

# *PLANT-BASED MEAT ALTERNATIVES*

*Toine Heetkamp*

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*University coach: Patrick Burgess*

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## Preface and Acknowledgements

My name is Toine Heetkamp and I am a graduate at Aeres University of Applied Sciences in Dronten and Dalhousie University Faculty of Agriculture in Nova Scotia. I live in the Netherlands and I am concluding my study course International Food business with a final thesis report. My personal passion towards the plant-based meat alternatives market and sustainability inspired me to write my bachelor thesis about this sector.

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## Summary

The increasing global population is pushing companies to come up with alternative ways of production to meet the demand (Roser, 2013). The problem of feeding nearly 10 billion people in 2050 is described by the EAT Lancet commission and in order to meet the demand that comes with the growing number of consumers, dietary shifts have to be made (EAT, 2021) (Willett et al., 2019).

The result will be that food is produced more sustainably and the production will have lower effects on the climate and will be less exhaustive on the resources (Van der Have, & Rubalcaba, 2016).

Therefore, the purpose of this study was to find out what the most important motivations of consumers are in order to write recommendations to food processors that will give these companies information about features that make the consumer buy plant-based meat alternatives (PBMA's). The research has been limited to the Dutch millennial consumer since this is a group that is more likely to initiate change because this group is buying products that they can identify their beliefs and values in (Moreno, Lafuente, Avila, Moreno, 2017). And so, the research question of this research is "*What are the main motivations of millennials to include plant-based meat substitutes in their diet?*". Due to current trends such as green consumerism and the behaviour of the millennial consumer it is expected that most of these consumers are willing to include PBMA's in their diet (Berkhout et al., 2018).

An online questionnaire was developed to reach the target group of the Dutch millennial (born between the year 1980 and 2000) (Moreno, Lafuente, Avila, Moreno, 2017). In this questionnaire, the respondents were asked different questions about the current diet of the respondent, willingness to reduce the animal meat intake and features the consumer is looking for when buying PBMA's.

The results show that the majority of the Dutch millennial consumer is consuming animal meat products. However, there is a rise in the number of consumers that is consuming PBMA's. Furthermore, 55% of the animal meat consuming consumers is willing to reduce their animal meat intake. The most important reason for this reduction is the concern for environment and the health benefits that are attached to the consumption of plant-based products. Finally, it can be concluded that the Dutch millennial consumer is willing to include PBMA's in their diet, due to a number of societal as well as product related motives such as environmental concerns, health benefits, animal welfare and taste.

Recommendations for food processors and retailers are to highlight the sustainability in their products compared to animal meat products. For the government the most important recommendation is that more awareness should be created for the shift to a more plant-based diet.

## 1. Introduction

The food processing industry has grown over the past decades into a diverse and varied flow of materials which are combined into reliable, standardized food products and delivered massively to consumers (Spaargaren, Oosterveer, & Loeber, 2012). Technological advancement is used to solve pressing problems of sustainability and businesses are reorienting by changing inputs and procedures to deliver new goods (Garnett, 2014). These solutions have to be found due to the population growth of 1 billion in the year 1800 to 7.8 billion today (Worldometer, 2020). This growth is pushing companies to innovate with new ideas to be able to supply the growing population (Roser, 2013). EAT Lancet is a science-based global platform for food system transformation that is looking into food and population growth related problems (EAT, 2021). The commission of EAT Lancet brought together 37 scientists in 2019 order to answer the main question of the EAT Lancet report where the problem of feeding nearly 10 billion people by 2050 has been described (EAT, 2021). The ultimate goal and two targets have been set up. The targets include to only produce sustainable food and providing healthy diets for all (EAT, 2021). In order to achieve these goals, dietary shifts have to be made and more effective ways of producing food have to be found in order to overcome this problem and meet the goals (Willett et al., 2019).

Besides the growing population, global warming is an increasing global issue that is not only effecting the global food supply but also partly caused by agriculture. Global warming is caused by an increase in greenhouse gas emissions, these emissions are caused by for example: globalization, urbanization, cultural factors and also agriculture (Rosa & Dietz, 2012). In 2015 the livestock sector contributed up to 18% to the global greenhouse gas emissions (Sejian et al., 2015). These emissions are mainly caused by the gas methane (CH<sub>4</sub>) (O'Mara, 2011). The distribution of these emissions differs on a global scale. Regions where food is produced like Europe, the USA and China are producing larger quantities, so they have a larger impact and are contributing more to this problem (O'Mara, 2011).

Currently, there is an elevation in green initiatives which should ensure the transition to a greener economy and development of green policies (Bowen, Duffy, & Frankhauser, 2016). Scientists speak of the new industrial revolution (Bowen, Duffy, & Frankhauser, 2016). With the technology that is available nowadays, improvements in supply chains towards a greener society can result in higher efficiency of food production (Van der Have, & Rubalcaba, 2016). Nevertheless, this will not be changing the habits of the consumers (Van der Have, & Rubalcaba, 2016). In order to make a change in people's eating habits, it is important to include social innovations and not only evolve in technological innovations (McPhee, 2017). Social innovations are new ways of solving social problems (McPhee, 2017). They have a positive effect on citizens, culture and organizations (McPhee, 2017). Social innovations are a technique that should also be used when tackling the problem that is shown earlier in the EAT Lancet report (EAT, 2021). In order to create a more sustainable way of producing and consuming food, a shift to plant-based is one of the key elements to create an outcome for the goal of feeding 10 billion people in the year 2050 and lowering the global greenhouse gas emissions (Willett et al., 2019).

The vegetarian segment or plant-based meat segment should be expanded to mainstream plant-based diets in developed economies (Beverland, 2014). Marketing, research and development are drivers of the current plant-based meat alternative market (Beverland, 2014). And it is expected that the market will grow over the coming years (Beverland, 2014).

## 1.1. Plant-Based Meat Substitutes

Plant-based meat alternatives (or substitutes) (PBMA) are products that have a similar taste, texture and appearance to regular meat products (He, Evans, Liu, & Shao, 2020). Though, they are made out of vegetables or other vegetarian products (He, Evans, Liu, & Shao, 2020). The taste, texture and appearance are key elements in the processing of these products in order for them to be named a PBMA (He, Evans, Liu, & Shao, 2020). The products are being processed to have the same amount of nutritional value such as protein and calories like traditional meat products and so are contributing to the healthy balanced diet (He, Evans, Liu, & Shao, 2020). The products are marketed and named as if they are similar to traditional meat products like “veggie burger or soy sausage” (European Parliament, 2020). The European Parliament has voted that these products can be named after traditional meat products since the name burger or sausage is not exclusively applicable to meat products (European Parliament, 2020). Plant-based meat substitutes are a more sustainable source of protein compared to regular animal-meat products (John, 2019). Research shows that plant-based meat is using 47-99% less land than regular meat (m<sup>2</sup> of land per kg of meat) (John, 2019). Besides the use of land, PBMA’s emit 30-90% less greenhouse gases, 72-99% less water and causes 51-91% less aquatic nutrient pollution compared to conventional meat products (John, 2019).

The above mentioned percentages show that many resources can be saved by producing PBMA’s instead of losing extra energy and resources that are needed for the production of animal-meat.

PBMAs have existed for many decades but only now these products are getting commercialized and becoming mainstream (Curtain, & Grafenauer, 2019). PBMAs have been known since at least the year 1960 when the first soy and tofu protein products were introduced to the market (Curtain, & Grafenauer, 2019). At the start of this innovation, PBMAs were only focussed on vegetarian consumers. However, since 2015 the market for these PBMA’s was also targeted to conventional meat eaters (He, Evans, Liu, & Shao, 2020).

Awareness is being created to shift from eating conventional meats to more plant-based foods, due to some of the environmental facts that are shown above (Staff, 2019). In addition, studies show that consuming PBMAs reduce the risk of diseases like diabetes, cancer and heart diseases (Staff, 2019). Some examples of PBMAs include: soy sausages, vegetarian meatballs, vegetarian chicken pieces, soy burgers, tofu strips, falafel, different fungi species and tempeh (Albert Heijn, 2020).

The first generation of PBMA’s (soy and tofu) were targeted to consumers that either did not eat meat at all or very rarely whereas the above mentioned products such as; vegetarian meatballs and vegetarian chicken pieces or second generation is targeted to also the big consumer group of conventional animal-meat eaters (He, Evans, Liu, &

Shao, 2020). The difference between this first generation of PBMA's and the second generation was, besides the target group also the texture and taste (He, Evans, Liu, & Shao, 2020). Where the first target audience, those of vegetarians and sporadic meat consumers was not expecting the products to have the same texture or to taste like conventional meat products (He, Evans, Liu, & Shao, 2020). The second generation of products is so comparable to the conventional meat products that they can hardly be distinguished from animal-meat and are therefore, as mentioned earlier also targeted to the conventional animal-meat eaters (He, Evans, Liu, & Shao, 2020).

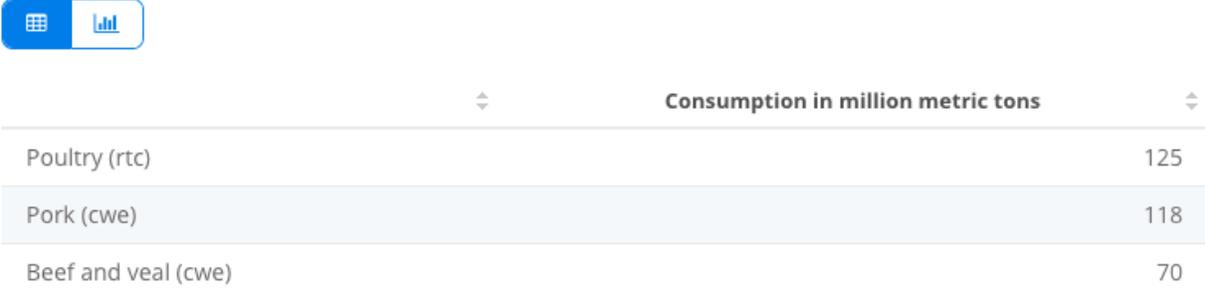
## 1.2. Traditional Meat Products

Meat products are products made of animal flesh that are produced to be consumed (Cambridge Dictionary, 2020). Meat has been part of the human diet for over 2.5 million years (Pobiner, 2020). Meat includes red meat, poultry and pork (Joseph, 2020). Global meat consumption has been growing since the early 20<sup>th</sup> century, and especially in the developed countries due to bigger populations and a wealthier economy (Petrovic, Djordjevic, Milicevic, Nastasijevic, & Parunovic, 2015). The global animal-meat consumption has grown by 300% over the last forty years (Petrovic, Djordjevic, Milicevic, Nastasijevic, & Parunovic, 2015). The global estimated meat consumption of 2019 is shown in the Table 1 below (Statista, 2020c).

Table 1 Estimated Meat Consumption Worldwide in the year 2019 (Statista, 2020c).

### Estimated animal protein consumption worldwide in 2019, by source

(in million metric tons)



	Consumption in million metric tons
Poultry (rtc)	125
Pork (cwe)	118
Beef and veal (cwe)	70

The current meat consumption patterns (as shown in table 1) are considered to be unsustainable (WUR, 2020) (Statista, 2020c). For example, the Dutch consumers have consumed more meat again in the year 2019, from 77,3 kilograms in 2018 to 77,8 kilograms in 2019. This means an increase of 0,5 kilograms (WUR, 2020).

Western Europe had been an innovator in terms of the transition towards a more plant-based society (Tolonen, 2018). Since the year 2010, the Netherlands has been decreasing meat consumption up to the year 2016 (Tolonen, 2018). After the year 2016, meat gained popularity in the Netherlands again even though the Netherlands have been playing a great role in the innovations part of the meat transition (Tolonen, 2018).

### 1.3. Plant-Based Meat Substitutes Market in the Netherlands

Over the past 30 years, the meat substitutes market has grown rapidly. Since the year 1990 the market for meat substitutes was compromised (Tziva, Negro, Kalfagianni, & Hekkert, 2020). Since then, the meat-substitute market consisted of only a few companies that offered a small range of products (Tziva, Negro, Kalfagianni, & Hekkert, 2020). These companies supplied the early vegans and vegetarians in the Netherlands (Tziva, Negro, Kalfagianni, & Hekkert, 2020). After 2000, the market grew larger due to innovations that had improved the texture and taste of the products (Tziva, Negro, Kalfagianni, & Hekkert, 2020).

In 2017, the plant-based meat substitute market in the Netherlands had an annual turnover of 89.1 million euros (Gelder, 2020). Due to the large investments from several corporations in the meat-substitute market, the sector grew rapidly in the past 20 years (Geijer, 2020). In the year 2018, the annual national turnover was already 140 million euros (Geijer, 2020). The meat-substitute market is becoming an important player within the food industry and is growing faster than ever before (Loon, 2020). The range of plant-based meat alternative products has been growing. The growth in the products can be seen best from the perspective of Dutch retailers, with the most important and largest retailer being Albert Heijn (Loon, 2020). Numbers show that from the year 2016 till the year 2019 there has been an increase in the product range of meat substitutes of 33% to over one-hundred products at the second largest retailer of the Netherlands: Jumbo (Loon, 2020) (Rijswijck, 2019). Jumbo's product range was already at two-hundred products in August 2019 (Rijswijck, 2019). Where in the year 2016, 32 new products were introduced to the market in the Netherlands, this number has grown to 69 products in the year 2017 and 97 products in the year 2018 (Statista, 2020b). This means that over a period of two years, the number of products that have been introduced that year has tripled in size (Statista, 2020b).

### 1.4. Trends and External Influences

Currently the meat industry is facing the competition guided by the success of various plant-based meat alternatives. Nowadays, the PBMA's are not only targeted at the niche consumer anymore, instead these products are gaining more popularity under the majority of the consumers (Deloitte, 2019). Investments in these products towards research and development (R&D) and marketing are fairly profitable due to increasing numbers of sales within the market of PBMA's within for example the European market (Pak, 2020). The European market is expected to grow from 1.5 billion euros in 2018 to 2.4 billion euros in 2025 (van Loo, Caputo, & Lusk, 2020). Not only the improving products are the drivers for the sales of PBMA's, also the health concerns that go along with the consumption of conventional meat products (Berkhout et al., 2018). Finally, the growing number of flexitarian consumers have been contributing to the growing sales as well (Berkhout et al., 2018). Existing food companies are trying to protect their current market position by innovating in order to compete with the new innovative start-ups (Deloitte, 2019). In addition, green consumerism or conscious consumerism is a trend that has been going on for a longer period of time (Berkhout et al., 2018). This trend is about the alternative consumption forms (Berkhout et al., 2018). Furthermore,

conscious consumerism is a more mentally and mindset focussed trend that is critical about the current influence of a dominant consumer group (Berkhout et al., 2018). Future consequences of the development of this trend can be that consumers will use their buying power as a resource to be able to influence the market (Berkhout et al., 2018). This trend also has to do with the overconsumption and consumers that are tending to find a healthy and balanced diet as opposed to consuming only cheap animal protein (Berkhout et al., 2018).

The COVID-19 pandemic that is going on has a big influence on the market growth of plant-based meat substitutes (FAIRR, 2020). Even though many economies around the globe have suffered from this pandemic, the investments in the plant-based market have doubled in the year 2020 (FAIRR, 2020). From January 2020 till the beginning of July 2020 twice the amount of money, 907 million dollars, have been invested in the market compared to 457 million dollars in the year 2019 (FAIRR, 2020). Because of the COVID-19 virus, consumers are buying more plant-based alternatives. Consumers have started buying more healthy and organic products worldwide since the start of the pandemic (Poinski, 2020).

## 1.5. Health Concerns

Research shows that the consumption of livestock products, especially red meat and processed meats, is increasing the risk of several diseases such as type 2 diabetes, several cancers and cardiovascular disease (de Boer, Schösler, & Aiking, 2014). The danger of this increased risk is dependent on the volume of meat that is consumed; however, it can cause some serious illnesses (de Boer, Schösler, & Aiking, 2014). A comparison between a flexitarian diet where meat is not consumed every day of the week and a diet where meat is consumed on a daily basis shows that there is a significant difference. Flexitarians can have significant health advantages with the strongest evidence of weight loss, metabolic health benefits and a decreased risk to the earlier mentioned diabetes type 2 and blood pressure (Derbyshire, 2017). Furthermore, during the Covid-19 outbreak there has been an increase in sales of plant-based meat substitutes due to the thoughts of consumers that meat consumption was related to the virus (Poinski, 2020). Besides, consumers were eating healthier during the outbreak of the virus and this led to more sales in plant-based products since these products are considered healthier by consumers (Poinski, 2020). Even though the plant-based products do have lower chances of mortality of the above-mentioned diseases compared to regular meat products. However, the plant-based products are ultra-processed and nutritional values show that some products even contain more saturated fats than regular meat products (Webster, 2020).

## 1.6. Millennials

People that are born between the year 1980 and 2000 are considered to be the so-called Millennial (Moreno, Lafuente, Avila, Moreno, 2017). They are characterized to spend more but show less brand loyalty compared to previous generations; higher price promotion exposures may be responsible for the reason for this lower loyalty (Moreno, Lafuente, Avila, Moreno, 2017). Millennials also search for products and brands that

suit their beliefs, personality, lifestyle, social values and community (Moreno, Lafuente, Avila, Moreno, 2017). Brands are used to construct an imagination to represent their personality and to convey their values (Moreno, Lafuente, Avila, Moreno, 2017). This generation was born in a changing technological environment. They have also faced higher unemployment and are burdened with debt and are viewed, now and in the future, as a large and lucrative market due to their population size. Millennials grow up in a digital world with an abundance of information sources.

Therefore, existing knowledge behaviour models do not define their approach to filling information needs accurately (Taylor, 2012). The statistics reflect the widespread self-reported use of all online networks, such as social networks, television, cell phone and internet usage (Smith, 2011). Millennials are very active in catching their attention and will visit a website with affordable prices and decent shipping rates repeatedly (Smith, 2011). Millennials are directed to the latest buying patterns by technological advancements and make their decisions based on these trends (Moreno et al., 2017).

With the rising demand for plant-based products in recent years, the millennial behaviour towards introducing plant-based meat substitutes in their diets has not been measured by study (Moreno, Lafuente, Avila, Moreno, 2017). It is important to carry out research to establish recommendations for interested and beneficial organization operating in the plant-based food sector (He, Evans, Liu, & Shao, 2020). The research offers an insight into whether businesses can adopt various methods to improve revenue or redirect their marketing strategies. The discussion will compare and discuss the outcomes of the tested hypothesis to existing research available and evaluate if the results match the expected outcomes.

Hypothesis H0: The meat consumers are not willing to change their current meat consumption patterns.

Hypothesis H1: With the rise of conscious consumerism and the recommendations from the EAT-Lancet Commission it is expected meat consumers are open to include plant-based meat substitutes in their diets. It is expected that the motivation of plant-based meat substitute consumers is about environmental concerns, in combination with health benefits.

To examine the hypothesis, the main question to be addressed is *“What are the main motivations of millennials to include plant-based meat substitutes in their diet?”*.

In order to answer the main research question, the supporting sub questions were formulated:

1. How does the current diet of millennials look like?
2. Do millennials want to reduce their animal-meat intake?
3. What are the main features millennials are looking for in plant-based meat substitutes?

## 2. Research Methodology

This chapter describes the material and methods used to perfect a research to indicate what would motivate the millennial consumers to include plant-based meat substitutes in their diet.

### 2.1. Questionnaire

For this research, a questionnaire is developed to find answers to the main research question. A questionnaire has been chosen as the method to collect the data. Since a questionnaire can be used for consumer related research that is focussed on a specific target group. It is a fast and cost-effective way of collecting data of larger numbers of consumers (Bhat, 2020).

The target group of this questionnaire is the millennial consumer living in the Netherlands. Millennials are born between the year 1980 and the year 2000, which makes the respondents require their age to be between 20 and 40 years old (Moreno et al., 2017). The questionnaire is distributed through the social media channels LinkedIn and Facebook. Due to the out brake of the Covid-19 virus doing research is limited to technological resources.

The questionnaire and test results are analysed to develop a functioning format to execute a larger scale questionnaire and provide the first preliminary insights of values given by millennials. The questionnaire and data analysis are inspired based on the research "*Consumers' associations, perceptions and acceptance of meat and plant-based meat alternatives*" (Michel, Hartmann, & Siegrist, 2021). The research is conducting a questionnaire that is in line with the topic of this research and is using the same statistical tests to measure the responses of the participants of the questionnaire. Furthermore, the topic of the overall research is similar to the scope of this research. Another research that has been used as inspiration is "Consumer preferences for farm-raised meat, lab-grown meat, and plant-based meat alternatives: Does information or brand matter?". For this research similar parameters have been investigated to be able

to answer the research its main question. These parameters include: willingness to pay, brand, sustainability and current diet.

In table 2 below, the linkage of questionnaire questions to the sub questions is given. The questions that are linked will answer the sub questions.

*Table 2 Sub question linkage to questionnaire questions*

<b>Sub question:</b>	<b>Linked to questionnaire question:</b>
How does the current diet of millennials look like?	4,5,6,7
What are the main features millennials are looking for in plant-based meat substitutes?	8,12
Do millennials want to reduce their animal-meat intake?	9, 10, 11

Below all of the questions are worked out.

The format of the answer-options for the questionnaire can vary between simple yes or no questions, multiple-choice or multiple answer questions.

For this questionnaire, a clear introduction is given to clarify the differences in demographics between the respondents, these include questions 1, 2 and 3.

In these questions it will be clear whether the respondent is suitable to participate in the research.

Question 1: Do you live in the Netherlands?

This question is looking into the living area of the respondent, since the research is determined on millennials in the Netherlands.

Question 2: Are you a 'millennial'? A millennial is born in the year 1980 till the year 2000. Is focussing on the year of birth, since the research is focussed on the age group between the year 1980 till the year 2000 or the millennials.

Question 3: What is your sex? This question will distinguish men, woman and other.

This will be of relevance to see whether there are for example more men that are currently following a plant-based diet.

The questions 3 till 7 will identify the current diets and preferences of the respondent. This will give an insight in the balance between the meat consumption and the plant-based meat substitute consumption.

Question 4: do you consume animal-based meat products and question 5: do you consume plant-based meat substitutes will show whether the respondent is currently consuming any of the products in the 2 categories.

Question 6 and 7 will show the ratio between the two product categories and how this is divided.

Question 8: Rate with 1-5 which aspects are motivating / would motivate you to eat plant-based meat substitutes? This question will look into 7 different aspects that might be a driver to consume these products. These 7 motivational factors have been set up based on another research. The respondent is being asked to rate the answer possibilities using the 5-point Likert scale to determine motivation. The scale measurements will be based on importance from 1 being very important and 5 being unimportant and the following rates can be chosen: Very important, important, moderately important, slightly important and unimportant (McLeod, 2020).

The same will apply for question 11, only here it is being asked for animal-based products.

Questions 9 and 10 are looking into if the consumer is thinking about reducing the animal-based products. If the respondent will answer with yes, then it is being asked why they would reduce the intake of animal-based products.

Lastly, question 12: If you are open to implement plant-based products in your diet, what is your main motivation towards this decision? Rate the top 3 motivations from most important to least important. This question will show the respondents main motives to implement plant-based meat substitutes in their diet. The most important motive will be put in the first place and the less important motives on place 2 and 3. The questionnaire can be found in Appendix 1.

A Chi<sup>2</sup> test is performed on the motivations given by the respondents. The test will determine if there is a significant relation detected. The Chi<sup>2</sup> test will show a significant statistical relation between the motivations given to implement plant-based meat substitutes over the four different consumer groups. Below four different consumer groups that are expected to be shown after the research are given.

Once the results are given, the respondents are expected to be categorized in four different consumer groups. The categorized consumer groups are expected to be as following: Group A, consumers do consume animal- based meat products and do not consume plant-based meat substitutes; Group B, consumers do consume plant-based meat substitutes and do not consume animal-based meat products; Group C, consumers do eat both animal-based meat products and plant-based meat substitutes; Group D, consumers do not consume animal-based meat products nor plant-based meat substitutes.

Since 4.381.481 millennials are currently living in the Netherlands (Statista, 2020b), and a confidence interval of 95% and a margin of error of 7% is being applied, the expected number of responses for the questionnaire is 196 (SurveyMonkey, 2020).

## 2.2. Analysis of Data

For the analysis of the Chi<sup>2</sup> statistical test the data is collected in MS Excel and pivot tables are used to clarify the overview of results. The Chi<sup>2</sup> test has been chosen for this research because it will show the significant statistical relation between the four consumer groups that are mentioned in the previous section. The Chi<sup>2</sup> test works with the expected frequency and the observed frequency. According to the research that has been performed, the expectation is that animal-based meat consumers are willing to implement plant-based meat substitutes in their diet.

The Chi<sup>2</sup> statistical test is performed with the statistical program JASP. The program JASP is an easy to use and free to download statistics program. The reason that it is being used for this research is that it is a very convenient and user-friendly program which can be downloaded and offers standard analyses like the Chi<sup>2</sup> test (JASP, 2020).

The gathered data is collected in MS Excel and pivot tables are used to give a clear overview to gather the needed data in order to proceed with the Chi<sup>2</sup> statistical test. The statistical test is performed with the statistical program JASP. The critical value for the Chi<sup>2</sup> test is given at the results chapter and this was needed in order to evaluate significant relations. The four expected consumer groups are tested by the Chi<sup>2</sup> test for any significant statistical relations between the motivations given.

### 3. Results

In order to answer the research question online data has been retrieved through a questionnaire. The data that was retrieved through the online resources Facebook and LinkedIn and consisted of millennial consumers in The Netherlands. It took two weeks to get the required number of respondents. In total the number of respondents was 206. The demographic requirements to participate in the questionnaire were that the respondent was living in the Netherlands and was considered a millennial (age between 20 and 40 years old). Three of the respondents that did fill in the questionnaire were not eligible and these responses were not used in the results. This makes the number of respondents that could be used for the research 203.

Table 3 below gives more insight in the demographics of the participants.

*Table 3 Demographics of the participants*

	Number of respondents
Number of respondents living in the Netherlands	203 (100%)
Number of respondents considered millennial consumer	203 (100%)
Sex of the respondents	94 men (46%), 109 women (54%)

#### 3.1. The current diet of the Dutch millennial consumer

The respondents are categorized in the four previously mentioned consumer groups. The exact number of respondents are shown in Figure 1 below.

## CURRENT DIET OF THE MILLENNIAL CONSUMER

- Only animal-based products
- Only plant-based products
- Both animal- and plant-based products
- Neither animal- nor plant-based products

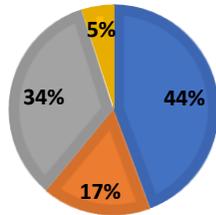


Figure 1: Current diet of the millennial consumer

Group 1: The first group consists of the consumer group that is only consuming animal-based products. This group is the biggest consumer group with 90 out of 203 (44%).

Group 2: This group consists of the consumers that only consume plant-based products. This group has 34 respondents out of 203 (17%).

Group 3: This group of consumers is consuming both animal-based and plant-based products. With 69 respondents out of 203 (34%) this is the second largest consumer group.

Group 4: This group does not consume neither animal-based nor plant-based products. 10 respondents out of 203 (5%) this is the smallest group of consumers.

### 3.2. Reduction of animal meat consumption

Below in Figure 2 the results of the question if the millennial respondent was willing to reduce their animal meat intake are shown. First the percentage of respondents is shown that is willing to reduce their animal meat intake in Figure 2 and after in Figure 3 the most important reasons why the respondent is willing to reduce their animal meat intake are shown.

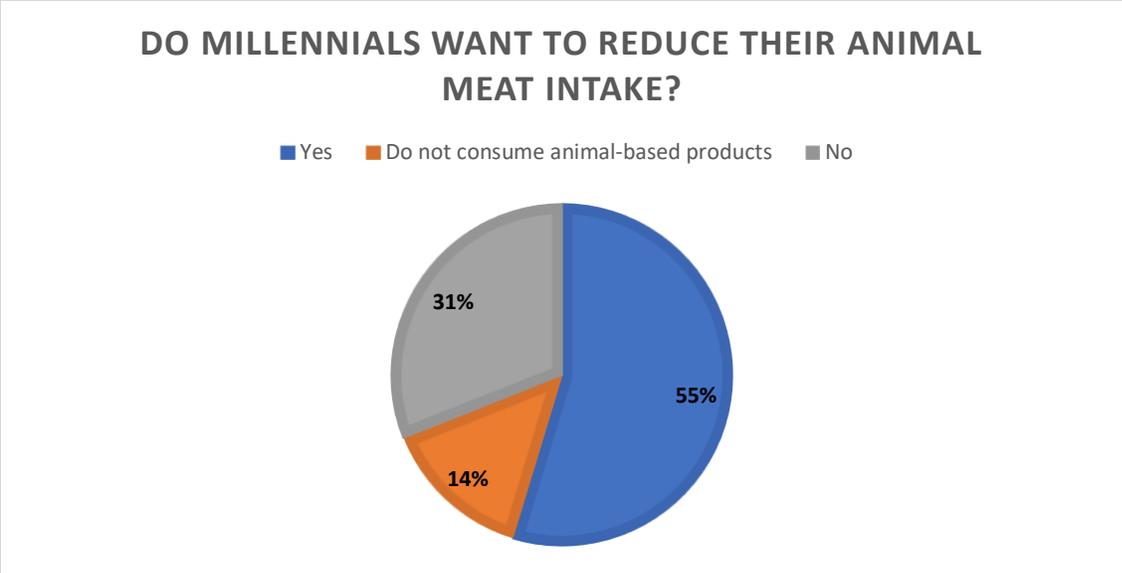


Figure 2: Do millennials want to reduce their animal meat intake

In Figure 2 it can be seen that 55% (111 out of 203) of the respondents is willing to reduce their animal meat intake. 14% (29 out of 203) says that they are not consuming animal meat products at all, and therefore will not continue the question. And 31% (63 out of 203) does not want to reduce their animal meat intake and are therefore also not eligible to fill in the next question.

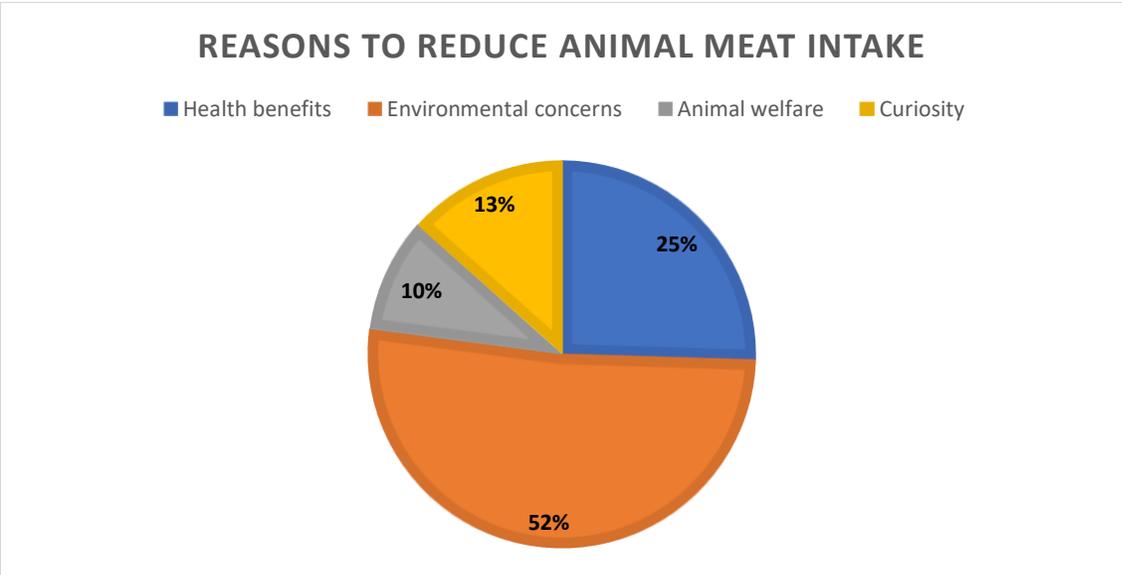


Figure 3: Reasons to reduce animal meat intake

The 55% of respondents that are willing to reduce their meat intake have been asked to fill out the question what the reasons are for them to be willing to reduce their animal meat intake of which the results are shown in Figure 3. Multiple answers could be picked and therefore the total number of responses was 157. 25% (40 respondents out

of 157) says that they would like to reduce their animal meat intake because of health benefits. 52% (81 out of 157) says they would like to reduce because of environmental concerns. 13% (21 out of 157) says they would like to reduce their animal meat intake because of curiosity.

### 3.3. The main features millennials are looking for in plant-based meat substitutes

To identify which features millennials are looking for in plant-based meat substitutes, a question relating to this has been asked in the questionnaire. The respondents were asked to score seven different features of plant-based meat substitutes. These seven features are: taste, price, nutritional value, environmental concerns, appearance / visual presentation, convenience of preparation and animal welfare. These seven factors have been rated from 1-5 (based on the Likert scale) with 1 being very important to 5 being unimportant. In the Tables below the number of respondents per group, chi<sup>2</sup> values and the P-values are given, this is done for every feature and for every feature a Table has been created. So, in total seven different P-values and Chi<sup>2</sup> values are mentioned in seven individual tables. The consumer groups are the same groups as mentioned in Figure 1. The scores have been used to calculate the chi<sup>2</sup> test value and the P-value. The critical value is 21,026 for the Chi<sup>2</sup> test that is performed. This number is based on 12 degrees of freedom ((4-1)\*(5-1)) and is a set number.

If the critical value (21,026) is bigger than the calculated Chi<sup>2</sup> test value and P<0,05, a significant relation between the variables can be seen. This is based on a confidence interval of 95% (or P<0,05). The P-value shows whether or not the significant relation is detected.

If a significant relation can be seen it means that there is a difference in how the four different consumer groups rate that feature. This will show which consumer group values which feature more than other consumer groups. The values in the tables are the observed values.

Table 4: Observed values to determine the importance of different features in plant-based meat substitutes; Taste

<b><u>Plant based feature</u></b>	Score 1. Very important	Score 2. Important	Score 3. Moderately important	Score 4. Slightly important	Score 5. Unimportant	X <sup>2</sup> value (Chi <sup>2</sup> test value)	P-value
<b>Taste</b>						13,812	0,129
Group 1: only animal meat	65	17	6	-	2		
Group 2: only plant-based	24	6	2	-	2		

Group 3: both animal- and plant-based	42	24	3	-	-		
Group 4: neither animal- nor plant-based	4	5	1	-	-		

In Table 4, it can be found that the majority of respondents in all of the groups are rating taste as a very important or important. The Chi<sup>2</sup> value is 13,812 and the P-value is 0,129, meaning that no significant relation is detected for this feature. Meaning that there is no or very little difference between the rating of the groups to the feature taste.

Table 5: Observed values to determine the importance of different features in plant-based meat substitutes; Price

<b><u>Plant based feature</u></b>	Score 1. Very important	Score 2. Important	Score 3. Moderately important	Score 4. Slightly important	Score 5. Unimportant	X <sup>2</sup> value (Chi <sup>2</sup> test value)	P-value
<b>Price</b>						34,670	<0,001
Group 1: only animal meat	25	38	18	5	4		
Group 2: only plant-based	7	7	9	6	5		
Group 3: both animal- and plant-based	16	26	13	13	1		
Group 4: neither animal- nor plant-based	8	2	-	-	-		

In Table 5 it can be seen that the responses are very much divided, meaning that the different groups have rated the feature price differently. This can also be seen when looking at the Chi<sup>2</sup> value of 34,670 (higher than 21,026) and the P-value of  $P < 0,001$  (lower than  $P < 0,05$ ). These values show that a significant relation is detected, meaning that the groups have rated the feature price differently based on the score of importance the respondents have given.

Table 6: Observed values to determine the importance of different features in plant-based meat substitutes; Nutritional value

<b><u>Plant based feature</u></b>	Score 1. Very important	Score 2. Important	Score 3. Moderately important	Score 4. Slightly important	Score 5. Unimportant	X <sup>2</sup> value (Chi <sup>2</sup> test value)	P-value
<b>Nutritional value</b>						20,994	0,050
Group 1: only animal meat	22	31	27	7	3		
Group 2: only plant-based	17	11	3	2	1		
Group 3: both animal- and plant-based	15	29	22	3	-		
Group 4: neither animal- nor plant-based	1	3	4	2	-		

In Table 6 the observed values of the feature “nutritional value” are shown. It can be found that many respondents in different groups are valuing this feature differently. Most responses are given for the first, second and third level of importance. The Chi<sup>2</sup> value and P-value show that a significant relation is not detected since the P-value is P0,050 and not P<0,050. However, this means that the significant relation is nearly detected, group 2 is scoring the feature nutritional value with a higher level of importance than group 1 is rating it. This results in the fact that no significant relation is detected.

Table 7: Observed values to determine the importance of different features in plant-based meat substitutes; Environmental concerns

<b><u>Plant based feature</u></b>	Score 1. Very important	Score 2. Important	Score 3. Moderately important	Score 4. Slightly important	Score 5. Unimportant	X <sup>2</sup> value (Chi <sup>2</sup> test value)	P-value
<b>Environmental concerns</b>						31,140	0,002
Group 1 only animal meat	21	28	21	13	7		
Group 2 only plant-based	22	5	6	-	1		
Group 3 both animal- and plant-based	22	26	13	5	3		
Group 4 neither animal- nor plant-based	1	5	4	-	-		

In Table 7, the data shows that the respondents of the different groups have rated the feature “environmental concerns” differently. Where the number of respondents of group 2 have almost all rated this feature very important, group 1 has a very divided rating and the same goes up for group 3 and 4, the number of respondents in these groups are divided, mainly over the scores one till three (very important to moderately important). When looking at the P-value (P0,002) and the Chi<sup>2</sup> value (31,140), it can be seen that a significant relation is detected for this feature, meaning that the groups are scoring this feature differently.

Table 8: Observed values to determine the importance of different features in plant-based meat substitutes;  
Appearance / visual presentation

<b><u>Plant based feature</u></b>	Score 1. Very important	Score 2. Important	Score 3. Moderately important	Score 4. Slightly important	Score 5. Unimportant	X <sup>2</sup> value (Chi <sup>2</sup> test value)	P-value
<b>Appearance / visual presentation</b>						18,769	0,094
Group 1 only animal meat	15	23	20	22	10		
Group 2 only plant-based	10	7	10	6	1		
Group 3 both animal- and plant-based	3	22	23	13	8		
Group 4 neither animal- nor plant-based	-	3	4	2	1		

Table 8 shows the feature “Appearance / visual presentation”. The number of respondents per group are divided over all the different scores. It can be seen that the Chi<sup>2</sup> value (18,769) and the P-value (P0,094) show no significant relation. All of the groups have divided scores and not necessarily one group is scoring the feature as less important than another group.

Table 9: Observed values to determine the importance of different features in plant-based meat substitutes;  
Convenience of preparation

<b><u>Plant based feature</u></b>	Score 1. Very important	Score 2. Important	Score 3. Moderately important	Score 4. Slightly important	Score 5. Unimportant	X <sup>2</sup> value (Chi <sup>2</sup> test value)	P-value
<b>Convenience of preparation</b>						20,686	0,055
Group 1 only animal meat	12	20	25	23	10		
Group 2 only plant-based	8	4	6	12	4		
Group 3 both animal- and plant-based	1	17	19	23	9		
Group 4 neither animal- nor plant-based	2	3	1	1	3		

Table 9 shows that a significant relation is almost detected as the Chi<sup>2</sup> value is 20,686 (nearly 21,026) and the P-value is P0,055 (nearly P0,050). It can be seen that “convenience of preparation” is more important to group 1 than to group 2 or 3. Group 1 rates this feature higher (with more responses) at the first 2 scores than group 2 and 3 which rates with more responses to score 3,4 and 5 (moderately important to unimportant).

Table 10: Observed values to determine the importance of different features in plant-based meat substitutes; Animal welfare

<b><u>Plant based feature</u></b>	Score 1. Very important	Score 2. Important	Score 3. Moderately important	Score 4. Slightly important	Score 5. Unimportant	X <sup>2</sup> value (Chi <sup>2</sup> test value)	P-value
<b>Animal welfare</b>						40,489	<0,001
Group 1 only animal meat	16	38	19	8	9		
Group 2 only plant-based	23	10	-	1	-		
Group 3 both animal- and plant-based	29	17	14	5	4		
Group 4 neither animal- nor plant-based	2	5	-	1	2		

In Table 10 the observed values to the feature “Animal welfare” are shown. The values show that group 2 and 3 are rating this feature as more important than group 1. Whereas group 1 has the highest number of responses for score 2 and 3 (important and moderately important). The Chi<sup>2</sup> value of 40,489 and P-value of P<0,001 are also showing that the groups respond different to this feature because a significant relation is detected. All four groups are valuing this feature different in terms of importance.

In Figure 4 the results are presented relating the question what the most important motives are to include plant-based meat substitutes into the diet of the respondents. Respondents were asked to rank their three most important motivations with one being very important to 3 being least important. Below the results are given in Figure 4.

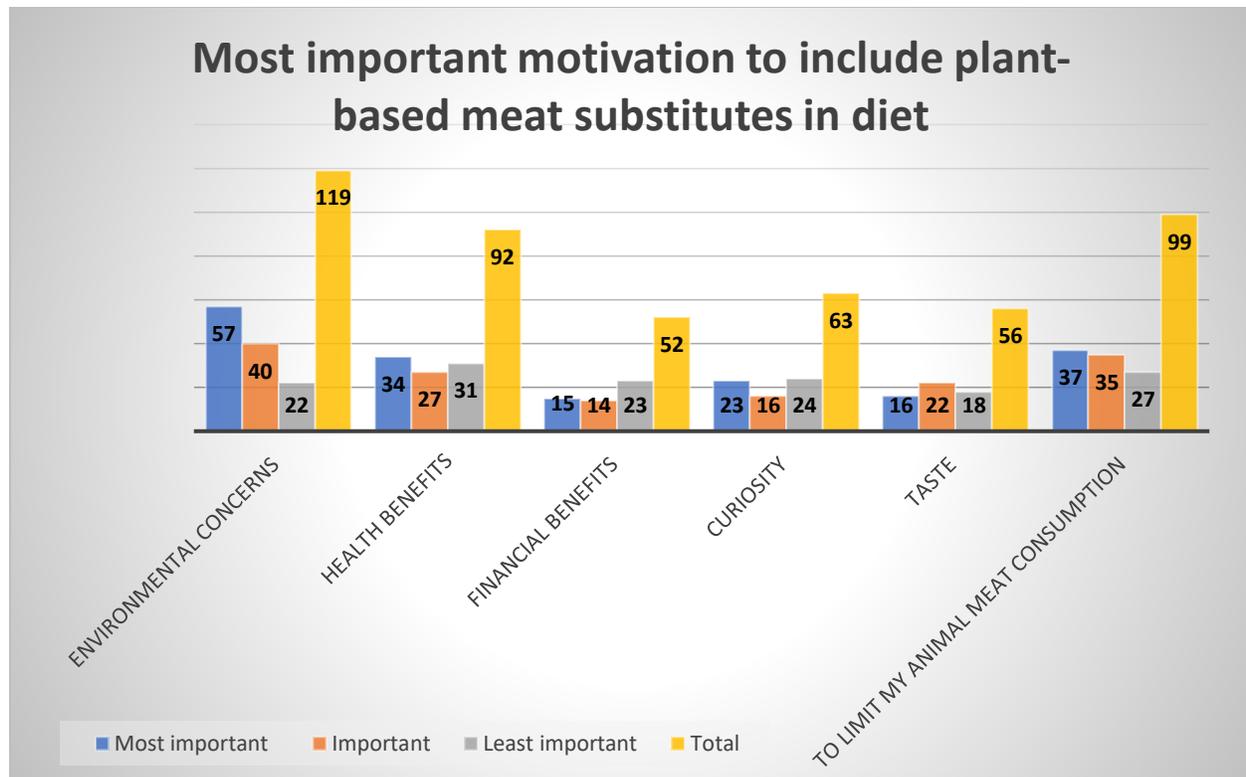


Figure 4 Most important motivation to include plant-based meat substitutes in diet

As shown in Figure 4 it can be seen that environmental concerns is the number one most important motivation. Not only the total number of respondents to this motivation is the highest but also the number of respondents that consider this their top choice (most important). Second and third are the motivations to limit the animal meat consumption (99 respondents) and the health benefits (92 respondents) are important motivations. As shown these motivations are more evenly spread out in terms of importance, people tend to choose these options also as important and least important. The fourth, fifth and sixth are all close in terms of respondents, curiosity (63 respondents), taste (56 respondents) and financial benefits (52 respondents).

The motivations can be split up in two different categories, the product related motivations and the societal related motivations. The product related motivations include: Taste, Financial benefits, Curiosity and Health benefits. The societal motivations include: Environmental concerns and to limit the animal meat consumption. It can be seen that the societal motivations have 218 responses in total and the product related motivations have 263 in total.

There are also correlations between the results of Figure 4 and the Tables 4 to 10, it can be seen that the features such as, environmental concerns, nutritional value and animal welfare also score high scores in the results of the Tables 4 to 10. These are important features and motivations that overlap each other in the results.

## 4. Discussion of Results

The objective of this research is to get an insight in the motivations of the Dutch millennial consumer to include plant-based meat substitutes in their diet. To research what these motivations are, a questionnaire was developed. These results have been used to develop four different consumer groups: only animal meat consumers, only plant-based meat substitutes consumers, both plant-based and animal meat, and neither plant-based nor animal meat. A Chi<sup>2</sup> test was performed to see what features are valued most by these four consumer groups. Furthermore, descriptive statistics have been used to give further clarification and show a correlation between the sub questions.

### 4.1. The current diet of the Dutch millennial consumer

The results of this question show the different consumer groups with different meat (animal and plant-based) consumption patterns. The consumption in this question is not focussing on a specific type of product, but instead is focussing on patterns of general animal meat consumption or plant-based meat substitutes consumption.

When looking at the results, it can be found that the biggest group of consumers is the group that is only consuming animal meat products. The second largest group is the group that is consuming both animal meat products as well as plant-based meat substitutes. These results show that the transition to more plant-based meat substitutes in the diet of the animal meat consumer is actually rising.

As also described in the theory, the rise of plant-based meat substitutes can be linked to the commercialization of these products, potential health benefits and the concern towards the environment that is a growing problem that consumers are taking into consideration when buying products (Staff, 2019). However, also the meat consumption is still rising in the Netherlands according to a research of Wageningen University which states that “The Dutch consumer is consuming more meat again in 2019” (WUR, 2020). Additionally, there is a small consumer group that is not consuming plant-based meat substitutes nor animal meat products (Webster, 2020). This group of consumers may have chosen a complete vegan diet without substitutes to add to the diet (Webster, 2020). This could be a choice due to the fact that some plant-based meat alternatives are ultra-processed and contain more saturated fats in some cases than regular animal meat products (Webster, 2020).

### 4.2. Reduction of animal meat consumption

The reduction of animal meat consumption is shown in the result of the question where respondents were asked to say whether or not the consumer wants to reduce their animal meat intake. Even though the meat consumption has risen again in 2019, 55% of the respondents answers yes to the question if they want to reduce their animal meat consumption (WUR, 2020). This can mean that these consumers are not yet familiar with plant-based alternatives or that the consumers do think that the alternatives are not yet living up to expectations.

The reasons for the respondents to reduce their animal meat consumption gives an insight in this.

Respondents could pick multiple answers for this question and also were given the option to give an open answer. To the open option, 10% of the respondents filled in that animal welfare was an important factor why the consumers want to reduce the animal meat intake.

This was a limitation to the questionnaire since in the previous question, animal welfare had been mentioned as an option but at this question there was not a set answer to animal welfare. At least the option to give an open answer was given.

Environmental concerns are the main aspect why consumers want to reduce the animal meat intake and the second aspect are the health concerns that consumers tend to have with the consumption of animal meat products. The health concerns that the consumers have are also being spread over the past few years. The risks of consuming meat from the livestock production can be the cause to some serious illnesses (de Boer, Schösler, & Aiking, 2014). Curiosity was another motivation why consumers want to reduce the animal meat intake. There has been a rise in global plant-based meat consumption due to the rising number of flexitarian consumers (Berkhout et al., 2018). This can be a reason for consumers to become curious. The consumer wants to be involved in new trends and as mentioned earlier, green consumerism is a current ongoing trend (Moreno et al., 2017) (Berkhout et al., 2018). It can be seen that the environmental concerns are of big influence as shown in the results and the previous sub question as well as the animal welfare motive.

#### 4.3. The main features millennials are looking for in plant-based meat substitutes

When looking at the results of the third sub question it is found that there are multiple significant relations detected. These significant relations are detected for the following features: price, environmental concerns and animal welfare. Furthermore, nutritional value and convenience of preparation are important because these features are almost showing a significant relationship.

Below in the Tables 11 till 14 the four different consumer groups are worked out with the features ranked based on the importance to the specific consumer groups: only animal meat, only plant-based meat substitutes, both plant-based meat substitutes and animal meat and "neither plant-based meat substitutes nor animal meat". Per group the scores are explained with the use of explored literature. In Table 11 below the first group is presented.

Table 11: Ranking of the different features per consumer group.

<b>Features</b>	<b>Group 1: Only animal meat</b>	<b>Group 2: Only plant-based meat substitutes</b>	<b>Group 3: Both plant-based meat substitutes and animal meat</b>	<b>Group 4: Neither plant-based meat substitutes nor animal meat</b>
<b>Taste</b>	No. 1	No. 2	No. 1	No. 2
<b>Price</b>	No. 2	No. 6	No. 5	No. 1
<b>Nutritional value</b>	No. 3	No. 3	No. 4	No. 5
<b>Environmental concerns</b>	No. 4	No. 4	No. 2	No. 4
<b>Appearance / visual presentation</b>	No. 6	No. 5	No. 6	No. 7
<b>Convenience of preparation</b>	No. 7	No. 7	No. 7	No. 6
<b>Animal welfare</b>	No. 5	No. 1	No. 3	No. 3

In table 11, the ranking of the features are given. As shown in table 11, it can be seen that to the only animal meat consuming group, taste is very important. This is mainly due to the fact that meat is already part of the human diet for 2.5 million years (Pobiner, 2020). Animal meat products are something that the millennial consumer grew up with, since the plant-based substitutes only gained popularity at the market since the year 2015. So, most millennials probably did consume meat when they were younger (He, Evans, Liu, & Shao, 2020). Next, price is an important feature to the millennial animal meat consumer. Due to large debts that millennials are burdened with, price is an important factor to them (Taylor, 2012). Nutritional value is scored third in terms of importance to the animal meat consumer. Plant-based meat substitutes are processed to have the same amount of protein as regular meat in order to compete with animal meat products (He, Evans, Liu, & Shao, 2020). The fourth most chosen feature is environmental concerns. Current animal meat patterns in diets are considered very unsustainable and therefor animal meat consuming millennials are probably valuing this in plant-based alternatives (WUR, 2020). Animal welfare is rated as the fifth most valued feature. Consumers that consume animal meat products rate animal welfare as important. When buying the products, millennials are looking for a product that they can identify themselves with in terms of beliefs, personality, lifestyle, social values and community (Moreno, Lafuente, Avila, Moreno, 2017). The sixth and seventh features are appearance and convenience of preparation. Since the millennial consumer is more focussed on buying the product for a good price and have more leisure time (Moreno et al., 2017). Therefore, appearance and convenience of preparation are the least valued features by group 1.

It can be found that plant-based meat consumers value animal welfare the most. Many vegetarians are not consuming meat because animals are being farmed on a large scale for human consumption (Petrovic, Djordjevic, Milicevic, Nastasijevic, & Parunovic, 2015). The value taste is the second most important feature to the consumers of plant-based alternatives. The taste of the plant-based products has improved over the years because of research and development as well as investments in the products (Tziva, Negro, Kalfagianni, & Hekkert, 2020). Ranked third is the nutritional value, the products have similar protein amounts as regular meat products and this is valued by the consumers (He, Evans, Liu, & Shao, 2020). The fourth feature is environmental concerns. Plant-based meat substitutes are a more sustainable source of protein than animal meat products (John, 2019). Furthermore, as previously mentioned, millennial consumers tend to buy products that they can identify themselves with in terms of their beliefs (Moreno, Lafuente, Avila, Moreno, 2017). The fifth value is appearance, this is not a feature that many consumers tend to find very important. The sixth most valued feature is the price. The consumers of plant-based meat substitutes do not value price as much as for example the animal meat consumer, this can be traced back to the buying behaviour of the millennial consumer which is making decisions based on trends and not necessarily price (Moreno et al., 2017). Finally, group 2 also showed no significant valued relation towards the convenience of preparation.

Group 3 is rating taste as the most valued feature. "Taste" has been valued the most by group 1 and 4 as well. The consumer groups that consume both animal meat products and plant-based meat substitutes, want good alternatives and are comparing animal meat products to plant-based meat substitutes in terms of taste (He, Evans, Liu, & Shao, 2020). Environmental concerns are ranked as second most valued feature. Due to the fact that plant-based meat substitutes are marketed as less harmful to the environment (John, 2019). And also because animal meat consumers are shifting towards more plant-based diets (Staff, 2019). Animal welfare is the third ranked feature. The fact that awareness is being created for plant-based diets, and the need that there is to consume a more sustainable alternative to animal-meat protein (John, 2019) (Staff, 2019). Fact is that this group rates environmental concerns and animal welfare very high compared to group 1. Fourth is the nutritional value, again this is because the plant-based meat substitutes have similar nutritional values to animal meat products (He, Evans, Liu, & Shao, 2020). Price, appearance and convenience of preparation are rated as the least valued features by group 3. Animal welfare and environmental concerns play a large role in group three's decision making process. This can be related to the fact that the millennial consumer can identify their beliefs more in these features compared to lower rates price, appearance and convenience (Moreno, Lafuente, Avila, Moreno, 2017).

Just like group 1 and 3, group 4 is rating price as the most valued feature. Since this group is not consuming plant-based meat substitutes nor animal meat products. It is assumed that these consumers have a plant-based diet without plant-based meat substitutes. Financial concerns can be a reason why price is important to this group of consumers. Meat is consumed in wealthy economies and so it has to be affordable for the consumer that wants to consume it (Petrovic, Djordjevic, Milicevic, Nastasijevic, & Parunovic, 2015). Taste is the second most important value to group 4, as well as to all the other groups. All groups tend to find this important since they will not consume a product they do not like the taste of it. The third most valued feature is animal welfare. To a group that is not consuming animal meat products, animal welfare is valued because of the bad conditions of some animals that are farmed on a large scale (Petrovic, Djordjevic, Milicevic, Nastasijevic, & Parunovic, 2015). Environmental concerns are rated as the fourth most important value. Which is not in relation to group 3 that is giving environmental concerns a second place. Again the fifth sixth and seventh place are nutritional value, convenience of preparation and appearance / visual presentation.

#### 4.4. Reflection on research process

At beginning of the research phase, a questionnaire was set up in order to retrieve the results. This aspect of the research is very important because if the questionnaire is not set up right, the data that will be retrieved will also not be useful or gives wrong information. Some of the data that has been retrieved also ended up not being useful for this research. Only 5 questions out of the 12 could actually be used to build the results with. This is an aspect of performing a research that could be improved next time. More attention and care should be involved when building a questionnaire for a research similar to this. Fortunately, enough data was collected in order to get a good insight in the current target group to answer the sub questions. The distribution of the questionnaire went fast, and the needed responses were attained within the time set in the planning. The number of respondents exceeded the number that was needed, 196 responses were needed and the number that responded was 203 (206 with the count of responses that were not eligible to participate). The results are giving clear insight in the aspects that are needed to answer the questions and are therefore living up to what was expected. The Chi<sup>2</sup> analysis also is giving a clear insight in how the different features show significant relations or not. This is a very good way of researching the answers of a questionnaire such as the one in this research. The program used to perform the Chi<sup>2</sup> analysis was very user friendly and recommendable for other researchers / research.

The features that are used in this research (taste, price, nutritional value, animal welfare, convenience of preparation, appearance / visual presentation and environmental concerns) are based on current literature study. More features could be important to be researched therefore, a qualitative research on consumer choice feature elicitation could be helpful in the study. Furthermore, the approach used may not be the best to rank results, in future researches other methods could be applied to highlight features such as the Fuzzy logic method or the Kano method.

## 5. Conclusions and Recommendations

This research aimed to identify the most important motivations for the Dutch millennial consumer to include plant-based meat substitutes in their diet. Different questions relating the features of products, current eating patterns and willingness to reduce consumption have been asked to the participant. In this chapter the findings of this research are presented, and detailed answers are given to the sub questions and the main question of this research: *“What are the main motivations of millennials to include plant-based meat substitutes in their diet?”*.

### 5.1. Conclusions

In relation to sub question 1 “How does the current diet of the millennials look like?”: according to the results, it can be said that the majority of the Dutch millennial consumer is consuming animal meat products. However, there is a rise in the number of consumers that is consuming plant-based meat substitutes. Due to the current trends and wider variety of products, plant based meat substitutes are gaining popularity, therefore the group that is consuming both animal meat products and plant-based meat substitutes is the second largest group in this research.

In relation to sub question 2 “What are the main features millennials are looking for in plant-based meat substitutes?”: according to the results, 55% of the current animal meat consuming consumer wants to reduce the consumption of animal meat. The most important reason for this reduction is the concern for the environment and the health benefits that go along with the consumption of plant-based products. Consumers are shifting to a more plant-based protein diet which is also a trend that is currently going on in the Netherlands. By creating more awareness for these aspects of plant-based products, more consumers are starting to consume plant-based meat substitutes.

In relation to sub question 3 “Do millennials want to reduce their animal-meat intake?”: the features that millennials are mainly valuing in plant-based meat substitutes consist of the environmental concerns, limiting animal meat consumption and health benefits. The millennial consumer is considered very aware of the problem on how to feed 10 billion people in 2050 that the EAT Lancet report is describing (EAT, 2021). This means that consumers nowadays are not only focussing on product related motivations but also societal related motivations. This plays an important factor when buying products.

It can be concluded that according to the findings of this research, the majority of the millennial consumer is willing to include plant-based meat substitutes. Not only for product related motives / benefits but also mainly because of societal related motives. Motivations such as environmental concerns, limitation of animal meat consumption are getting the same number of responses as taste, health and financial benefits. The trend of green consumerism and the increasing awareness for the problems and benefits of these products is already initiating a transition towards a more plant-based society (Berkhout et al., 2018).

Consumers are very aware of the fact that with the current consumption patterns, the problems will not only worsen globally, but can also become a problem individually in terms of the health concerns.

## 5.2. Recommendations

This research leads to recommendations for food processors, retailers, and the government.

The recommendation for food processors and retailers is to focus more on the sustainability aspect when selling the plant-based meat substitutes. Show for example the information of what natural resources have been saved when producing the plant-based product compared to the animal meat product. Furthermore, taste is a very important motivation for consumers to buy plant-based meat substitutes so for processors it is important to keep innovating and researching ways to improve the taste of products and create new products that consumers will like. This will cost time and money, but over the years this will have a big impact in the amount of market share that will be created by pulling consumers away from animal meat products.

For the government it will be important to emphasize the problem that is described by EAT Lancet (EAT, 2021). By creating awareness for this problem, consumers will be thinking better when buying animal meat products. Green consumerism is a current trend that should be embraced by the government. In order to know about this trend, the government can make commercials and increase the involvement in this trend.

## List of References

- Albert Heijn. (2020). *Vleesvervangers en vega(n) producten bestellen* | Albert Heijn. Retrieved 28 November 2020, from: <https://www.ah.nl/producten/vlees-kip-vis-vega/vegetarisch-vegan-vleesvervangers>
- Berkhout, P., Achterbosch, T., van Berkum, S., Dagevos, H., Dengerink, J., van Duijn, A. P., & Terluin, I. J. (2018). Global implications of the European Food System : A food systems approach. *Wageningen Economic Research Publications*, 27. <https://doi.org/10.18174/448884>
- Beverland, M. B. (2014). Sustainable Eating. *Journal of Macromarketing*, 34(3), 369–382. <https://doi.org/10.1177/0276146714526410>
- Bhat, A. (2020, July 21). *The ultimate guide to great questionnaires*. Retrieved 8 December 2020, from: <https://www.questionpro.com/blog/what-is-a-questionnaire/>
- Bowen, A., Duffy, C., & Frankhauser, S. (2020, November 2). *'Green growth' and the new Industrial Revolution*. Retrieved 28 November 2020, from: <https://greenindustryplatform.org/research/%E2%80%98green-growth%E2%80%99-and-new-industrial%C2%A0revolution>
- Cambridge Dictionary. (2020, November 24). *Meaning of meat in English*. Retrieved 29 November 2020, from: <https://dictionary.cambridge.org/dictionary/english/meat>
- Curtain, F., & Grafenauer, S. (2019). Plant-Based Meat Substitutes in the Flexitarian Age: An Audit of Products on Supermarket Shelves. *Nutrients*, 11(11), 2603. <https://doi.org/10.3390/nu11112603>
- de Boer, J., Schösler, H., & Aiking, H. (2014). “Meatless days” or “less but better”? Exploring strategies to adapt Western meat consumption to health and sustainability challenges. *Appetite*, 76, 120–128. <https://doi.org/10.1016/j.appet.2014.02.002>
- Deloitte. (2019, March 13). *Plant-based alternatives*. Retrieved 28 November 2020, from: <https://www2.deloitte.com/uk/en/pages/consumer-industrial-products/articles/plant-based-alternatives.html>
- Derbyshire, E. J. (2017). Flexitarian Diets and Health: A Review of the Evidence-Based Literature. *Frontiers in Nutrition*, 3, 1. <https://doi.org/10.3389/fnut.2016.00055>

- EAT. (2021). The EAT-Lancet Commission on Food, Planet, Health - EAT Knowledge. Retrieved May 23, 2021, from <https://eatforum.org/eat-lancet-commission/>
- European Parliament. (2020, October 23). *Are veggie burgers or tofu steaks going to be banned?* | News | European Parliament. Retrieved 27 November 2020, from: <https://www.europarl.europa.eu/news/en/press-room/20201019BKG89682/eu-farm-policy-reform-as-approved-by-meps/7/are-veggie-burgers-or-tofu-steaks-going-to-be-banned>
- FAIRR. (2020, November 9). Appetite for Disruption. Retrieved 27 November 2020, from: <https://www.fairr.org/article/appetite-for-disruption-a-second-serving/>
- Garnett, T. (2014). Three perspectives on sustainable food security: efficiency, demand restraint, food system transformation. What role for life cycle assessment? *Journal of Cleaner Production*, 73, 10–18. <https://doi.org/10.1016/j.jclepro.2013.07.045>
- He, J., Evans, N. M., Liu, H., & Shao, S. (2020). A review of research on plant-based meat alternatives: Driving forces, history, manufacturing, and consumer attitudes. *Comprehensive Reviews in Food Science and Food Safety*, 19(5), 2639–2656. <https://doi.org/10.1111/1541-4337.12610>
- JASP. (2020, October 15). *JASP - A Fresh Way to Do Statistics*. Retrieved 28 November 2020, from: <https://jasp-stats.org/>
- John, J. (2019, August 1). *New GFI Fact Sheet Shows Just How Sustainable Plant-Based Meat Really Is*. Retrieved 28 November 2020, from: <https://www.gfi.org/sustainable-meat-fact-sheet>
- Joseph, M. (2020, February 17). *12 Types of Meat and Their Benefits (Includes Full Nutrition Facts)*. Retrieved 28 November 2020, from: <https://www.nutritionadvance.com/types-of-meat/>
- van Loo, E. J., Caputo, V., & Lusk, J. L. (2020). Consumer preferences for farm-raised meat, lab-grown meat, and plant-based meat alternatives: Does information or brand matter? *Food Policy*, 95, 101931. <https://doi.org/10.1016/j.foodpol.2020.101931>
- Mcleod, S. (2020). *Likert Scale Definition, Examples and Analysis*. Retrieved 30 November 2020, from: <https://www.simplypsychology.org/likert-scale.html>
- Michel, F., Hartmann, C., & Siegrist, M. (2021). Consumers' associations, perceptions and acceptance of meat and plant-based meat alternatives. *Food Quality and Preference*, 87, 104063. <https://doi.org/10.1016/j.foodqual.2020.104063>

- Moreno, F. M., Lafuente, J. G., Carreón, F. Á., & Moreno, S. M. (2017). The Characterization of the Millennials and Their Buying Behavior. *International Journal of Marketing Studies*, 9(5), 135. <https://doi.org/10.5539/ijms.v9n5p135>
- Morrar, R., & Arman, H. (2017). The Fourth Industrial Revolution (Industry 4.0): A Social Innovation Perspective. *Technology Innovation Management Review*, 7(11), 12–20. <https://doi.org/10.22215/timreview/1117>
- O'Mara, F. P. (2011). The significance of livestock as a contributor to global greenhouse gas emissions today and in the near future. *Animal Feed Science and Technology*, 166–167, 7–15. <https://doi.org/10.1016/j.anifeedsci.2011.04.074>
- Pak, T. (2020, October 15). *No Beef Here: How the Dutch are Innovating Plant-Based Proteins*. Retrieved 28 November 2020, from: <https://investinholland.com/news/no-beef-here-how-the-dutch-are-innovating-plant-based-proteins/>
- Petrovic, Z., Djordjevic, V., Milicevic, D., Nastasijevic, I., & Parunovic, N. (2015). Meat Production and Consumption: Environmental Consequences. *Procedia Food Science*, 5, 235–238. <https://doi.org/10.1016/j.profoo.2015.09.041>
- Pobiner, B. (2020, May 21). *Meat-Eating Among the Earliest Humans*. Retrieved 22 November 2020, from: <https://www.americanscientist.org/article/meat-eating-among-the-earliest-humans>
- Poinski, M. (2020, May 27). *Plant-based food sales outpace growth in other categories during pandemic*. Retrieved 28 November 2020, from: <https://www.fooddive.com/news/plant-based-food-sales-outpace-growth-in-other-categories-during-pandemic/578653/>
- Rosa, E. A., & Dietz, T. (2012). Human drivers of national greenhouse-gas emissions. *Nature Climate Change*, 2(8), 581–586. <https://doi.org/10.1038/nclimate1506>
- Roser, M. (2013, May 9). *World Population Growth*. Retrieved 28 November 2020, from: [https://ourworldindata.org/world-population-growth?source=post\\_page-----d904819ea029-----](https://ourworldindata.org/world-population-growth?source=post_page-----d904819ea029-----)
- Sejian, V., Hyder, I., Ezeji, T., Lakritz, J., Bhatta, R., Ravindra, J. P., ... Lal, R. (2015). Global Warming: Role of Livestock. *Climate Change Impact on Livestock: Adaptation and Mitigation*, 141–169. [https://doi.org/10.1007/978-81-322-2265-1\\_10](https://doi.org/10.1007/978-81-322-2265-1_10)
- Smith, K. T. (2010). Digital Marketing Strategies that Millennials Find Appealing, Motivating, or Just Annoying. *SSRN Electronic Journal*, 1. <https://doi.org/10.2139/ssrn.1692443>

- Spaargaren, G., Oosterveer, P., & Loeber, A. (2012). *Food Practices in Transition*. Abingdon, United Kingdom: Routledge.
- Staff, A. (2019, October 28). *Ask the Expert: Popular plant-based meat alternatives*. Retrieved 28 November 2020, from: <https://www.hsph.harvard.edu/nutritionsource/2019/08/26/questions-plant-based-meat-alternatives/>
- Statista. (2020a, March 30). *Number of new meat substitute products introduced in the Netherlands 2010-2018*. Retrieved 28 November 2020, from: <https://www.statista.com/statistics/1016636/number-of-new-meat-substitute-products-introduced-in-the-netherlands/>
- Statista. (2020b, June 12). *Population of the Netherlands in 2020, by age and gender*. Retrieved 28 November 2020, from: <https://www.statista.com/statistics/755052/population-of-the-netherlands-by-age-and-gender/>
- Statista. (2020c, October 1). *Global animal protein consumption by type 2019*. Retrieved 28 November 2020, from: <https://www.statista.com/statistics/1025784/human-consumption-of-protein-by-type-worldwide/>
- SurveyMonkey. (2020). *Steekproefcalculator: meer informatie over steekproefgroottes* |. Retrieved 28 November 2020, from: <https://nl.surveymonkey.com/mp/sample-size-calculator/>
- Taylor, A. (2012). The Information Search Behavior of the Millennial Generation. *Ubiquitous Learning: An International Journal*, 4(3), 85–98. <https://doi.org/10.18848/1835-9795/cgp/v04i03/40341>
- Tolonen, E. (2018). *Meat substitution in the Netherlands* | TU Delft Repositories. Retrieved 28 November 2020 from: <https://repository.tudelft.nl/islandora/object/uuid:559ae075-3aeb-48de-8c2a-d185e32a3d32?collection=education>
- Tziva, M., Negro, S. O., Kalfagianni, A., & Hekkert, M. P. (2020). Understanding the protein transition: The rise of plant-based meat substitutes. *Environmental Innovation and Societal Transitions*, 35, 217–231. <https://doi.org/10.1016/j.eist.2019.09.004>
- van der Have, R. P., & Rubalcaba, L. (2016). Social innovation research: An emerging area of innovation studies? *Research Policy*, 45(9), 1923–1935. <https://doi.org/10.1016/j.respol.2016.06.010>

- Webster, A. (2020, April 8). *Plant-based Meat Alternatives: Are They Healthy?*  
Retrieved 8 December 2020, from: <https://foodinsight.org/plant-based-meat-alternatives-are-they-healthy/>
- Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., ...  
Murray, C. J. L. (2019). Food in the Anthropocene: the EAT–Lancet Commission  
on healthy diets from sustainable food systems. *The Lancet*, 393(10170), 447–  
492. [https://doi.org/10.1016/s0140-6736\(18\)31788-4](https://doi.org/10.1016/s0140-6736(18)31788-4)
- Worldometer. (2020, November 27). *Worldometer - Real time wereld statistieken*.  
Retrieved 27 November 2020, from: <https://www.worldometers.info/nl/>
- WUR. (2020). *We eten opnieuw meer vlees*. Retrieved 28 November 2020, from:  
<https://www.wur.nl/nl/nieuws/We-eten-opnieuw-meer-vlees.htm>

## Appendix 1. Questionnaire

1. Do you live in the Netherlands?
  - Yes
  - No (please do not continue the questionnaire)
  
2. Are you a 'millennial'? A millennial is born between the year 1980 and 2000.
  - Yes
  - No (please do not continue the questionnaire)
  
3. What is your sex?
  - Man
  - Woman
  - Other
  
4. Do you consume animal-based meat products?
  - Yes
  - No
  - No, but I would like to
  
5. Do you consume plant-based meat substitutes?
  - Yes
  - No
  - No, but I would like to
  
6. How often do you consume animal-based meat products?
  - Every day of the week
  - 3-5 days per week
  - 1-2 days per week
  - Once every month
  - I do not eat animal-based meat products
  
7. How often do you consume plant-based meat substitutes?
  - Every day of the week
  - 3-5 days per week
  - 1 or 2 days per week
  - Once every month
  - I do not eat plant-based meat substitutes

8. Rate with 1-5 which aspects are motivating / would motivate you to eat plant-based meat substitutes:

Taste  
Price  
Nutritional value  
Environmental concerns  
Appearance / visual presentation  
Convenience of preparation  
Animal welfare

9. Would you like to reduce your meat intake?

Yes  
No

10. If yes, why would you like to reduce your meat intake?

Health benefits  
Environmental concerns  
Curiosity  
Taste  
Other:

11. Rate with 1-5 which aspects are motivating / would motivate you to eat animal-based products:

Taste  
Price  
Nutritional value  
Environmental concerns  
Appearance / visual presentation  
Convenience of preparation  
Animal welfare

12. If you are open to include plant-based products in your diet, what is your main motivation towards this decision? Rate the top 3 motivations from most important to least important.

- I would include due to environmental concerns
- I would include due to health benefits
- I would include due to financial benefits
- I would include due to curiosity
- I would include due taste
- I would include due to limiting my animal- meat consumption