food prepared in one's home towards convenience food and eating-out. This is the case, for example, in Japan, in particular amongst older and single person households, and it is a trend that the Japanese government expects will increase over the next decade. In addition, given that the Japanese population is expected to decline

by 4%, when compared to the base period, overall meat consumption is estimated to decrease a little. Other factors, such as quality, will become increasingly important for consumers in high-income countries and influence their choices.

Thus, it can be analysed that the meat demand is on a continual rise as a direct impact of rising income in developing countries, and it is projected that the per capita consumption will increase in such locations, and the per capita growth rates will be similar to those of developed countries, when compared to the base period. In the developed nations, the influence of factors like income and prices have been seen to decline, and also it must be noted that these countries have reached a saturation in their meat consumption levels. Other factors besides price and income are religion, cultural norms, ethical, health concerns, environmental impact and urbanisation.

Poultry meat like chicken have been the choice for consumers in developing countries, historically, owing to its lower prices. With slow growth in income, this will continue, making poultry the largest share of additional per capita consumption.

Beef consumption is projected to increase to 76 Mt over the next ten years and to account for 16% of the total increase in meat consumption compared to the base period. The consumption will be lover in developed countries as compared to the developing countries, with overall increase being highest in the asian countries. The consumption of beef might also decline in favour of poultry or pig meat.

Thus, looking at the overall world trend projections, we can see that there is room for the market of vegan meats as well because in the long run, the demand is going to increase and specifically for beef it is going to rise by 76 Mt and account for 16% increase in meat consumption, so in coming 10 years, vegan meat can act a disruptor for beef market, if reached properly to the masses. Also, the focus needs to be on developing nations as there is more potential of increase in consumption over there. Also, price will have a very important impact on the sales since people also tend to opt for cheaper alternatives, even though it means shifting to totally new alternatives. Poultry will definitely remain a big competition owing to its cheap prices and large availability. Quality is a big factor in high income countries and the vegan meat definitely fulfils that criteria as of now. Other trends such as environmental concern as it relates to food consumption, will unfold new possibilities in the years to come.

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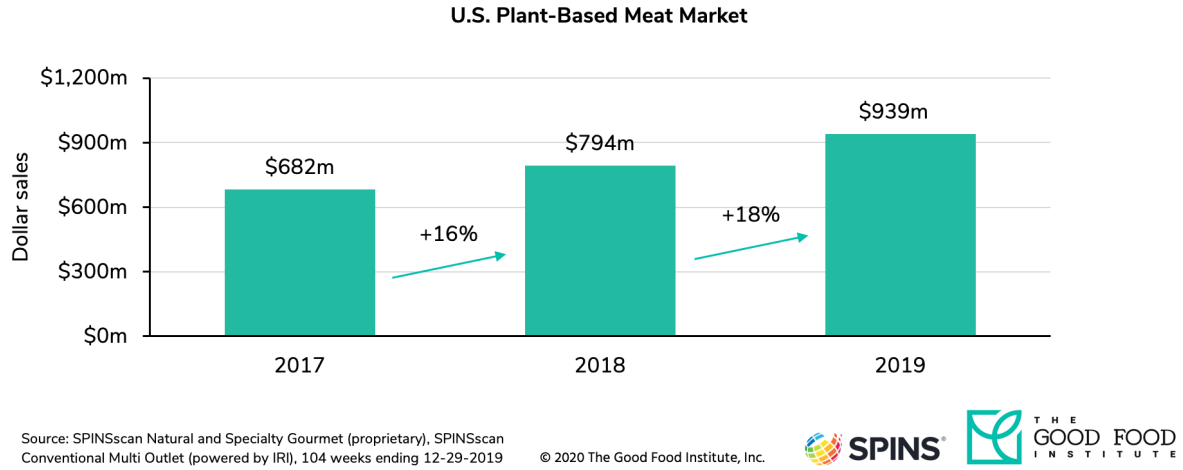
ANNEXURE



Annexure I: Plant based meat sales in dollar

2019 Plant-Based Food Market By Category

Category	2017 Sales (values in 000's)	2018 Sales (values in 000's)	2019 Sales (values in 000's)	$ Sales Growth (2018–2019)	$ Sales Growth (2017–2019)
Plant-based milk	$1,765,971	$1,920,579	$2,016,540	5.0%	14.2%
Plant-based meat	$681,763	$793,614	$939,459	18.4%	37.8%
Plant-based meals	$300,464	$348,102	$376,972	8.3%	25.5%
Plant-based ice cream and frozen novelty	$250,513	$317,575	$335,549	5.7%	33.9%
Plant-based creamer	$148,809	$213,381	$286,662	34.3%	92.6%
Plant-based yogurt	$144,906	$215,156	$282,502	31.3%	95.0%
Plant-based butter	$173,053	$183,070	$198,359	8.4%	14.6%
Plant-based cheese	$125,377	$159,783	$189,099	18.3%	50.8%
Tofu and tempeh	$111,823	$118,807	$127,856	7.8%	14.6%
Plant-based ready-to-drink beverages	$87,862	$103,242	$122,276	18.4%	39.2%
Plant-based condiments, dressings, and mayo	$62,841	$71,465	$63,696	-10.9%	1.4%
Plant-based dairy spreads, dips, sour cream, and sauces	$12,543	$19,206	$29,513	53.7%	135.3%
Plant-based eggs	$3,001	$3,377	$9,851	191.7%	228.2%
Grand Total	**$3,868,925**	**$4,467,358**	**$4,978,587**	**11.4%**	**28.7%**

Source: SPINScan Natural and Specialty Gourmet (proprietary), SPINScan Conventional Multi Outlet (powered by IRI), 104 weeks ending 12-29-2019

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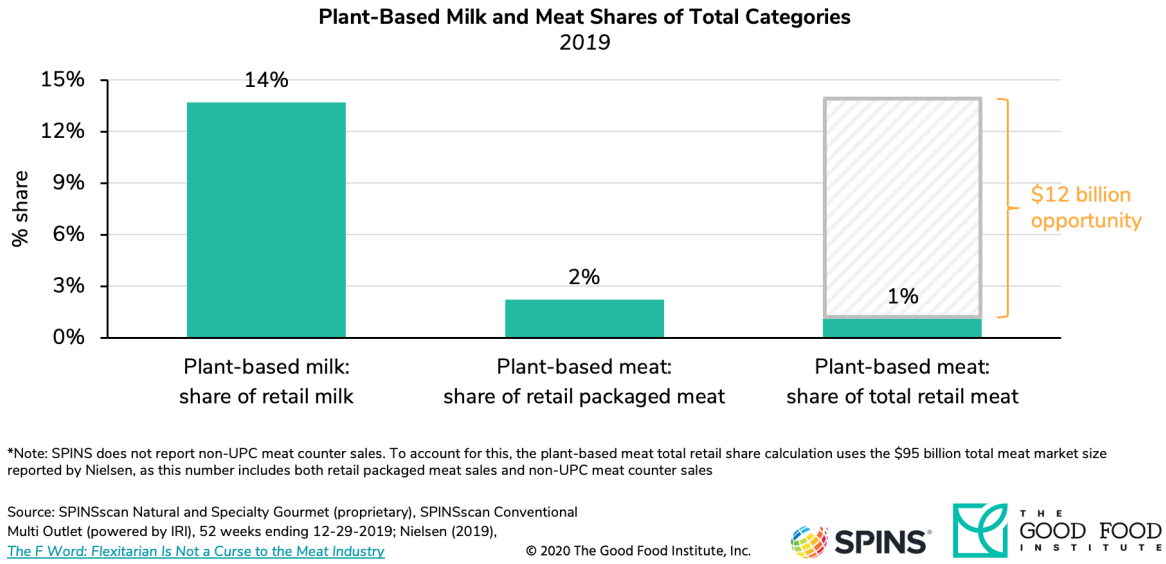
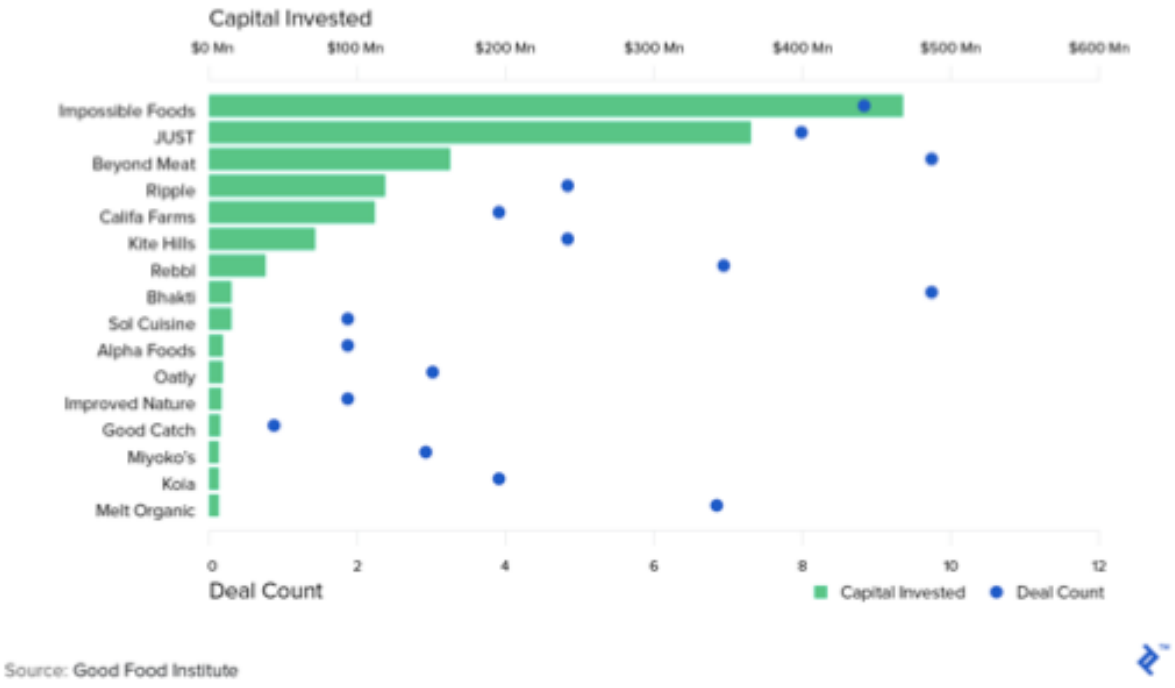
Annexure II: Plant-based category dollar sales (detailed).



Annexure III: Plant-based milk and plant-based meat dollar market share.



Annexure IV: Capital Invested vs Deal Count for competitors of plant-based meat market.

The five main ingredients of an Impossible Burger 2.0 are
Water
Soy Protein Concentrate
Coconut Oil
Sunflower Oil
Natural Flavors
Also contains 2% or less of
Potato Protein
Methylcellulose
Yeast Extract
Cultured Dextrose
Food Starch Modified
Soy Leghaemoglobin
Salt
Soy protein isolate
Mixed Tocopherols (Vitamin E)
Zinc Glutonate
Thiamine Hydrochloride (Vitamin B1)
Sodium Ascorbate (Vitamin C)
Niacin
Pyridoxine Hydrochloride (Vitamin B6)
Riboflavin (Vitamin B2)
Vitamin B12

Annexure V: Impossible burger ingredients (A four-ounce patty packs 240 calories, 14 grams of fat, 370 milligrams of sodium, and 19 grams of protein - a slight improvement upon the nutritional profile of the original recipe, which had 290 calories, 17 grams of fat, 580 milligrams of sodium, and 27 grams of protein.)