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# FACTORS AFFECTING CONSUMER BEHAVIOUR TOWARDS MEAT ALTERNATIVES IN ESTONIA

Master´s thesis

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I hereby declare that I have compiled the paper independently

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# ABSTRACT

This research is exploring what factors affect consumer behaviour towards meat alternatives in Estonia. The central task of this Master thesis is to find out what factors influence Estonian consumer's behaviour towards meat alternatives. It also explores which meat alternative sensory factors are considered important by the consumer. The theory is based on the Multidisciplinary Model of the Main Factors Affecting Consumer Behaviour in a Food Domain.

The paper is based on quantitative research conducted in Estonia during April. 2019 and a mix of convenience and judgemental sampling were used. The total respondent count 317 amongst of which 8 different dietary styles are presented.

Correlation analysis between factors shows that consumer behaviour is affected by multiple interrelated factors. Estonian consumers are not influenced by their peers nor by their family, furthermore, their diet choices are not limited due to family members. The study reveals that food neophobia, the fear of trying new foods, a barrier brought out in many previous studies was not evident amongst the gathered sample. The barriers towards consuming meat alternatives are socio-cultural, related to product and information availability, and sensory appreciation of meat as a versatile product. The results show that meat is perceived to be part of the Estonian culture. Increasing consumer awareness about meat alternatives by introducing interesting recipes will help to overcome the unfamiliarity barrier. For meat alternative product development the ability to prepare the meat alternative in multiple ways (cooking, frying, baking in the oven) is most expected by the gathered sample.

Keywords: meat alternatives, sustainability, consumer expectations, consumer behaviour, barriers.

# INTRODUCTION

Consumers' daily food choices have a huge impact on the environment and compared to other protein production, meat has a much larger impact. Fossil fuel usage, animal methane, effluent waste, water, and land consumption are all associated with the production of meat (Gerber *et al.,* 2013; Steinfeld *et al.*, 2006). According to the Food and Agriculture Organization of the United Nations 2013 report, livestock — including cows, pigs, sheep, and other animals — are responsible for about 14.5 percent of global greenhouse gas emissions. Livestock is considered to be one of the biggest contributors to greenhouse gas emissions. Cows are the primary offenders, and each animal releases 30 to 50 gallons a day on average. Climate change is directly linked with livestock produced greenhouse gas emissions (FAO, 2013).

The growth of the world's population and rising disposable incomes have led to an increase in global meat consumption (de Boer *et al.,* 2014; Hallström *et al.,* 2014; Edjabou and Smed, 2013). Despite the overall negative beliefs and attitudes toward meat and meat products, they have secured themselves an important role in many Western and non-Western countries daily diets (Font-i-Furnols and Guerrero, 2014). According to FAO, we will have to double the production of meat and dairy to meet the predicted demand for animal proteins in 2050. This forecast is alarming if we consider that the environmental impact of livestock must be halved only to prevent the current level of ecological damage from being exceeded (Steinfeld *et al.,* 2006) Enormous consequences for the environment- nature, landscape and food security are predicted by the experts if the consumption of animal proteins is not successfully turned into a more sustainable diet. (Audsley *et al.,* 2009; D´Silva and Webster 2010; FAO 2009; UNEP 2007).

Factors affecting consumer behaviour towards meat alternatives has been researched in many countries but in Estonia, this subject had not been thoroughly explored. Based on the prior, the following research problem was formulated: **insufficient information on the factors influencing Estonian consumer's behaviour towards meat alternatives.**

The research aims to find out what are the different individual and environmental factors affecting consumer behaviour towards meat alternatives, and are Estonian consumers willing to change their consumption habits towards a more sustainable choice. The thesis objective is also to find out what product-specific factors affect consumer behaviour towards meat alternatives in terms of taste, texture, odor, and appearance.

Consequently, the following research tasks have been set by the author:

1. Explaining The Multidisciplinary Model of the Main Factors Affecting Consumer Behaviour in a Food Domain
2. Get acquainted with different dietary styles
3. Understanding the complexity of changing diets
4. Give an overview of meat alternatives developments
5. Give an overview of earlier research results related to meat alternatives and consumers barriers
6. Create and conduct research using a structured questionnaire based upon the previously mentioned model

The object of the research is insufficient information on the factors influencing Estonian consumer's behaviour towards meat alternatives and to resolve this research problem, the quantitative method will be used. The quantitative info will be gathered through an online questionnaire set up in Google Forms. The questionnaire will be promoted via social media or sent directly to respondents e-mail. Collected data will be analyzed between different diet groups and compared with prior researches done in other countries.

The outcome of this research can be the basis of alternative protein product design and offer possible business development opportunities in a large still unfulfilled market. There are already ongoing developments in Estonia, which have received worldwide recognition and funding. TFTAK (Center of Food and Fermentation Technologies), is in the process of designing meat alternatives through the fermentation of oat proteins. Estonia has been successful in innovating the technology field, so why not stand out and show the way by developing sustainable and innovative meat alternatives.

# 1. THEORETICAL BACKGROUND

The first section will analyse and explain the Multidisciplinary Model of the Main Factors Affecting Consumer Behaviour in a Food Domain which will be the basis of designing the questionnaire for the empirical research. Then various diet styles and meat alternatives will be introduced and based on previous researches the main consumer barriers are brought out.

## 1.1. The Multidisciplinary Model of the Main Factors Affecting Consumer Behaviour in a Food Domain

Researchers have estimated that humans could continuously make roughly around 200 food-related decisions within a day (Wansink & Sobal 2007). According to Manan (2016), these food choice decisions are complex, continuous and repetitive due to the interconnectivity between people, environment and the foods themselves. The model (Figure 1.) aims to understand the factors affecting consumer behaviour and the relations between them.
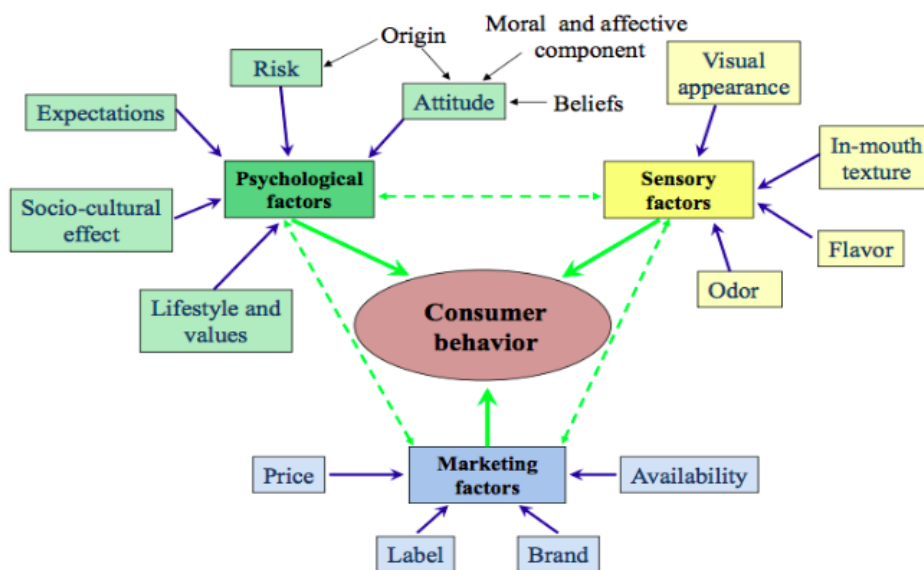


Figure 1. The Multidisciplinary Model of the Main Factors Affecting Consumer Behaviour in a Food Domain
Source: Font-i-Furnols & Guerrero (2014)

The model consists of three main factors: psychological (individual factor), sensory (product-specific factor) and marketing (environmental factor), which in turn are divided into several subgroup factors (Font-i-Furnols & Guerrero, 2014). Therefore, the relatively complicated consumer decision making process is individual, varies between people, and is an outcome of multiple interrelated factors (Font-i-Furnols & Guerrero, 2014; Torjusen *et al.*, 2001).

## 1.2. Psychological factors

According to Font-i-Furnols and Guerrero (2014) consumers as rational beings are affected by many external inputs on an everyday basis and from a social, economic, cultural or psychological perspective their individual conduct can be predicted.

The psychological factor consists of the following subgroups: attitude, risk, expectations, socio-cultural effect, and lifestyle and values. The authors state that the consumers' perceptions and attitudes together with their beliefs, greatly influences their buying behaviour (Font-i-Furnols & Guerrero, 2014). Onkvisit and Shaw (1994) have said that attitude is a learned tendency of response towards an object which can be favorable or unfavorable therefore determining whether a product will be bought or not. Attitude is intangible and cannot be directly observed thus any info gathered from consumers about their attitudes will result in hoping that their replies are honest ones (Sethna & Blythe, 2016).

Beliefs represent the information that a person possesses about an object and is, therefore, the outcome of descriptive beliefs (formed by consumers through their direct experience), informational beliefs (formed by an outside source such as mass media, relatives, friends, etc.), and inferential beliefs (formed through previously acquired experience and knowledge) (Fishbein & Ajzen, 1975; Smith *et al.*, 2012). Furthermore, the formation of belief is a dynamic ongoing lifelong process and consumers opinions and knowledge about products influence their perceptions creating either a positive or negative cognition (Castelfranchi, 2004; Foxall *et al.*, 1998).

Risk is defined as a subjective expectation of loss in consumers purchasing decision process (Mitchell, 1999). Consumers with no prior experience or limited experience towards a product

category are sensitive towards risk and uncertainty due to the lack of knowledge. Therefore consumers often browse online and offline to gather knowledge and reduce the risk of making the wrong decision (Sethna & Blythe, 2016).

Expectations on how a certain product is going to be, plays a significant role in consumers' buying behaviour, in terms of whether they decide to approve or disapprove a product. Furthermore, this shows that during a product/service development, consumer expectations should be known already, in order for it to be a success. The consumer decision-making process is also influenced by the socio-cultural effects like gender, age, education, traditions, and culture.
Among the factors, the cultural environment influences consumers food choices as it defines the types of foods acceptable and connected to the culture (Delaney & McCarty, 2009).

Consumer´s lifestyle and values are directly linked and are the mixture of gender, upbringing and geographical background (Font-i-Furnols & Guerrero, 2014; Chryssohoidis & Krystallis, 2005). Furthermore, Palmer (2003) has pointed out, that household size also affects consumer decision making and shifts it from an individual perspective (individual needs and wants) to deciding as an economic union.


## 1.3. Marketing factors

According to Font-i-Furnols and Guerrero (2014) marketing factors such as price, label, brand, and availability can influence consumers both consciously and subconsciously. In addition to labels and brands, consumers receive most of the product related information through adverts, information campaigns. Furthermore expected product quality is derived from the previously mentioned external factors and is considered to be one of the main influential factors in the food domain that affects consumers buying behaviour (Font-i-Furnols & Guerrero, 2014). Price is one of the biggest barriers for consumers in terms of switching from animal protein to plant-based protein, so this is an important factor under marketing that should not be looked past.
Through these factors consumer expectation is created, which will influence product choice, affect purchasing decisions, and sensitivity to price (Font-i-Furnols & Guerrero, 2014).

Recent years have shown that consumers are becoming more aware of product labels, in terms of nutritional value and ingredients. From a marketer´s perspective, a well-designed product with

clear information can be a great competitive advantage (Gracia & de-Magistris, 2016; Font-i-Furnols & Guerrero, 2014). Prior researches have also found that product unfamiliarity and perception about meat alternative preparation difficulty is a barrier for consumers (Pohjolainen *et al.,* 2015; Salonen & Helne, 2012; Lea & Worsley, 2003). According to Font-i-Furnols and Guerrero (2014), the solution for overcoming the unfamiliarity and preparation difficulty barrier lies in the product package design. Preparation guidelines or even recipes could be included on the products package for help and inspiration.

Brands have multiple ways to attract consumer attention and make them stand out from competitors. With all these marketing factors combined, consumers expectations, acceptance, the action of choosing one brand over another and the willingness to pay can be created and influenced (Font-i-Furnols & Guerrero, 2014)

## 1.4. Sensory factors

The third factor in the multidisciplinary model affecting consumer behaviour in a food domain is the sensory factor consisting of visual appearance, texture, flavor, and odor. The visual appearance of food comes from the shape, color and the actual ingredient list of the product. Foods color is an important factor as it is one of the first visual appearance characteristics that help the consumer to determine if the product is fresh and therefore make the decision to buy or not. Consumers buying behaviour is also affected by the in-mouth texture of the product so stringiness, juiciness, hardness, tenderness or even pastiness can be behind the success or failure of the product. Both flavor and odor are very complex and are highly correlated with the consumer perception and acceptability of a food product (Font-i-Furnols & Guerrero, 2014).

According to Font-i-Furnols and Guerrero (2014) consumers behaviours toward food products is therefore shaped by multiple determinants. Thus, their perceptions are heterogeneous and depend not only on the appearance and sensory properties but also psychological and marketing aspects are included.

## 1.5. The Difference between Omnivore, Vegetarian, Vegan, and Other Diets

Early human evolution shows that the omnivorous diet was followed. The omnivorous diet means energy and nutrients are derived by feeding on both animals and plants, this was what allowed the human species to establish itself worldwide (Zucoloto, 2011). However, over the years many diets have formed where the amount of meat is nonexistent or significantly reduced. According to researchers, dietary adoptions may be done due to ethical, religious, environmental, cultural, economic or health reasons (Soule and Sekhon, 2018; Springmann *et al.,* 2016; Elzerman *et al.,* 2013). As there are multitude reasons behind choosing to follow a restrictive or animal-protein avoiding diet, its followers can not automatically be considered healthy, as consumers who do it for the ethical reasons may still consume over processed alternatives (Waldmann *et al.,* 2003). The aim is to understand whether meat or any other animal protein is consumed in a certain diet and what are the main differences in those diets.

The roots to the term vegetarian, abstaining from the consumption of meat, date back to World War II. Shortly after the term fruitarian emerged which consists of only consumption of fruits and in some cases nuts and seeds (Torrens, 2018). The subgroup ahimsa fruitarians only eat fruit that has naturally fallen from a tree or bush (without harming the plant), this helps them to follow the life motto of nonviolence, non-injury, and helps to avoid harming any life forms (Means and Antony, 2019).

Vegetarians then proceeded to practice a diet which eliminated the use of all animal (including animal by-products) and dairy products, the term vegan was introduced. Forward to the nineties which brought along the term pescatarian, describing people whose diet does not include any meat but who consume fish, seafood, eggs, and dairy (Mangels, Messina & Messina, 2011). Pollotarians similarily to pescatarians eat animal by-products like dairy and eggs along with animal protein consisting of fowl and poultry, however, they avoid red meat and seafood. Lacto Vegetarians do not eat any meat, fish, fowl or eggs, but they do consume dairy products. Ovo Vegetarians consume eggs, honey, vegetables, fruits but avoid meat, fish, fowl as well and avoid dairy. Lacto- Ovo Vegetarians combine the prior two diets together excluding from their diets only animal protein and consuming dairy, eggs, honey, vegetables, etc.

Flexitarianism a relatively new member amongst diets and the idea behind it is to decrease the amount of meat consumption. Flexitarians (Flexible Vegetarians) are people who mostly follow a vegetarian diet and occasionally eat meat or fish produce.

The different dietary styles are brought out below (Table 1.) with different food groups to better show what is consumed and what is not.

Table 1. Comparison of diets

| Food group | Animal protein | | | Animal By-Products | | | Vegetable Protein | |
|------------|----------------|---|---|--------------------|---|---|-------------------|---|
| Diet Name | livestock | fowl, poultry | seafood | dairy | eggs | honey | vegetables | fruits, nuts, seeds |
| Fruitarian | no | no | no | no | no | no | no | yes |
| Vegan | no | no | no | no | no | no | yes | yes |
| Lacto Vegetarian | no | no | no | yes | no | yes | yes | yes |
| Ovo Vegetarian | no | no | no | no | yes | yes | yes | yes |
| Lacto-ovo Vegetarian | no | no | no | yes | yes | yes | yes | yes |
| Pescatarian | no | no | yes | yes | yes | yes | yes | yes |
| Pollotarian | no | yes | no | yes | yes | yes | yes | yes |
| Flexitarian | occ | occ | occ | yes | yes | yes | yes | yes |
| Omnivore | yes | yes | yes | yes | yes | yes | yes | yes |

Source: created by the author

Based on the previous info, one might assume that consumers following a restrictive or avoiding diet are frequently consuming meat alternatives, however a study conducted amongst Dutch consumers showed that a number of these consumers often prefer to cook all of their meals from scratch and therefore avoid processed foods (Hoek *et al.,* 2011).

## 1.6. Change in diet and alternative proteins

Meat consumption per capita has increased within the last few decades, in Europe the consumption figure is already over 76kg per person per year (Raphaely and Marinova, 2016; Pohjolainen *et al.,* 2015) and is related to many environmental and public health issues according to (World Health Organisation (WHO), 2015; Springmann *et al.,* 2016; Pohjolainen *et al.,* 2015). Increase in demand has increased the production of animals, which has brought along the usage of antibiotics which

will affect consumers health and the overall food security in general (Pohjolainen *et al.,* 2016; Pathak *et al.,* 2010; Essoussi and Zahaf, 2009; Harper and Makatouni, 2002).

Researchers have found that excessive meat consumption is harmful to human health as it is associated with the occurrence of type 2 diabetes and cardiovascular diseases, red meat has also been classified as a Group 2A carcinogen (WHO, 2015; Kaluza *et al.,* 2012; Micha *et al.,* 2012).

Furthermore in addition to the prior, climate change is considered to be the biggest threat to human health (Watts *et al.,* 2015) which is closely connected with livestock management and the production of meat. Number of authors (Carlsson-Kanyama, 1998; Horrigan *et al.,* 2002; Steinfeld *et al.,* 2006; McMichael *et al.,* 2007; de Bakker and Dagevos, 2012; Gerber *et al.,* 2013; Eshel *et al.,* 2014) have proposed that a change in the human diet through the decrease in meat consumption will create a more sustainable food system. Increasing consumption of „alternative" proteins will help to reduce greenhouse gas emissions and slow down climate change as well as lower the overall usage of resources which affect the biodiversity of the earth. Therefore reducing meat consumption has evident co-benefits to human health and the environment (Bogudeva *et al.,* 2017)

As discussed in the previous chapter, there are many different forms of diet that do not include meat as a protein, some like fruitarian diet is in the author´s opinion too limiting and probably will not suit the majority of people. However, the problem is that changing food habits is considered difficult. According to researchers food is closely related to emotions and tied with both cultural and personal perceptions. It is important to understand that consumers mostly associate meat with gusto and nourishment followed by its versatility, availability, and ease of preparation. All of the above makes meat highly appreciated food group (Pohjolainen *et al.,* 2015).

Soule and Sekhon (2018) have highlighted an important aspect in the process of changing a diet „By removing conventional meat and/or animal by-products from the diet, a consumer must replace that food with an alternative. Food is one of the very few, perhaps only, product categories where true anti-consumption is not possible, as humans would not be able to survive without food. Therefore, when a large category of food products is excluded from purchase and consumption, it must be replaced."

## 1.7. Meat alternatives

When a consumer decides to change their diet and leave out animal protein a substitute must be introduced. The possible replacement could be a plant-based protein which is commonly referred to as meat alternatives, aiming to mimic the taste and consistency of the animal protein and make the diet transition easier (Hoek *et al.,* 2011).

Elzerman *et al.,* point out that fish, cheese and nuts, may be used to replace animal protein in a diet, however, they should not be considered as meat substitutes (Elzerman *et al.,* 2013). Today vegetarians have a wide variety of alternative protein sources to choose from differing in flavor and texture whilst forty years ago there was only tofu, a soy product originated from China, that became known for the USA and Western Europe in the sixties (Elzerman *et al.,* 2013).

First developments with soy in the meat substitutes field, failed to meet the sensory expectations of consumers. The biggest problems pointed out were that soy flavor dominated and the texture of the meat substitutes was dry and stringy (Elzerman *et al.,* 2013).

Nowadays scientists all over the world are working to find sustainable meat alternative solutions that would meet consumer expectations and needs. Special attention has been put into using base produce like peas and wheat to develop meat alternatives. Past few years have brought forth a breakthrough and through new techniques like extrusion, the development of meat alternative products has improved, making it possible to mimic the texture and moisture content of real meat (Pehanich, 2004). The goal of meat alternative is to mimic the taste and consistency of animal products (Hoek *et al.,* 2011).

One of the companies on a mission to create plant-based meat alternatives is Beyond Meats, founded in 2009 by Ethan Brown. The Los Angeles-based producer states on their homepage, that their mission is " to create The Future of Protein® – delicious plant-based burgers, sausage, crumbles, and more– made directly from simple plant-based ingredients. By shifting from animal to plant-based meat, we are creating one savory solution that solves four growing issues attributed to livestock production: human health, climate change, constraints on natural resources and animal welfare." ("Beyond Meat - The Future of Protein™", n.d.). Their product portfolio consists of two types of sausages „Beyond Sausage" great substitute to use in English breakfast or in a hot dog. For recipes that require ground beef like tacos, pasta bolognese, or minced meat sauce they have

developed two types of substitute crumbles „Beyond Beef Crumbles". From a consumers point of view, these versatile products have many applications. One of their most talked about products is the „Beyond Burger". They have managed to create soy, gluten GMO-free plant-based burger patty (contains 20-grams of pea protein per serving), which when cooked bleeds like real meat patty due to the clever usage of beetroot juice which, allows the burger patty to „bleed".

Aside plant-based meat alternatives, many researchers argue that in vitro meat is the solution to the increasing demand for animal protein, and avoidance of further ecological damage. In vitro meat, or cultured meat, is meat that is laboratory grown from cell cultures instead of inside an animal (New Harvest, 2017).

Currently lab-grown meat is not available for consumption to the general public, however, researchers are working to address the technicalities of advancing the technology (Haagsman *et al.,* 2009; Post, 2012). Even though the process has been found to require less land and energy resources, and production of fewer greenhouse gas emissions as a by-product, there are still multiple areas of concern and objection (Waste and Action Resources Programme, 2015; Laestadius, 2015; Tuomisto and Teixeira de Mattos, 2011).

Multiple researchers have reported that participants with different backgrounds and cultures, view cultured meat as unnatural, some even describe it as „fake" meat (Bekker, Tobi, *et al.,* 2017; Verbeke, Marcu, *et al.,* 2015; Tucker, 2014). In connection with unnaturalness comes food safety and Hocquette (2016) explains that even if cancerous cells could develop in the process of cell growth, their harm to the consumer is unlikely as they are dead when digested. On the other hand, participants are confident that in vitro meat will only be available to the general public after it is proven safe (O'Keefe *et al.,*2016). Nutritional value of the in vitro meat is also a common concern amongst participants, however studies note that some think the lab-grown meats lower fat content should be viewed as a health benefit (Bekker, Tobi, *et al.,* 2017; Laestadius and Caldwell 2015; Verbeke, Sans, *et al.,* 2015; Tucker, 2014).

As mentioned earlier the first developments in meat alternatives failed due to meeting the taste and texture expectations of the consumers, the same goes for the anticipation of taste texture and appearance of in vitro meat. According to researchers probable reasons for consumer rejection towards cultured meat seem to be based on concerns about lack of sensory appeal, inferior taste, „soft" or „dull" texture (Bekker, Tobi, *et al.,* 2017; Verbeke, Marcu, *et al.,* 2015; Tucker, 2014). Though Slade (2018) found that many respondents are expecting in vitro meat to taste better than

plant-based meat alternatives, for many participants regular consumption is only conceivable if the end product looks and tastes as good as conventional meat (Verbeke, Marcu, *et al.,* 2015). The anticipated price of in vitro meat has participants divided, many believe it will be expensive and therefore a crucial factor in their decision making, others believe ethical benefits justify the difference in product cost. (Slade, 2018; Bekker, Tobi, *et al.,* 2017; Verbeke, Marcu, *et al.,* 2015). Some predict a lower price in order for it to achieve widespread acceptance amongst consumers (O'Keefe *et al.,* 2016).

Aside from the previous many believe that edible insects are the sustainable alternative to meat and the best answer to the increasing demand for protein, which is in correlation with the rise of the world population. Remarkable is the change in the number of different species consumed by humans, while (Chen *et al.,* 1999) said there are 96 of them, (Jongema, 2017) brings out that the most recent count is 2111 different edible insect species. According to Food and Agriculture Organization of the United Nations (FAO), in addition to being a good source for protein and balanced amino acids, insects also include great amounts of lipid, copper, zinc, and iron (FAO, 2013).

In Asia, Africa, South- and Central-America insects are and have been an important part of the traditional diet for centuries (van Huis *et al.,* 2013). Although insects are rich in species, have a great nutritional value, and are incorporated into traditional diets around the world, the Western society is reluctant to follow (Evans *et al.,* 2015; Gahukar, 2012; Yen, 2009; Ramos-Elorduy, 2009). There are multiple reasons behind the Western cultures unwillingness to adapt to this „exotic" food group. According to various authors, insects are viewed as dirty, dangerous, disgusting, and are often associated with fear and repulsion (Tan, Fischer, van Trijp, & Stieger, 2016; Franklin & White, 2001; Kellert, 1993).

Similar to in vitro meat consumers have a concern about food safety, related to edible insects produced outside western countries, as the original producer´s food safety laws are less strict and demanding. Efforts to motivate consumption can be attempted through education and sensory appeal (Looy & Wood, 2006; Tan, van den Berg, & Stieger, 2016). Researchers have found that consumer acceptance could be achieved if insects were to be incorporated into well-known, popular, familiar foods and flavor profiles (Sun-waterhouse *et al.,* 2016; Hartmann *et al.,* 2015; Hoek *et al.,* 2011). Insects as an alternative protein source could be adapted into Western diets,

however, further research in consumer behaviour and insects as a source of food should be conducted.

## 1.8. Meat masculinity and barriers

Changes from an omnivorous diet to a plant-based diet are not likely to come easy and there are a number of reasons behind it. Authors Pohjolainen *et al.,* 2015; Grauerholz, 2008; Fiddes, 1991; Mennell, 1985; Twigg, 1983 have brought out that historically various symbolic meanings have been associated with meat as a cultural object, like masculine power, status, and superiority over women and animals. These historical and socio-cultural factors have shaped a general understanding of what kinds of foods are viewed as valuable and appropriate for human consumption. These factors have also given vegetarian foods the label of weakness and feminity and therefore it is widely considered as a side dish to meat in meals.

Prior researches have found multiple barriers consumers have towards plant-based diets. As previously mentioned consumers associate meat with good emotions, taste, and enjoyment. They also rate highly the convenience, versatility and nutritional value which is also one of the most important barriers of switching from a diet consisting of animal protein to plant-based protein (Pohjolainen *et al.,* 2015; Holm and Møhl, 2000).

Historically researchers have found that the relatively low price of meat compared to meat substitutes is also an important factor in the consumer decision process and often considered as a crucial barrier from switching from animal protein to plant-based protein diet (Hoek *et al.,* 2011; Kotler, Armstrong & Parment, 2011).

The high appreciation of meat, consumption routines and social surroundings are the main obstacles for consumers who are unwilling to implement changes in their diets (Pohjolainen *et al.,* 2015). Additionally, Holm and Møhl (2000) point out that some household types like families with children prioritize meats necessity for nutritional reasons. Vegetarian diet, on the other hand, is often viewed as tasteless and ill-nutritious, more so by males than females which is understandable considering that the frequency and the consumption amount of meat are larger for men than for

women (Pohjolainen *et al.,* 2015). A common understanding of the previous has also been linked with consumers with low educational background and older age groups (Lea and Worsley, 2003; Wyker and Davidson, 2010).

Limited knowledge about vegetarian diets, recipes, products and limited options of vegetarian foods outside the home as well as the widespread notion that vegetarian food preparation is difficult, have also been pointed out (Pohjolainen *et al.,* 2015; Salonen and Helne, 2012; Lea and Worsley, 2003). In other cases, consumers may have personal barriers like food neophobia, which is fear or reluctance towards tasting new foods (Hoek *et al.,* 2011).

# 2. RESEARCH METHOD AND ANALYSIS

In the third chapter, the conducted quantitative research will be analyzed. First the method will be introduced, second the most important findings will be brought out and analyzed and third, the conclusions shall be done based on the analysis. Finally, some propositions are made and important aspects to consider about Estonian consumers are pointed out.

## 2.1. Research method

As the world's population is growing at a fast pace and the demand for meat cannot be met without having major ecological damage to the environment, scientists are working on finding solutions for future generations. Changes from an omnivorous diet to a vegan diet or simply restricting ones meat consumption is getting more and more popular all around the world. (How many Adults...; Top Trends... 2017).

However, there have not been any prior researches directed to the Estonian consumer and their expectations and attitudes towards meat alternatives. Based on the prior the objective of the research is to find out what are the Estonian consumer expectations towards meat alternatives in terms of taste, texture, smell, and looks and what are the attitudes towards these meat alternative products.

Quantitative research was conducted in the form of an online questionnaire (Appendix 1.), which aimed to discuss various food-related consumer decision making factors and also included questions about respondents sociodemographic backgrounds. The data was gathered from consumers with various ranging diets including omnivores, vegans, pescatarians, pollotarians, lactovegetarians, ovo-vegetarians, etc. Depending on respondents dietary choice, omnivores questionnaire was one question shorter than for vegans or different types of meat consumption restrictors, as the author is interested in the duration of following the meat restrictive diet.

There were 3 omnivores who answered the question also, their answers were not taken into account for this specific question.

The online questionnaire was first tested on 4 people with different sociodemographic backgrounds and based on their feedback some changes were made. One of the questions was more clarified, for one of the questions an extra answer option was added and one completely new question was added.

The questionnaire was active during the following period 23.04.-26.04.2019 and it was shared on various Facebook groups (dedicated for vegans, food recipes, consumption of meat) and amongst friends and relatives. The author found it important to include people with different dietary views to get a better representation of Estonian consumers. The total respondent count was 317 filled out questionnaires. The questionnaire had multiple choice questions, statements with Likert scale and socio-demographic background questions which were marked required. The author also found it important to question the respondent's income per household member, because alternatives tend to be more expensive than the traditional product. Also, the author agreed with the supervisor's suggestion to let the respondents write their age in the form of a number, instead of giving them an age range. For that specific question, the respondent could not write anything else there besides a number format because the system would have shown an error there. Due to the set-up of the questionnaire, none of the responses had to be removed. The gathered samples of dietary selections are brought out in the following table 2.

Table 2. Sample structure based on dietary style and gender

| Diet group | Diet | Frequency | Percentage (%) | Male | Female | Other |
|---|---|---|---|---|---|---|
| 1 | Omnivore | 159 | 50,2 | 43 | 115 | 1 |
| 2 | Vegan | 80 | 25,2 | 7 | 71 | 2 |
| | Lacto vegetarian | 7 | 2,2 | 1 | 6 | - |
| 3 | Ovo vegetarian | 5 | 1,6 | - | 5 | - |
| | Ovo-Lacto vegetarian | 22 | 6,9 | - | 22 | - |
| | Pescatarian | 13 | 4,1 | - | 13 | - |
| 4 | Pollotarian | 3 | 0,9 | - | 3 | - |
| | Flexitarian | 28 | 8,8 | 1 | 27 | - |
| Total | | 317 | 100 | | | 317 |

Source: created by the author

The previous Table 2 shows that the number of lacto-, ovo-, ovo-lacto vegetarian diet followers was considerably small, as was the number of pollo-, and pescatarian diet followers and therefore they would not be reasonable for including them in a separate analysis. The author has decided to count together lacto-, ovo-, ovo-lacto vegetarians. Pescatarians and pollotarians will be grouped together with flexitarians. Four major diet groups were made (Table 2.) omnivores (159); vegans (80); lacto-, ovo-, ovo-lacto vegetarians (34) and pollo-, pesca-, flexitarians (44).

Even though this is a convenience and judgemental sampling we can assume that the distribution of different types of vegetarians in the sample represents the same logic as within the overall sample, meaning few pollotarians, pescatarians, lacto-, ovo-, and ovo-lacto vegetarians compared to omnivores, vegans, and flexitarians.

The average age was 33 years (with the youngest being 10, oldest 71; SD 11,98; median 31). The final sample consisted of 262 (82,6%) females, 52 (16,4%) males and 3 people (0,9%) who chose to answer „do not wish to specify/other". The share of females amongst different dietary styles was on average 88,9% and 10,3% of men.

Table 3 shows the age structure of the gathered sample. More than half of the respondents (74,1%) were under the age of 40, the age groups with the most respondents were 20-29 (32,8%) and 30-39 (30%). Respondents under 20 made up 11,4%, 40-49 age group 12%, 50-59 age group 11,7% and 60+ group 2,2%.

Table 3. The age structure of the sample

| Measure | Items | Frequency | Percentage (%) |
|---------|-------|-----------|----------------|
| Age | Under 20 | 36 | 11,4 |
| | 20-29 | 104 | 32,8 |
| | 30-39 | 95 | 30,0 |
| | 40-49 | 38 | 12,0 |
| | 50-59 | 37 | 11,7 |
| | 60 and up | 7 | 2,2 |
| Total | | 317 | 100 |

Source: created by the author

Household sizes of respondents (Table 4.) were as follows 63,4% (201) lived in a household consisting of 2-3 persons, 18,3% (58) lived alone, 17% (54) is a part of households consisting of 4-5 persons and 1,3% (4) are part of a 5 or more persons household.

Table 4. Household sizes of gathered sample

| Measure | Items | Frequency | Percentage (%) |
|---|---|---|---|
| Household | 1 person | 58 | 18,3 |
| | 2-3 persons | 201 | 63,4 |
| | 4-5 persons | 54 | 17,0 |
| | 5+ persons | 4 | 1,3 |
| Total | | 317 | 100 |

Source: created by the author

Table 5. shows the educational background of the gathered sample. More than half of the respondents 55,2% (175) had acquired higher education, 31,5% (100) had secondary education, 8,8% (28) had primary education and 4,4% (14) had vocational education.

Table 5. Education of gathered sample

| Measure | Items | Frequency | Percentage (%) |
|---|---|---|---|
| Education | Primary education | 28 | 8,8 |
| | Secondary education | 100 | 31,5 |
| | Vocational education | 14 | 4,4 |
| | Higher education | 175 | 55,2 |
| Total | | 317 | 100 |

Source: created by the author

According to the respondents, the income per household member (Table 6.) was as follows, 26,2% (83) marked it 1500 euros and over, 18,6% (59) marked it 1200-1499 euros, for 17% (54) it was 900-1199 euros and 14,2% (45) answered 600-899 euros. The income per household member up to 599 euros was selected by 9,8% (31) and 14,2% (45) respondents selected the option „do not wish to say".

Table 6. The income per household member of the gathered sample

| Measure | Items | Frequency | Percentage (%) |
|---|---|---|---|
| The income per household member (EUR/Month) | Do not wish to say | 45 | 14,2 |
| | up to 599€ | 31 | 9,8 |
| | 600-899€ | 45 | 14,2 |
| | 900-1199€ | 54 | 17,0 |
| | 1200-1499€ | 59 | 18,6 |
| | 1500 and over | 83 | 26,2 |
| Total | | 317 | 100 |

Source: created by the author

Occupation wise, the respondents can be divided into the following groups, 73,5% (233) are employed, 20,2% (64) are students either in primary, secondary or university level. Stay at home was selected by 3,5% (11) and currently unemployed are 1,3% (4) of the respondents. Parental leave was chosen by 0,9% (3) and pension by 0,6% (2) respondents.

Table 7. Occupation of gathered sample

| Measure | Items | Frequency | Percentage (%) |
|---|---|---|---|
| Occupation | Student | 64 | 20,2 |
| | Employed | 233 | 73,5 |
| | Stay at home | 11 | 3,5 |
| | Unemployed | 4 | 1,3 |
| | Pension | 2 | 0,6 |
| | Parental leave | 3 | 0,9 |
| Total | | 317 | 100 |

Source: created by the author

Upon making conclusions, it should be noted that the research sample is not representative of the Estonian consumers as a whole. The sample consists of mostly female respondents, with a large percentage being between age groups 20-29 and 30-39. In the next chapter the results will be presented and compared based on diet styles and in some cases for comparison analysed with prior research results on the same topic.

## 2.2. Research results

Amongst the respondents the average age of omnivores was 38 years (SD 12,2; min 10, max 71; median 34), for vegans its was 28 years (SD 8,8; min 15, max 55; median 27), lacto vegetarians 32 years (SD 9,3; min 20, max 48; median 31), ovo vegetarians 28 years (SD 7,5; min 20, max 36; median 24), ovo-lacto 25 years (SD 9,4; min 12, max 50; median 22), pescatarians 28 years (SD 8,9; min 14, max 50; median 28), pollotarians 35 years (SD 18,3; min 14, max 49; median 41) and for flexitarians the average age was 27 years (SD 10,2; min 11, max 55; median 27). Although the relatively lower average age of plant-based diet followers describes the gathered sample for this research, it may also reflect the idea confirmed in previous studies of plant-based diet followers relative youth. Below (Table 8.) derived from the sample also shows the tendency for animal protein and/or animal by-products restricting and/or excluding diets to decrease with age.

Table 8. Diet followers per age groups

| Diet style | Age group | | | | | | Total |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | up to 20 | 20-29 | 30-39 | 40-49 | 50-59 | 60+ | |
| Omnivore | 5 | 33 | 55 | 29 | 30 | 7 | 159 |
| Vegan | 14 | 38 | 21 | 3 | 4 | 0 | 80 |
| Lacto vegetarian | 0 | 3 | 3 | 1 | 0 | 0 | 7 |
| Ovo vegetarian | 0 | 3 | 2 | 0 | 0 | 0 | 5 |
| Ovo-Lacto vegetarian | 8 | 8 | 4 | 1 | 1 | 0 | 22 |
| Pescatarian | 2 | 8 | 2 | 0 | 1 | 0 | 13 |
| Pollotarian | 1 | 0 | 0 | 2 | 0 | 0 | 3 |
| Flexitarian | 6 | 11 | 8 | 2 | 1 | 0 | 28 |
| Total | 36 | 104 | 95 | 38 | 37 | 7 | 317 |

Source: created by the author

Connected with the previous, a question about the duration of the diet following was asked from all respondents except omnivores. Table 9 highlights that only one person has followed it their entire life, 6,3% (10) have followed it for more than 10 years, 15,2% (24) 6-10 years, 42,4% (67) of the respondents state that this is a 3-5 year process, 19,6% (31) have been following for 1-2 years and 15,8% (25) have followed just under a year. This again may just describe the sample that was gathered, however, it may also reflect the fact that the idea of plant-based diets or flexitarianism is relatively new concept amongst Estonian consumers.

Table 9. Duration of restrictive diet

| Duration | Age group | | | | | | Total |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | up to 20 | 20-29 | 30-39 | 40-49 | 50-59 | 60+ | |
| Entire life | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 10 + years | 0 | 2 | 4 | 4 | 0 | 0 | 10 |
| 6-10 years | 1 | 8 | 11 | 0 | 4 | 0 | 24 |
| 3-5 years | 9 | 35 | 17 | 3 | 3 | 0 | 67 |
| 1-2 years | 11 | 16 | 3 | 1 | 0 | 0 | 31 |
| under 1 year | 9 | 9 | 6 | 1 | 0 | 0 | 25 |
| Total | 31 | 70 | 41 | 9 | 7 | 0 | 158 |

Source: created by the author

The author wanted to know if and how many respondents amongst the sample have or have not tried any plant-based meat alternative products and the results were that 245 (77,3%) of the respondents have tried a plant-based meat alternative. No was chosen by 43 respondents (13,6%) out of them, 37 were omnivore diet followers, 5 flexitarians and one vegan diet follower. As a third option "Do not know/Do not remember" was chosen by 29 (9,1%) respondents, out of which 26 were omnivores, 2 ovo-lacto group member and only one vegan diet follower.

In the questionnaire's questions, 7-11 were presented as statements on a Likert scale and asked the respondents to rate how much they strongly disagree (1) or strongly agree (5) with them. The option „do not know" was also presented. The statements were derived from the Multidisciplinary Model of the Main Factors Affecting Consumer behaviour in a Food domain and addressed some of the key barriers that similar previous researches on meat alternatives had noted. Therefore question number 7 and 8 (12 statements) was about the psychological factors that influence consumer behaviour. Question 9 (6 statements) was about the marketing factors and question 10 (6 statements) was directed towards the sensory factors. Question 11 (6 statements) was added as an extra to understand the respondent's cognition towards their diet choices, how they perceive meat alternatives health-wise, and if the buying process of meat ever makes them think about the production process.

First, the results will be discussed in general including the whole sample. Later on, significant differences or similarities between various diet styles will be brought out.

### 2.2.1 Psychological factors

The twelve statements about psychological factors like attitude, risk, expectations, socio-cultural effects and lifestyle and values received the following results amongst the sample. The respondents who choose the option „do not know" are not counted for on this Table.10, therefore the column N shows the statement a specific number of respondents who answered between the scale of 1 (strongly disagree) to 5 (strongly agree).

Table 10. Psychological statements

| Statement | N | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|---|
| Meat consumption is a part of the Estonian culture | 308 | 1 | 5 | 3,88 | 1,355 |
| Meat is a versatile product to prepare, cook, and has good nutritional value | 315 | 1 | 5 | 2,93 | 1,564 |
| For me meat associates with pleasure, good taste and positive emotions | 315 | 1 | 5 | 2,54 | 1,564 |
| Plant based food is more like a side dish | 314 | 1 | 5 | 2,31 | 1,556 |
| Meat associates with status, strength, and masculinity | 313 | 1 | 5 | 1,63 | 1,090 |
| Vegan foods associate with weakness and femininity | 313 | 1 | 5 | 1,48 | 0,997 |

Source: created by the author

Meat consumption is a part of the Estonian culture was a statement agreed upon almost all respondents (x= 3,88). Comparing respondents answers based on dietary styles shows that omnivores agreed the most (x= 4,36), and vegans the least but still over average (x= 3,08). Based upon the gathered sample the author can see that consumers from different diet groups more or less agree with the statement.

Prior researches have highlighted that certain consumer groups highly appreciate meats versatility and convenience. Based on the gathered sample significant differences can be found amongst diet groups towards the statement „Meat is a versatile product to prepare, cook, and has good nutritional value", (x= 2,93). While vegans (x= 1,56) and ovo-lacto group disagreed with the statement the most, a growth trend can be seen amongst different animal protein consumers. Pollo-pesca-flexitarian (x= 2,27) and the most supportive of the statement, omnivores (x= 4,10). Upon checking the correlation between respondents dietary style and the perception of meat as a comfortable product to prepare and consume, the outcome was as expected- the more flexible the consumer's diet choice, the higher the rating of meats convenience and versatility (r=0,708).

Similarly to the previous result, the statement about meat association with pleasure (Figure 2.), good taste and positive emotions (x= 2,54) received the highest support from omnivores (x= 3,76). Other dietary groups however think the opposite, for pollo-pesca-flexitarians (x= 1,80), ovo-lacto group (x= 1,12) and vegans (x= 1,14). A strong correlation is present between the respondent's diet style and meats association with good taste and emotions (r=0,730), meaning the more food groups allowed in a diet, the higher the appreciation for meat and linking it with pleasure and good emotions.
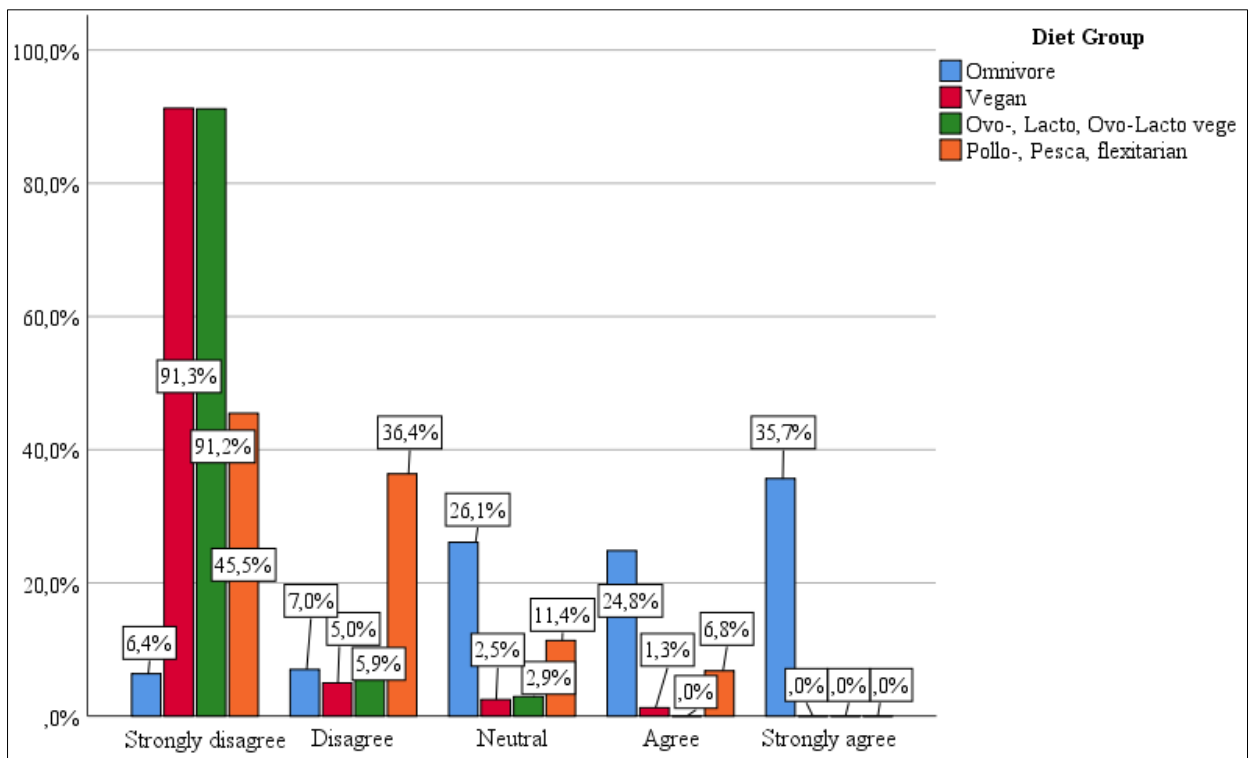
Figure 2. Meats association with pleasure, good taste, and positive emotions
Source: created by the author

The consumer perception about plant-based food being a side dish (x= 2,31) received significantly different ratings between diet groups. The less agreeing was ovo-lacto Group (x= 1) and vegans (x= 1,01) followed by pollo-pesca-flexitarian group evaluation of (x=1,48). Omnivores agreed the most and evaluated the statement the highest (x= 3,50) which was expected. A strong positive correlation was found between meats association with pleasure, good taste and emotions and perceiving plant-based food as a side dish (r= 0,806).

According to researchers meat has long been treated as a cultural object and associated with various symbolic meanings like masculine power and strength. Vegetarian foods have been labelled the opposite. This notion has been described in multiple types of research and based on findings considered as a strong barrier. Surprisingly based on the sample of this research, the following two statements "Meat associates with status, strength, and masculinity" and „Vegan foods associate with weakness and femininity" received similar results in each diet group (Figure 3.). Meat masculinity (x= 1,63) and vegan foods femininity (x=1,48) furthermore without any exception all diet groups disagree. These results may reflect the gender distribution of the sample (82,6%) females, (16,4%) of male respondents.
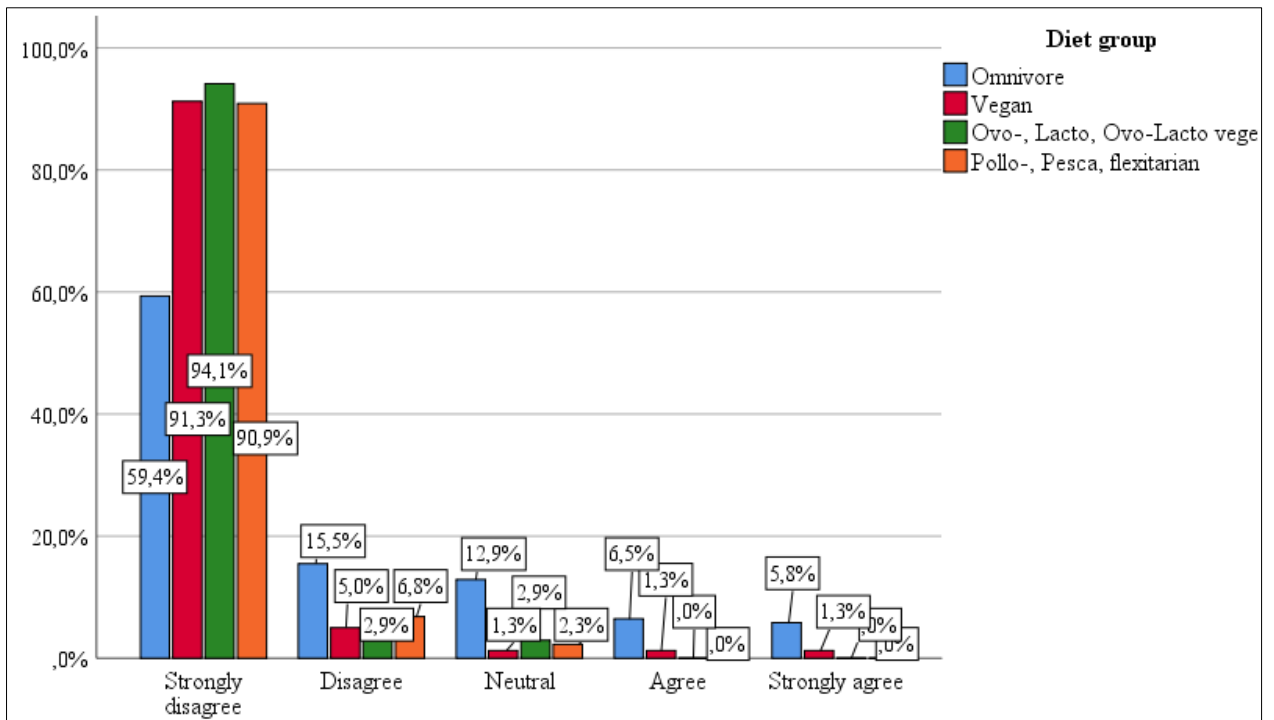
Figure 3. Vegan food feminity
Source: created by the author

The second block of psychological statements below (Table.11) is under the average, however differences amongst diet groups are present. There are not enough recipes that include the usage of meat alternatives (x= 2,58) was most agreed upon by the omnivore group (x= 3,10) followed by less agreeing pollo-pesca-flexitarian group (x= 2,72), ovo-lacto group (x= 2,63) and the least agreeing amongst the diet groups were vegans (x= 1,76), this opinion distribution amongst diet groups is not surprising.

Table 11. Psychological statements

| Statement | N | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|---|
| There are not enough recipes that include the usage of meat alternatives | 267 | 1 | 5 | 2,58 | 1,444 |
| I have insufficient knowledge about meat alternatives to change my diet | 303 | 1 | 5 | 2,46 | 1,550 |
| The preparation and usage of meat alternatives seems difficult | 279 | 1 | 5 | 2,30 | 1,397 |
| I would have difficulties changing my diet due to a family member | 309 | 1 | 5 | 2,20 | 1,427 |
| I do not like to try new things and / or tastes | 315 | 1 | 5 | 1,50 | 1,048 |
| I care about the opinions of my friends and/or family and they would not approve of such a dietary choice with meat alternatives | 307 | 1 | 5 | 1,39 | ,827 |

Source: created by the author

Insufficient knowledge about meat alternatives (x= 2,46) was the least agreed upon by vegans (x= 1,29) and most agreed by omnivores (x= 3,33). The author has found a significant correlation between the estimation of the availability of recipes and insufficient knowledge, therefore the less the respondent feels they have knowledge the more they agree that there are not enough recipes (r= 0,671).

Omnivores agreed the most with the statement „The preparation and usage of meat alternatives seem difficult" (x= 3,02) and vegans agreed the least (x= 1,42). Upon checking there is a strong positive correlation between the notion that there are not enough recipes including meat alternatives and the preparation/usage of meat alternatives is difficult (r= 0,694). This confirms the findings in previous researches that limited knowledge about products, recipes, etc. deepens the idea amongst consumers that vegetarian food preparation is difficult.

I do not like to try new things and/ or tastes (x= 1,50) was formulated as a statement due to it being identified as a consumer barrier in previous researches. Figure 4 shows that based on the research sample, food neophobia – fear or dislike in trying new foods, is not a problem amongst consumers.
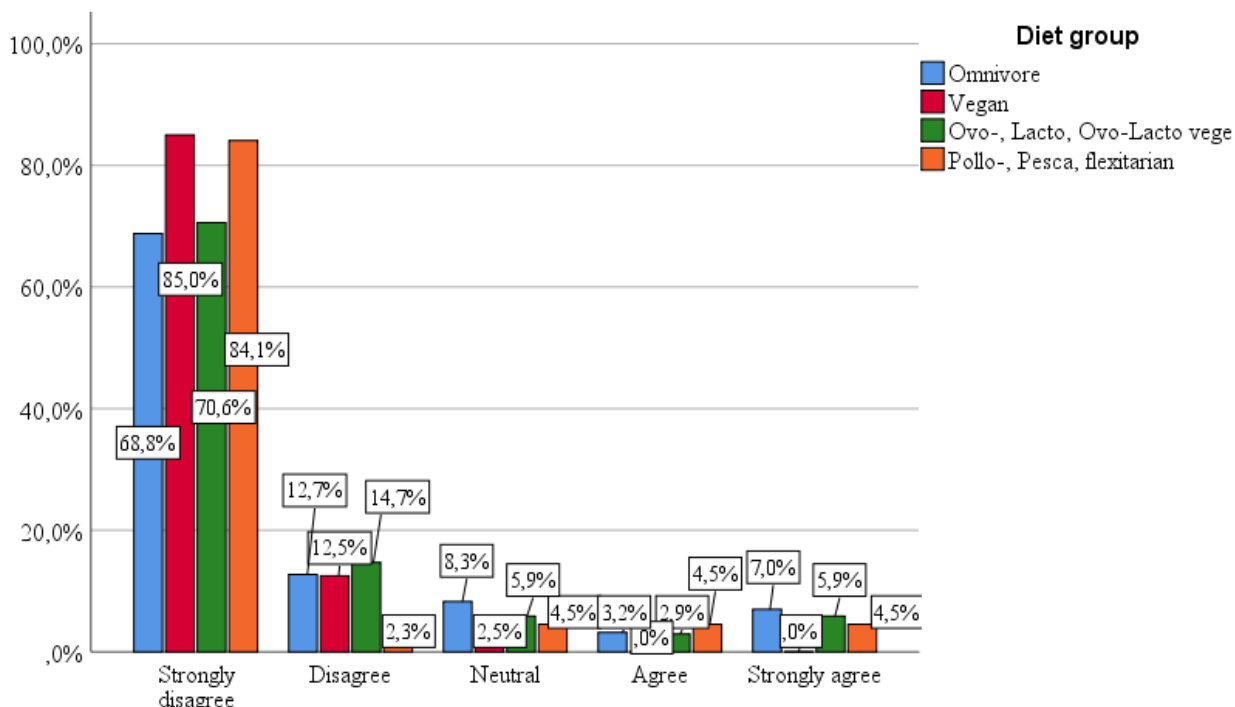


Figure 4. Food neophobia
Source: created by the author

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Previously conducted researches have found that habits and consumption routines are difficult to change especially for families with children. The statement „I would have difficulties changing my diet due to a family member" (x= 2,20), shows all means being below 3. The author could conclude that amongst Estonian consumers it is not an important barrier.

The statement „I care about the opinions of my friends and/ or family and they would not approve of such a dietary choice with meat alternatives" (x= 1,39), received the most common evaluation amongst all diet groups. The standard deviation (s= 0,827) is relatively small, meaning the answers are not located that far apart and there is little variation amongst the dietary groups.

Based on the gathered sample, the author can make the following conclusions about the psychological factors. All diet groups perceive meat as a part of the Estonian culture. The omnivore group stands out highly appreciating the meats versatility and preparation possibilities, therefore understandably they agreed the most with the statement that meat associates with pleasure and good emotions. The findings also indicate that omnivores feel they do not have sufficient knowledge about meat alternatives and therefore think the preparation of meat alternatives is difficult. Vegans and other dietary groups disagree that there is a lack of recipes. Compared with foundings from previous researches, the gathered sample of Estonian consumers do not perceive meat as a masculine product group and vegan foods as feminine, furthermore they do not agree with the fact that their decisions as a consumer are influenced by friends or family.

## 2.2.2 Marketing factors

The statements about marketing factors like price, label, brand, and availability received the following results amongst the sample. The respondents who choose the option „do not know" are not counted for on this Table 12, therefore the column N shows for each statement a specific number of respondents who answered between the scale of 1 (strongly disagree) to 5 (strongly agree).

Table 12. Marketing statements

| Statement | N | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|---|
| Media campaigns in Estonia are directed to increasing meat consumption | 276 | 1 | 5 | 4,05 | 1,275 |
| Meat alternatives are too expensive | 241 | 1 | 5 | 3,61 | 1,125 |
| There is not enough information on meat alternatives | 279 | 1 | 5 | 3,30 | 1,342 |
| Meat alternatives are not easily available at my home store | 260 | 1 | 5 | 3,29 | 1,363 |
| Estonian grocery shops do not sell meat alternatives that meet my expectations | 246 | 1 | 5 | 3,11 | 1,294 |
| Including a recipe on the package of the meat alternative would increase the chance of me buying it | 284 | 1 | 5 | 2,98 | 1,498 |

Source: created by the author

Media campaigns in Estonia are directed to increasing meat consumption was the most agreed upon statement amongst all respondents (x= 4,05). Comparing respondents answers based on dietary styles shows that vegans agreed the most (x= 4,49), and omnivores the least but still considerably over average (x= 3,71). Based upon the gathered sample the author can see that consumers from different diet groups agree with the statement. This may also be related to the previously discussed psychological statement "Meat is a part of Estonian culture" and how the consumers perceive their culture.

The cost of meat alternatives has historically been found as an important factor in the consumer decision process and a crucial barrier in switching between diets. The statement about meat alternatives being too expensive (x= 3,61), showed similar results amongst all diet groups. However looking at the number of omnivore diet followers responses 91 (57,23%), may indicate that meat alternatives are still a relatively unknown product segment for that diet group.

Insufficient information on meat alternatives (x= 3,30) showed a quite predictable difference between diet groups. Vegans agreed the least (x= 2,49), followed by the ovo-lacto group (x= 2,88), pollo-pesca-flexitarian group with an over average (x= 3,30) and omnivores agreed the most (x= 3,87). Diet groups who do not consume any animal protein possess more knowledge on alternative products, whereas omnivores or diets that limit only certain animal proteins have a knowledge deficit barrier.

The statement about meat alternatives being not easily available at the respondents home store (x=3,29), shows uniform perceptions amongst diet groups. However, looking at additional data

from questionnaires question 6 about respondents grocery shopping habits, 94,6% do their purchases in big supermarkets, 4,7% alternate between small shops and supermarkets and only 0,6% do their purchases in small grocery shops. Based on the sample this points out that the availability problem is not directly related to small grocery stores. Therefore insufficient product availability is connected with big supermarkets.

Estonian grocery shops do not sell meat alternatives that meet my expectations (x= 3,11), does not show significant differences between most of the diet groups, with only the exception of vegan diet followers (x= 2,82). However as they are the restrictors of all animal-proteins, the result is not surprising.

According to previous researches, including a recipe on the package of the meat alternative influenced consumer buying behaviour positively. Based on the gathered sample the respondents were mostly neutral (x= 2,98) towards the recipe influencing their buying behaviour. Interestingly, omnivores agreed the most (x= 3,27) and vegans the least (x= 2,45). The conducted t-test shows that these results are statistically different (p< 0,05).

In summary about marketing statements, the results were mostly similar with some differences between diet groups. Estonian consumer awareness towards meat alternatives needs work, the media campaigns should be diversified and grocery stores product range should be checked. Including recipes on packages might positively influence consumers buying behaviours especially omnivores and help them overcome the unfamiliarity barrier.

### 2.2.3 Sensory factors

Sensory factors (Table 13.) include different product-specific attributes like visual appearance, texture, flavor, odor. As the field of meat alternatives is still developing, consumers expectation towards the end products could give valuable insight into the development process. The respondents who choose the option „do not know" are not counted for on these results, therefore the column N shows per each statement the specific number of respondents who answered between the scale of 1 (strongly disagree) to 5 (strongly agree).

Table 13. Sensory statements

| Statement | N | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|---|
| It must be possible to prepare the meat alternative in different ways (cooking, frying, baking in the oven, etc.) | 283 | 1 | 5 | 3,77 | 1,319 |
| The taste of the meat alternative must be similar to that of meat of animal origin | 299 | 1 | 5 | 2,94 | 1,466 |
| Meat alternative texture should resemble animal protein | 294 | 1 | 5 | 2,78 | 1,451 |
| The odor of the meat alternative must be similar to that of meat of animal origin | 296 | 1 | 5 | 2,38 | 1,421 |
| Meat alternative should look the same as animal protein | 295 | 1 | 5 | 2,25 | 1,303 |
| For me, it is important that the meat alternative remains red ("bloody") in the centre, like the meat of animal origin | 291 | 1 | 5 | 1,44 | ,939 |

Source: created by the author

Out of sensory factors, the statement regarding meat alternatives preparation options was rated the highest (x= 3,77). Results (Figure 5.) in terms of dietary groups were as follows. Omnivores agreed the most giving this factor the highest (x= 4,04) rating. This factor was also important for pollo-pesca-flexitarian diet group (x= 3,74) which is as expected, as they along with omnivore group are the two who consume meat or animal-proteins in some kind of form. No significant connections were found by the author when the correlation analysis was conducted.
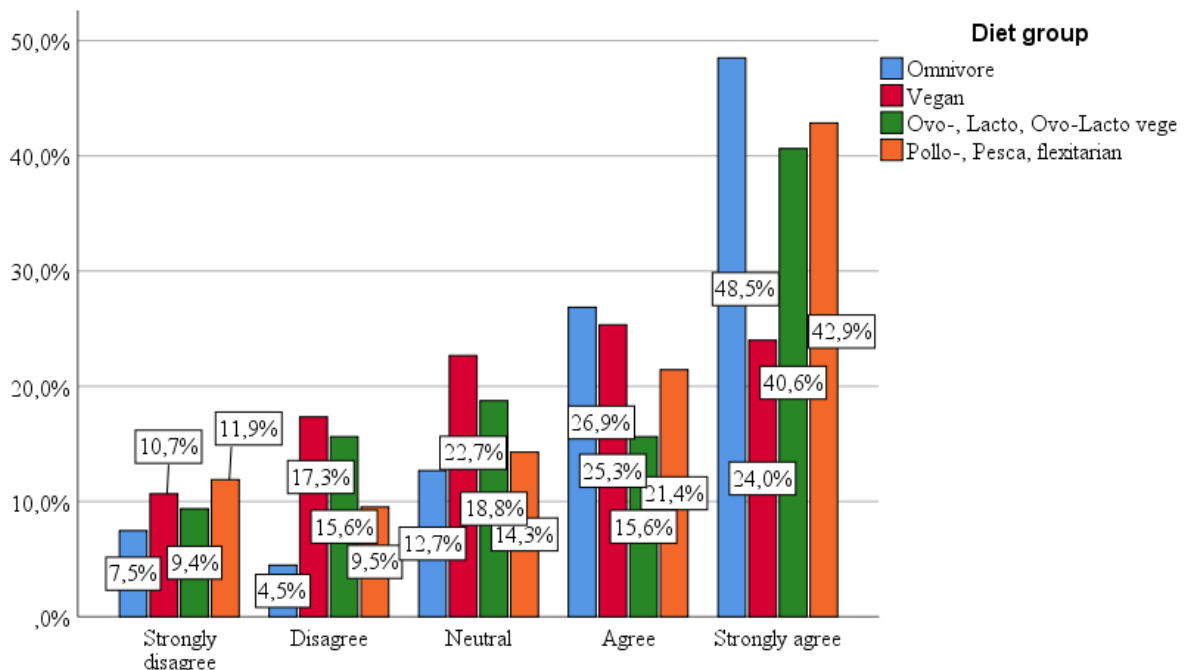


Figure 5. Meat alternative different preparation possibilities
Source: created by the author

The second statement was about the taste of the meat alternative having to be similar to real animal protein (x= 2,94). Highest rating for this factor (x= 3,33) is from the omnivore group, all other dietary groups evaluated it below three.

Meat alternative texture should resemble animal protein was rated third (x= 2,78), this is not as high as the author expected. Prior researchers have evaluated this factor to be really influential in making consumer decisions, furthermore, the first meat alternatives did have poor texture and therefore failed to gain consumer acceptance.

The odor of the meat alternative must be similar to that of meat of animal origin was rated fourth (x= 2,38). The smell of raw meat is not anything to crave for, however, this is one of the first sensory factors that tell the consumer if the product is fresh or not. The odor of cooked meat is one of the sensory factors omnivores enjoy. Interestingly this sensory factor also received lower scores than the author expected. Amongst diet groups, omnivores scored the highest (x= 2,88), which was expected, however, the mean is below average. Other diet groups scaled it even less which is understandable considering their goal is to avoid animal protein.

The statement „Meat alternative should look the same as animal protein" (x= 2,25). The overall low mean of the statement indicates that the sample as a whole seems to agree that this is not as important of a factor for meat alternatives.

Finally keeping in mind the Beyond Meats strategy of adding in their burger patty some beetroot juice, to imitate the redness of meat and create the „bleeding" effect. The statement „For me, it is important that the meat alternative remains red ("bloody") in the centre, like the meat of animal origin" was created. The statements mean was the lowest within the sensory factors (x= 1,44) and the standard deviation was also low (s= 0,939).

The statements for sensory factors may have had quite low means and a uniform appearance but the correlation analysis exposed that most of the factors have a significant positive correlation. The correlation between the look of the meat alternative and the texture of meat alternative is (r= 0,774) meaning the more similar the look of the meat alternative to animal protein, the more similar the texture of meat alternative to animal protein. The correlation between the look of the meat

alternative and the taste of meat alternative is (r= 0,689) meaning the more similar the look of the meat alternative to animal protein, the more similar the taste of meat alternative to animal protein. The look of the meat alternative and the odor of meat alternative correlate at (r= 0,704) meaning the more similar the look of the meat alternative to animal protein, the more similar the odor of meat alternative to animal protein.

The correlation between the texture of the meat alternative and the taste of meat alternative is (r= 0,799) so the more similar the texture of the meat alternative to animal protein, the more similar the taste of meat alternative to animal protein has to be. There was also a correlation between the sensory factor texture and odor (r= 0,696), the more similar the texture, the more similar the odor of the meat alternative. The final sensory factor correlation was between taste and odor (r= 0,795), the more similar the taste, the more similar the odor of the meat alternative to animal protein.

Table 14. Correlations between sensory factors

|  | Alter. look similar to meat | Texture similar to meat | Taste similar to meat | Odor similar to meat |
|---|---|---|---|---|
| Alter. look similar to meat | 1 | **,774**[**] | **,689**[**] | **,704**[**] |
| Texture similar to meat | **,774**[**] | 1 | **,799**[**] | **,696**[**] |
| Taste similar to meat | **,689**[**] | **,799**[**] | 1 | **,795**[**] |
| Odor similar to meat | **,704**[**] | **,696**[**] | **,795**[**] | 1 |

Source: created by the author

In conclusion, sensory factors definitely play a huge part in the consumer decision process and the success of the meat alternative as a product. Highly appreciated amongst the sample as a whole is the ability to prepare and cook the meat alternative in different ways, as animal protein can be prepared. Interestingly the sensory appearance factor of meat alternative remaining red inside after it is cooked, which is one of the sales arguments for the previously discussed Beyond Burger, is not expected by any of the dietary groups of the gathered sample.

## 2.2.4 Additional factors

With the additional factors (Table 15.) the author wanted to understand the Estonian consumer's perceptions of their consumer behaviour and their evaluation of their choices as a consumer.

Table 15. Consumer self-assessment

| Statements | N | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|---|
| For me, the welfare of all animals (including livestock) is important | 309 | 1 | 5 | 4,28 | 1,032 |
| I wish to preserve nature as much as I can with my lifestyle | 304 | 1 | 5 | 4,24 | 1,058 |
| I think my dietary choices will contribute to making the world more sustainable | 289 | 1 | 5 | 3,84 | 1,271 |
| Meat alternatives are good for my health | 266 | 1 | 5 | 3,14 | 1,230 |
| It is not possible to find equivalent substitution for animal meat | 299 | 1 | 5 | 2,45 | 1,616 |
| When buying and consuming meat, I don't think about how meat is produced | 301 | 1 | 5 | 2,33 | 1,502 |

Source: created by the author

Based on the gathered sample animal welfare is really important amongst Estonian consumers (x= 4,28). Diet groups that restrict or avoid animal protein scored as follows: vegans (x= 4,94), pollo-pesca-flexitarian group (x= 4,71), ovo-lacto group (x= 4,65). This is not surprising, as previous studies have found the main motivators behind choosing these diets to be ethical. However, the score amongst the omnivore diet group (x= 3,73) surprised the author. This might be related to one of the other statements "When buying and consuming meat, I don't think about how meat is produced" the mean for this is quite low (x= 2,33) but it is due to the restrictive and avoiding diet groups. Omnivores answers to this statement (x= 3,33) show that they tend to not think about how meat is produced when they buy and consume it, therefore they may not link their consumer behaviour to be against the welfare of livestock and other animals. There is a strong correlation (r= 0,660) between associating meat with pleasure, good taste and positive emotions and not thinking about meat production when buying or consuming, meaning the more the consumer rates the enjoyment the less they think about the production. The author also found a negative correlation (r= -0,512) between dietary choice and prioritizing animal welfare, meaning that the more flexible the diet, the less relevant animal welfare is to the respondent.

The samples wish to preserve nature as much as they can with their lifestyle (x= 4,24). Rated highest amongst vegans (x= 4,86), ovo-lacto group (x= 4,71), pollo-pesca-flexitarian group (x= 4,59). Omnivores scaled it (x= 3,68), which is again higher than the author expected. This may be a representation of the gathered sample or be related to the restrictive and avoiding dietary groups knowledge about the meat production impact on the environment and therefore the lack of knowledge from omnivores side. The author found a negative correlation (r= -0,502) between the

statements associating meat with pleasure and good emotions and wishing to preserve nature with lifestyle choices- the more the respondent associates meat with pleasure, good taste and positive emotions the less they agreed with wishing to preserve nature with their lifestyle choices.

Respondents perceptions of their dietary choices contributing to making the world sustainable (x= 3,84). Rated high (between 4,09- 4,86) by all restrictive and avoiding diet groups and by omnivores the result is neutral (x= 3,00). Multiple correlations were found:

- The more flexible the diet, the less sustainable the diet choice (r= -0,602)
- The more animal-protein is consumed, the less sustainable the diet choice (r= -0,544)
- The more sustainable the diet choice, the bigger the wish to preserve nature through lifestyle choices (r= 0,709)

Statement "Meat alternatives good for my health" (x= 3,14), received different results amongst diet groups. This was most agreed upon by pollo-pesca-flexitarian group (x= 3,74), followed by ovo-lacto group (x= 3,57) and then vegans (x= 3,22). The lowest rate was by omnivores (x= 2,75) which is not surprising considering they were the ones who felt they had the least information knowledge about meat alternatives. It is important to understand that you can be a vegan and make unhealthy choices as there are multiple different reasons behind for choosing a vegan diet and health is not always the main motivator, many consumers just follow the diet due to ethical reasons. The conducted t-test shows that these results are statistically different (p< 0,05).

Respondents opinion on the statement "It is not possible to find an equivalent substitution for animal meat" (x= 2,45). Most agreed by omnivores (x= 3,51). Other dietary groups rated below neutral pollo-pesca-flexitarian group (x= 2,05), ovo-lacto group (x= 1,29) and vegans (x= 1,25). The statement had multiple positive correlations with factors related to meat enjoyment, convenience and meat consumption which explains omnivores score.

In conclusion, the perceptions of consumers about their own consumer behaviour vary between diet groups. Restrictive and avoiding diet followers wish to preserve nature through their lifestyle choices, while omnivores understand that their flexible diet is less sustainable. Even though animal welfare is important amongst all diet groups, omnivores admitted to not thinking about how meat is produced when they buy and consume it.

**2.2.5 Consumption of meat and meat alternatives**

Finally, the author wanted to see if based upon this sample relations can be found between meat consumption and level of education. Table 16 shows that there is a tendency between higher education and higher meat consumption which is the opposite of previous studies. Out of the sample 40,7% do not consume meat, 19,9% consume 3-4 times a week, 15,5% consume daily, 8,5% consume 1-2 times a week, 8,2% consume 5-6 times a week and 7,3% consume seldom.

Table 16. Consumption of meat (on the average week)

| Times per week | Education | | | | Total |
| --- | --- | --- | --- | --- | --- |
| | Primary education | Secondary education | Vocational education | Higher education | |
| Do not consume meat | 19 | 40 | 5 | 65 | 129 |
| Consume seldom | 3 | 8 | 0 | 12 | 23 |
| 1-2 times per week | 2 | 11 | 0 | 14 | 27 |
| 3-4 times per week | 3 | 16 | 5 | 39 | 63 |
| 5-6 times per week | 1 | 7 | 1 | 17 | 26 |
| Daily | 0 | 18 | 3 | 28 | 49 |
| Total | 28 | 100 | 14 | 175 | 317 |

Source: created by the author

Upon checking the correlation between respondents dietary style and frequency of meat consumption, the outcome was as expected, meaning the more flexible the diet, the more frequent the meat consumption (r= 0,816).

Based on the gathered sample, the author also wished to know the consumption of meat alternatives on the average week. Only 1,3% of the sample consumes meat alternatives daily or 5-6 times per week and 32,8% say they do not consume meat alternatives. This may be a representation of the gathered sample, or it may reflect the consumer's knowledge gap that was discussed before.

**2.2.6 Alternative proteins**

In the theory part, the author brings up that some researchers argue that the key to avoiding further ecological damage and meeting the increasing demand is in vitro meat. There are multiple concerns and barriers towards the "clean meat" and the author wanted to see what the gathered samples attitudes towards it are. The results shown in figure 6 based on dietary groups are quite similar. Out of the respondents, 42,6% think it is interesting and would agree to try, 29,7% think it is unnatural and they would not like to try and 27,8% cannot say.
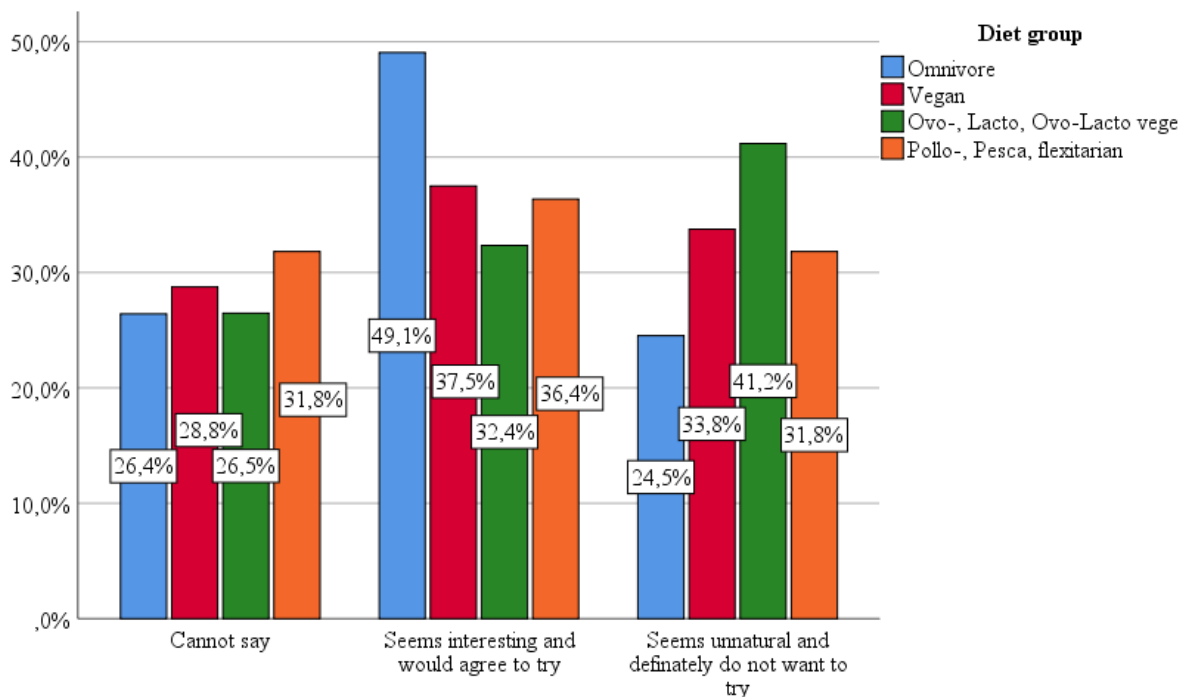


Figure 6. In vitro meat
Source: created by the author

Aside from the previous many believe that edible insects are the sustainable alternative to meat and the best answer to the rising problem. Researchers have found that insects often cause the feeling of disgust amongst consumers, however when they are not visible inside a food, the consumer would be more likely to try it. The results shown in figure 7 based on dietary groups are quite different. Out of the respondents 43% think it is disgusting and would not want to try, 22,4% think it is interesting and would agree to try, 17,8% would agree only if not visible in food and 16,7% cannot say.
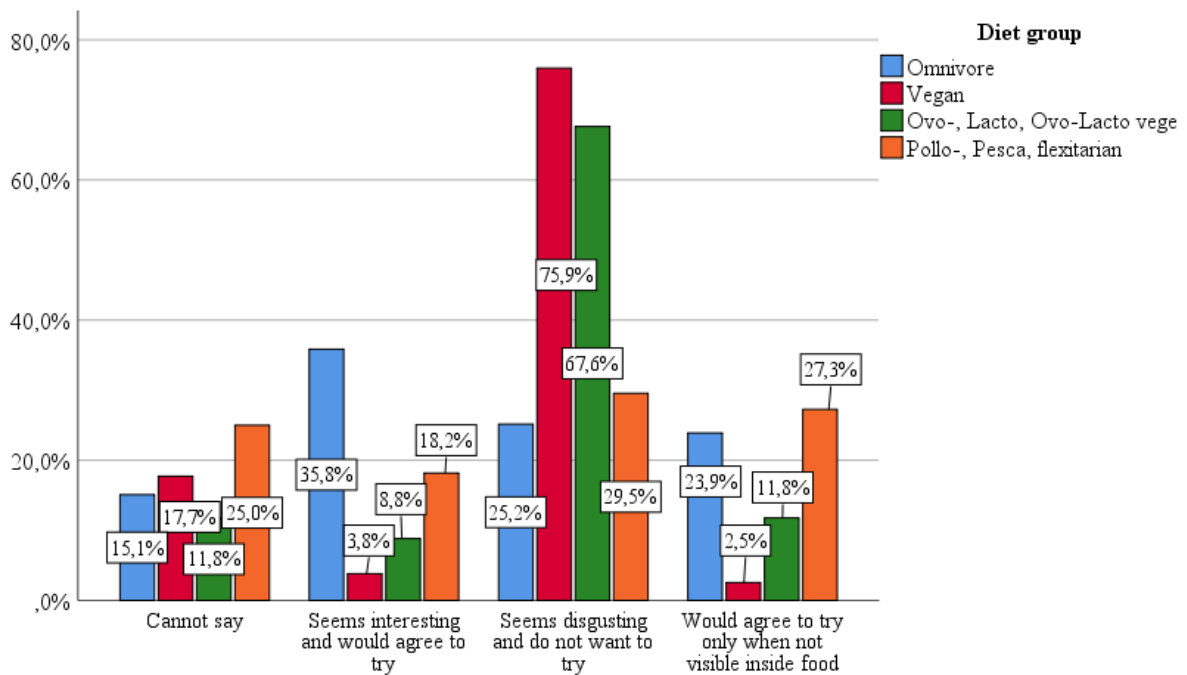
Figure 7. Edible insects
Source: created by the author

It is important to mention that a few vegans pointed out, that they do not want to try because insects are alive creatures and they do not wish to kill anything and not because they think insects are disgusting. The author understands that for this question one extra answer options should have been presented.

It is safe to say that from alternative protein perspective consumers opinions are divided and more thorough research should be conducted.

# CONCLUSION

The purpose of this research was to find out, what are the different individual and environmental factors affecting consumer behaviour towards meat alternatives and are Estonian consumers willing to change their consumption habits towards a more sustainable choice. The thesis objective was also to find out what product-specific factors affect consumer behaviour towards meat alternatives in terms of taste, texture, odor, and appearance.

Based on the gathered sample, the restrictive or excluding diet followers are relatively young and the duration of their diet following (highest results were 3-5 years and 1-2 years) this may reflect the fact that the idea of plant-based diets or flexitarianism is a relatively new concept amongst Estonian consumers.

Results of the research were in parts what the author expected and parts of it were surprising. As expected from the theory the Multidisciplinary Model of the main factors affecting consumer behaviour in a food domain (Font-i-Furnols & Guerrero, 2014) the consumer behavivour is affected by multiple interrelated factors as the analysis showed correlations between them. Surprisingly Estonian consumers are not influenced by their peers nor by their family, furthermore, their diet choices are not limited due to family members. Authors Pohjolainen *et al.,* 2015; Grauerholz, 2008; Fiddes, 1991; Mennell, 1985; Twigg, 1983 brought out that historically meat has been associated with masculine power and status, in the current study meat masculinity and vegan food femininity was strictly disagreed upon by every diet group. Food neophobia, the fear of trying new foods, a barrier brought out in many previous studies was not evident amongst the gathered sample.

The barriers towards consuming meat alternatives are socio-cultural, related to product and information availability, and sensory appreciation of meat as a versatile product. The gathered sample shows that all diet groups perceive meat as a part of the Estonian culture. Omnivores more than vegans feel they do not have enough information on meat alternatives. The previous is also

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related to the perception amongst all diet groups that media campaigns in Estonia are directed to increasing meat consumption.

The results showed that almost all consumers, no matter their diet group, consider the welfare of all animals (including livestock) to be important. Results showed, however, that omnivores tend to not think about how meat is produced when consuming it. In general, the respondents are aware of the environmental problems of animal farming, restrictive diet followers more than omnivores which explain the strong negative correlation that the more flexible the diet, the less sustainable the diet choice.

There are some limitations to the generalization of this study. The population is not representative of Estonian consumers as a whole, therefore it can not be generalized. What the author noticed after joining a Facebook group directed to vegans, to share the questionnaire, is that the vegan society is very supportive of one another and they work hard on spreading the word to educate people and reduce animal suffering. The author was pleased to get a sample consisting of different dietary groups.

To help consumers overcome the barriers, the author proposes to focus on creating more diverse media campaigns and not only focus on the consumption of meat. Info about meat alternatives should be easily available to all consumers. Increasing consumer awareness about meat alternatives through introducing interesting recipes will also help to overcome the unfamiliarity barrier that vegetarian food preparation is difficult. For meat alternative product development it should be kept in mind that out of sensory aspect the ability to prepare the meat alternative in multiple ways (cooking, frying, baking in the oven, etc.) was most expected by the gathered sample. Interestingly meat like texture for meat alternatives has been reported to be important in previous studies but the gathered sample of Estonian consumers did not find it as important.

Further research can and definitely must be done as this field is still new and undiscovered, furthermore, it would be interesting to test various diet groups reactions to different kinds of meat alternatives already available in the Estonian market.

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# APPENDICES

## Appendix 1. Questionnaire

## Factors affecting consumer behaviour towards meat alternatives in Estonia

Dear Respondent

Please take time to fill in this anonymous questionnaire, which aims to get information about the different individual and environmental factors affecting consumer behaviour towards meat alternatives. The survey is conducted as a part of a Master's thesis and the data obtained is only used in generalized form.

In the survey, the term meat alternative is used which means a product of plant origin that attempts to mimic the taste, texture of meat and therefore be a suitable replacement for animal protein. The study does not consider chickpea cutlets, falafel or other vegetarian foods to be meat alternatives.

Filling in the questionnaire is easy and takes about 10 minutes. Your answers are important because they contribute to the success of the research, the result of which can be a valuable input to the development of meat alternatives.

Please take the time to reply before April 26, 2019.

Thank you for your help and dedicated time!

Mirjam Montvila
Tallinn University of Technology
e-mail: mmontvila@gmail.com

* Required

1. **What are your dietary habits / diet style? (choose one)** *
   *Mark only one oval.*

   ◯ Omnivore (eats everything including animal protein, animal by-products and plants)

   ◯ Fruitarian (eats berries, fruits, seeds and nuts)

   ◯ Vegan (abstaining from the consumption of animal protein and all animal by-products)

   ◯ Lacto Vegetarian (plant-based diet with the addition of dairy)

   ◯ Ovo Vegetarian (plant-based diet with the addition of eggs)

   ◯ Lacto-ovo Vegetarian (plant-based diet with the addition of dairy and eggs)

   ◯ Pescatarian (plant-based diet and fish)

   ◯ Pollotarian (plant-based diet and poultry)

   ◯ Flexitarian (mostly plant-based diet with the occasional consumtion of meat and other animal proteins)

2. **How long have you followed a restrictive diet?**
   Omnivores, please skip this question
   *Mark only one oval.*

   ◯ All my life

   ◯ More than 10 years

   ◯ 6-10 years

   ◯ 2-5 years

   ◯ 1-2 years

   ◯ Under a year

3. **Have you ever tried any plant-based meat alternative products?** *
*Mark only one oval.*

- ⭕ Yes
- ⭕ No
- ⭕ Do not know/ do not remember

4. **Do you and if so, how often do you consume meat alternatives? (on the average week)** *
*Mark only one oval.*

- ⭕ I do not consume meat alternatives
- ⭕ Consume seldom
- ⭕ 1-2 times
- ⭕ 3-4 times
- ⭕ 5-6 times
- ⭕ Daily

5. **Do you and if so, how often do you consume meat? (on the average week)** *
*Mark only one oval.*

- ⭕ I do not consume meat
- ⭕ Consume seldom
- ⭕ 1-2 times
- ⭕ 3-4 times
- ⭕ 5-6 times
- ⭕ Daily

6. **Generally I do my grocery shopping** *
*Check all that apply.*

- ☐ Big supermarkets (Selver, Rimi, Maxima, Coop, Prisma etc.)
- ☐ Small grocery store (not part of a retail store chain)

7. **Please rate the following statements on a scale of 1 (don't agree at all) to 5 (I fully agree)** *
*Mark only one oval per row.*

|  | 1 | 2 | 3 | 4 | 5 | Can not tell |
|---|---|---|---|---|---|---|
| Meat consumption is a part of the Estonian culture | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ |
| Meat associates with status, strength, and masculinity | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ |
| Vegan foods associate with weakness and femininity | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ |
| Plant based food is more like a sidedish | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ |
| For me meat associates with pleasure, good taste and positive emotions | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ |
| Meat is a versatile product to prepare, cook, and has good nutritional value | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ |

8. **Please rate the following statements on a scale of 1 (don't agree at all) to 5 (I fully agree)** *

*Mark only one oval per row.*

|  | 1 | 2 | 3 | 4 | 5 | Can not tell |
|---|---|---|---|---|---|---|
| I have insufficient knowledge about meat alternatives to change my diet | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| There are not enough recipes that include the usage of meat alternatives | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| The preparation and usage of meat alternatives seems difficult | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| I would have difficulties changing my diet due to a family memeber | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| I care about the opinions of my friends and / or family and they would not approve of such a dietary choice with meat alternatives | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| I do not like to try new things and / or tastes | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |

9. **Please rate the following statements on a scale of 1 (don't agree at all) to 5 (I fully agree)** *

*Mark only one oval per row.*

|  | 1 | 2 | 3 | 4 | 5 | Can not tell |
|---|---|---|---|---|---|---|
| Meat alternatives are too expensive | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| Meat alternatives are not easily available at my home store | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| There is not enough information on meat alternatives | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| Estonian grocery shops do not sell meat alternatives that meet my expectations | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| Including a recipe on the package of the meat alternative would increase the chance of me buying it | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| Media campaigns in Estonia are directed to increasing meat consumption | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |

10. **Please rate the following statements on a scale of 1 (don't agree at all) to 5 (I fully agree)** *
*Mark only one oval per row.*

|  | 1 | 2 | 3 | 4 | 5 | Can not tell |
|---|---|---|---|---|---|---|
| Meat alternative should look the same as animal protein | ○ | ○ | ○ | ○ | ○ | ○ |
| Meat alternative texture should resemble animal protein | ○ | ○ | ○ | ○ | ○ | ○ |
| The taste of the meat alternative must be similar to that of meat of animal origin | ○ | ○ | ○ | ○ | ○ | ○ |
| The odor of the meat alternative must be similar to that of meat of animal origin | ○ | ○ | ○ | ○ | ○ | ○ |
| For me, it is important that the meat alternative remains red ("bloody") in the centre, like meat of animal origin | ○ | ○ | ○ | ○ | ○ | ○ |
| It must be possible to prepare the meat alternative in different ways (cooking, frying, baking in the oven, etc.) | ○ | ○ | ○ | ○ | ○ | ○ |

11. **Please rate the following statements on a scale of 1 (don't agree at all) to 5 (I fully agree)** *
*Mark only one oval per row.*

|  | 1 | 2 | 3 | 4 | 5 | Can not tell |
|---|---|---|---|---|---|---|
| I think my dietary choices will contribute to making the world more sustainable | ○ | ○ | ○ | ○ | ○ | ○ |
| Meat alternatives are good for my health | ○ | ○ | ○ | ○ | ○ | ○ |
| I wish to preserve nature as much as I can with my lifestyle | ○ | ○ | ○ | ○ | ○ | ○ |
| For me, the welfare of all animals (including livestock) is important | ○ | ○ | ○ | ○ | ○ | ○ |
| When buying and consuming meat, I don't think about how meat is produced | ○ | ○ | ○ | ○ | ○ | ○ |
| It is not possible to find equivalent substitution for animal meat | ○ | ○ | ○ | ○ | ○ | ○ |

12. **If and how often do you plan to consume meat alternatives in the future? (provided the product meets your expectations in criteria such as availability, price, taste, odor, texture, appearance)** *
*Mark only one oval.*

|  | 1 | 2 | 3 | 4 | 5 |  |
|---|---|---|---|---|---|---|
| Never | ○ | ○ | ○ | ○ | ○ | Daily |

13. **Would you be up for trying and if suitable consuming in vitro meat (clean meat)?** *
*Mark only one oval.*

○ Sounds interesting and I would be interested in trying

○ Seems unnatural and would not like to try

○ Can not tell

14. According to the latest data, there are over 2111 different species of edible insects in the world. Would you be willing to try / consume them as a replacement for meat protein? *
*Mark only one oval.*

◯ Sounds interesting and I would be interested in trying

◯ Seems disgusting and would not like to try

◯ I would only be willing to try if they are not visible in the food so grinded up (smoothie, cookie, cake, cutlet, etc.)

◯ Can not tell

15. Your gender *
*Mark only one oval.*

◯ Female

◯ Male

◯ Do not wish to publish / other

16. Your age (in the form of a number like: 31) *

_____

17. Occupation *
*Mark only one oval.*

◯ Student

◯ Employee

◯ Stay at home

◯ Unemployed

◯ Pension

◯ Other: _____

18. Your highest level of education *
*Mark only one oval.*

◯ Primary education / primary education acquisition

◯ Vocational education

◯ Secondary education

◯ Higher education

19. The size of your household group *
*Mark only one oval.*

◯ 1 person

◯ 2-3 persons

◯ 4-5 persons

◯ more than 5 persons

20. **Average monthly net income per household member (after tax)** *
*Mark only one oval.*

- ⬭ upto 599 €
- ⬭ 600 - 899 €
- ⬭ 900 - 1199 €
- ⬭ 1200 - 1499 €
- ⬭ 1500 € or more
- ⬭ Do not wish to publish

21. **Would you like to add something else?**

_____

_____

_____

_____

_____