

Studying regional differences in consumer attitudes towards meat consumption in Finland: is the direction sustainable?

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Abstract <p>The aim of the thesis was to find out if there were any remarkable differences between different regions in Finland in consumer attitudes towards sustainable meat consumption. There is no former research found on this topic. Another aim of the thesis was to clarify the differences in meat consumption habits and attitudes in general, so that the direction of meat consumption could be understood better. This thesis was assigned by World Wildlife Fund (WWF) Finland. The base of the research was the data already collected by a survey by Kantar TNS Agri Oy for WWF Finland on the attitudes towards sustainable meat consumption.</p> <p>In the theoretical framework a sustainable food system, how meat production affects the environment and climate, how much meat is produced and consumed in Finland and how the role of meat has changed in the Finnish food culture throughout the history of Finland are explained generally.</p> <p>The research methods of the thesis were quantitative. The data analyzed was broad (N = 1000) and consisted of Finnish people aged from 15 to 74-years-olds. The analysis of the data was made by K-means clustering. Differences were searched between the regions, statistical groupings of municipalities, age groups and different educational backgrounds.</p> <p>The result of the research showed that there were little to no differences between different regions or statistical groupings of municipalities in Finland on consumer attitudes towards meat consumption. However, there were clear divisions in meat consumption habits and attitudes between the clusters, and the most surprising finding was that the people who ate meat the most were also those who were the most willing to decrease their meat intake in the future. Further research about the topic would be needed to confirm these findings.</p>		
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<p>Tiivistelmä</p> <p>Opinnäytteen tavoitteena oli saada selville, onko Suomen eri alueiden välillä eroavaisuuksia kuluttaja-asenteissa lihankulutusta kohtaan. Aiempaa tutkimusta aiheesta ei ole tehty. Opinnäytteen toisena tavoitteena oli selvittää eroavaisuuksia lihankulutustottumusten sekä asenteiden suhteen yleisellä tasolla, jotta lihankulutuksen suuntaa voitaisiin ymmärtää paremmin. Opinnäytteen toimeksiantajana oli WWF Suomi, ja tutkimuksen pohjana käytettiin Kantar TNS Agri Oy:n kyselylomakkeella keräämää dataa kuluttajien asenteista kestävästä lihankulutusta kohtaan.</p> <p>Teoriapohjassa esiteltiin, mitä on kestävä ruokajärjestelmä, millaisia vaikutuksia lihantuotannolla on ympäristöön ja ilmastoon, kuinka paljon Suomessa tuotetaan ja kulutetaan lihaa sekä kuinka lihan rooli suomalaisessa ruokakulttuurissa on muuttunut kautta Suomen historian.</p> <p>Tutkimusmenetelmänä käytettiin kvantitatiivisia menetelmiä. Työssä analysoitu data oli laaja (N = 1000), ja koostui suomalaisista ihmisistä aina 15-vuotiaista 74-vuotiaisiin. Datan analyysi toteutettiin K-means-klusterianalyysin avulla, ja analyysissä etsittiin eroavaisuuksia alueiden, tilastollisten kuntaryhmitysten, ikäluokkien sekä koulutustaustojen välillä.</p> <p>Analyysin tulokset osoittivat, että kuluttaja-asenteissa lihankulutusta kohtaan ei ole merkittäviä eroavaisuuksia eri alueiden tai tilastollisten kuntaryhmitysten välillä. Sen sijaan klustereiden välillä näkyi selkeitä eroavaisuuksia lihankulutustottumusten sekä asenteiden suhteen. Yllättävin havainto oli se, että vastaajat, jotka ilmoittivat syövänsä eniten lihaa, olivat myös niitä, jotka ovat avoimimpia lihankulutuksensa vähentämiselle tulevaisuudessa.</p> <p>Näiden havaintojen vahvistamiseksi tarvitaan lisää tutkimusta aiheesta.</p>		
Avainsanat (asiasanat) lihankulutus, kestävyys, kuluttaja-asenteet		
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1 Introduction

When rewinding about a century back in time, Finnish culture was very different from what it is now. From those times a lot has changed. The quality of life has improved, and societies have become wealthier, which can be seen for example in the rising GDP (Tilastokeskus 2018). At the same time the Finnish food production systems have become more modernized, and Finnish food production and -consumption have increased. Especially meat consumption has been steadily growing for decades. (Ahokas, Ahvenainen, Pohjolainen & Kuhmonen 2016, 7.)

Food production – meat production in particular – and its impacts on the environment have been a huge topic lately on the media (Carrington 2018; Stylianou, Guibourg & Briggs 2018; Mikkonen 2018; Tammenheimo 2018; Kokkonen 2019). Food production is commonly known to cause massive emissions, and veganism has become a global trend (Herrala 2018), despite the fact that the number of vegans is very small compared to the population. For example, in Finland it has been estimated that there are no more vegans than 1-2% of our population (Mäki-Petäjä 2018).

This thesis was made as an assignment by World Wildlife Fund (WWF) Finland. The goal was to find out if there were any differences in consumer attitudes towards meat consumption among different regions in Finland. The regions are Helsinki-Uusimaa, southern Finland (Etelä-Suomi), western Finland (Länsi-Suomi), and northern- and eastern Finland (Pohjois- ja Itä-Suomi) combined. This research also takes into consideration the dynamics between the regions, statistical grouping of municipalities, age and education. Another aim was to clarify the differences in meat consumption habits and attitudes in general, so that the direction of meat consumption could be understood better. The research is based on data already collected by WWF on the topic. The analysis focuses on attitudes towards meat consumption. The term “meat” in this study includes red meat and poultry. There are a lot of ways how we define red meat, but in the frame work, focus is on cattle and pigs. The production of sheep-, horse- or other “red” meat (such as game-meat) is not included in the frame-work, since they are just a small fraction of all meat consumption in Finland. While in

2017 the consumption of pork was 33,4 kg/capita and cattle 19,4 kg/capita, the consumption of sheep, reindeer and horse meat stayed under one kg per capita. (Kortesmaa 2018.)

2 Sustainable food system

Every one of us makes tens of food choices per day. As consumers, we are a part of a bigger food system, that includes everything from all the stages of the food chain – production, processing, distribution, consumption and disposal of food – to all the values, actors and activities behind the chain, and their outcomes such as socio-economic and environmental outcomes (HLPE 2017, 11).

The term “sustainability” has been defined in many ways, thus it is obvious that the subject is broad and not in any ways simple. In the publication “Our Common Future” (1987), also known as Brundtland Report, the World Commission on Environment and Development defines sustainable development as follows: development that “meets the needs of the present without compromising the ability of future generations to meet their own needs”. The word sustainability consists of two separate words, sustain and ability. From the environmental aspect, adapting to the definition of sustainable development, it could be understood as the ability of maintaining the natural resources and biodiversity as they are. From deep ecology’s point of view, it is impossible to practice agriculture sustainably, since every part of the chain has at least some kind of impact on the environment (Paarlberg 2013, 116.).

Right now, food production takes up approximately 40% of global land, its greenhouse gas emissions are 30% of the global GHG-emissions and it is responsible for 70% of the global freshwater use. Spreading agriculture and narrowing natural ecosystems is said to be the largest factor causing the threat of extinction to many species. (Willett, Rockström, Loken, Springmann, Lang, Vermeulen, Garnett, Tilman, DeClerck, Wood, Jonell, Clark, Gordon, Fanzo, Hawkes, Zurayk, Rivera, De Vries, Sibanda, Afshin, Chaudhary, Herrero, Agustina, Branca, Lartey, Fan, Crona, Fox, Bignet, Troell, Lindahl, Singh, Cornell, Reddy, Narain, Nishtar & Murray 2019, 449.) The

visible environmental effects of agriculture are mostly local, and the effects vary between different regions. That is why it is also important to make plans to mitigating these problems on a regional level. (ibid., 461.)

Production of food releases nutrients into soil and water systems locally, and therefore contributes to eutrophication. Food production is the major cause of nutrient loading, since the use of fertilizers has been too generous. Other effects of food production can be acidification of the soil and decrease in biodiversity. In addition to land and water, there are other important resources, too, that are used in the food production chain; for example, energy. Huge amounts of nutrients are being artificially added to the soil, and great amounts of them are being leached into the water systems. (Katajajuuri, Usva & Pulkkinen n.d.)

Sustainable food systems take environmental, social and economic sustainability into account. They are accessible, support the development of local economies, create jobs and direct links between farmers and consumers, improve the working- and living conditions in the area and promote locality through food and agriculture policies. (Garrett & Feenstra 1999, 1-2.) In addition to that, sustainable food systems do not expand at the expense of important environmental services but use the already existing agricultural land to its full potential and strive to close the yield gaps, this way protecting the environmental services from biodiversity loss. Sustainability in food systems also requires reducing unsustainable water usage and the amount of greenhouse gas emissions and other air- and water pollution. Changes in the dietary habits and avoiding food waste are also included. (Foley, Ramankutty, Brauman, Cassidy, Gerber, Johnston, Mueller, O'Connell, Ray, West, Balzer, Bennett, Carpenter, Hill, Monfreda, Polasky, Rockström, Sheehan, Siebert, Tilman & Zaks 2011, 338-341.)

The Food and Agriculture Organization of the United Nations (FAO) has pointed as a key point from the Sustainable Development Goals (SDGs) from the Agenda 2030 that the agriculture sector has a major role in achieving the goals set in the SDGs, since food and agriculture have such a huge impact on the environment (FAO, n.d.). This point of view is supported for example by Johan Rockström and Pavan Sukhdev in their speech at the Stockholm EAT Food Forum on 13th of June 2016. They presented the idea in the form of "the wedding cake" -figure, in which they explain the dynamics between the different SDGs and their linkage to food system. (Stockholm

Resilience Centre 2016.) One of the major issues in reaching the SDGs is the growing global population and through that the increased consumption of animal-originated food products (Vinnari & Vinnari 2013, 370).

When comparing protein delivery efficiency from animal-, and plant-based foods, it has been found that plant-based foods are causing less greenhouse gas (GHG) emissions and use less energy than meat. Still, there are a few exceptions in plant foods (greenhouse-grown -, and air-freighted vegetables) that can climb up to the same levels of emissions as animal foods. (González, Frostell & Carlsson-Kanayama 2011, 566-567.) One way to reduce the amount of greenhouse grown vegetables would be eating according to the harvest seasons.

The supply chains in the food systems can in some cases be very long, and all parts of the chain add their own effect to the total environmental footprint of the product. To estimate the environmental impacts of food products, several indicators that are evaluating the product's different aspects of sustainability and responsibility have been developed; there are for example water-, carbon- and ecological footprint indicators. Ecological footprint indicates how much surface the production takes. Water footprint indicates how much water is being used to produce certain product, and carbon footprint tells how the product affects climate change by the amount of greenhouse gas emissions it has released into the atmosphere. (Eri-laiset mittarit ruuan ympäristövaikutuksille n.d.) Life Cycle Analysis (LCA), that takes into consideration the resource use and outputs that the product creates in all stages of the supply chain, is also used to evaluate the sustainability of the supply chain. LCA has its uncertainties, since the measurements require very specific research questions and focuses, and thus comparing the results with other researches can be challenging. With LCA we can measure, for example, greenhouse gas emissions, ozone layer depletion, acidification, eutrophication, photochemical smog, ecotoxicity, land use and water usage. (Garnett & Rööös 2015.)

Researchers often prefer looking at the sustainability issue of food from a wide perspective. There is no use comparing individual foods with one another, but rather think about the big picture, for example diets. Many researchers and organizations are speaking for plant-based diets, eating more alternative protein sources (e.g. fish, broad beans, peas) and thus cutting the meat intake drastically. (Karmitsa 2017.)

There are many procedures that are being implemented to guide our consumption habits and food production towards a more sustainable system. A few good examples would be national nutrition recommendations, agricultural regulations and environmental payments nationally and from the EU, responsibility traceability systems, work towards reducing food waste, and different kinds of projects and campaigns to bring knowledge to the producers, companies and consumers. (Salo 2016, 38-44.)

2.1 Meat production and environment

Meat production has significant effects on the environment, both direct for example through rumination and indirect for example through deforestation and desertification (Vinnari & Vinnari 2013, 370). The overall conclusion of various researches has been that animal derived products do have a bigger impact on the environment according to many different environmental indicators. (Willett et al. 2019, 470-471.)

One of the effects of animal agriculture is greenhouse gas (GHG) emissions. The dominant GHGs that animal agriculture is causing are nitrous oxide (N₂O), methane (CH₄) and carbon dioxide (CO₂). Nitrous oxide is released into the atmosphere through soil and livestock processes such as urine and manure and the use of nitrogen fertilizers. Ruminants' digestion release methane, and carbon dioxide comes for example from the land use change, fossil fuels and machinery. (Garnett 2010, S23-S24.)

Cheap soy production is clearing alarmingly large areas of, for example, forests, grasslands and savannah from its way, which causes pollution and a threat to local biodiversity and animal- and human rights (Responsible soy, n.d.). Nearly two thirds of soybeans currently produced is used for animal feed (Willett et al. 2019, 472). The percentage of overall animal feed and bedding material are estimated to be nearly 60% of the total biomass harvested globally. 60-80% of the GHG emissions from eggs, poultry meat and pork, and 35-45% of GHG emissions from milk- and beef sector, come from feed production. (Grossi, Goglio, Vitali & Williams 2019, 71.)

Most of the water footprint of meat products, an estimated percentage of 98%, comes from the feed that the animals consume. From the total global groundwater and surface water consumption feed production represents around 12%. Cattle has the biggest water footprint compared to other farm animal categories. From the

global water footprint of farm animal production its percentage is 33%. Pigs' contribution is at 19%, and broiler chickens' 11%. The water footprint of a certain product depends for example on where it is produced and what production systems were used. (Mekonnen & Hoekstra 2012, 405-409.)

It has been estimated, that 70% of the land used for agriculture globally is used for livestock production. Land use in the agricultural sector has many direct and indirect impacts on the environment, such as biodiversity loss and deforestation, soil degradation, nutrient pollutions and carbon loss. All impacts are closely related to the production systems, areas in which the production is located and the types of animals that are produced. Efficient management can in some cases help cutting the negative impacts, and with it the production activities can even be beneficial to the environment by protecting the local traditional biodiversity and maintaining soil fertility. This could be for example by favouring extensive grazing systems and using mixed crop-livestock systems. (Garnett, Rööös & Little 2015, 16-18.)

3 Meat production and -consumption in Finland

The overall meat production and consumption in Finland has been steadily increasing in the past decades. In the Food and Agricultural Organisation of the UN (FAO) statistics below (Figure 1) it can be seen that the meat supply (kg/capita/year) has been growing from 34,67 kg in 1961 to 77,53 kg in 2013. This means that the supply of meat has more than doubled since the early 1960's.

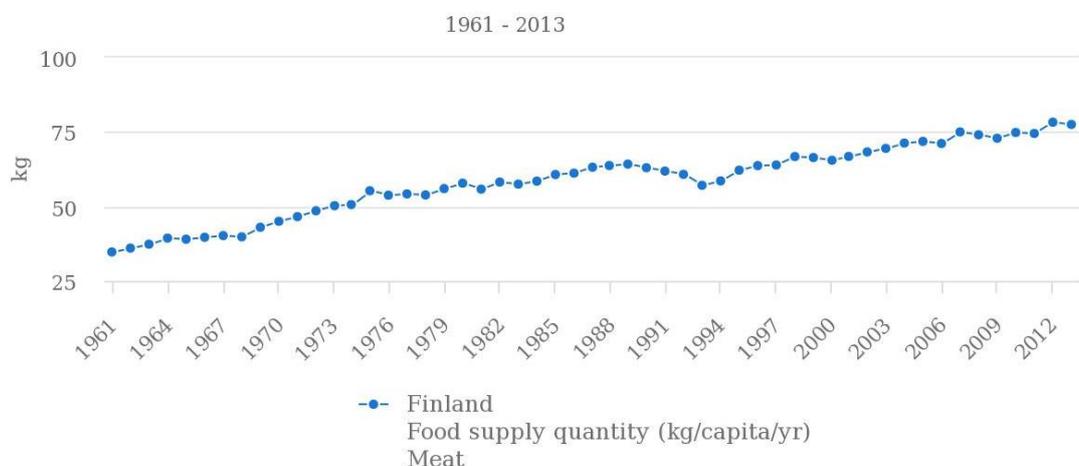
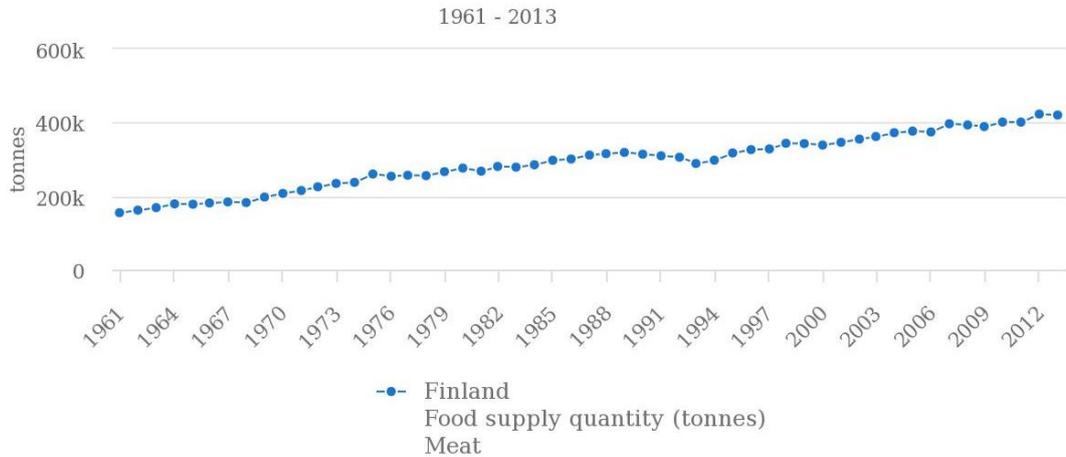


Figure 1st Meat supply quantity per capita (kg/yr) in Finland (FAOSTAT 2018.)

When counted in tonnes, the meat supply has grown from approximately 154 700 tonnes to 420 700 tonnes.



Source: FAOSTAT (Nov 16, 2018)

Figure 2nd Meat supply quantity (tonnes) in Finland (FAOSTAT, 2018.)

Organic meat production has been growing in the 2010's, but still in 2016 the production was under 4 360 tonnes. Hence, it is only a very small percentage (approximately 1%) of the total meat production. (Natural Resources Institute Finland 2016.)

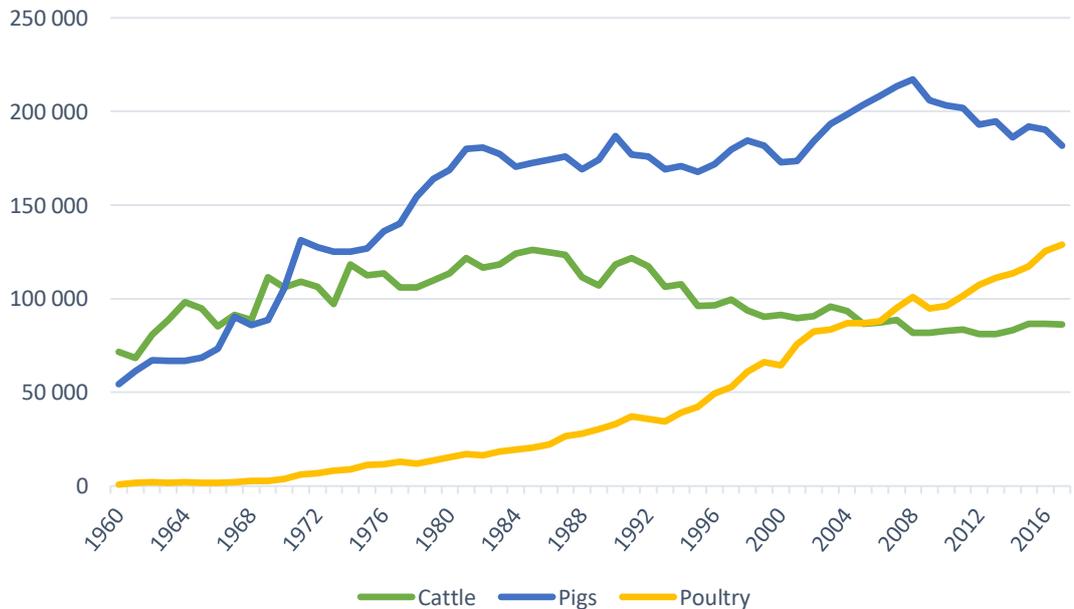
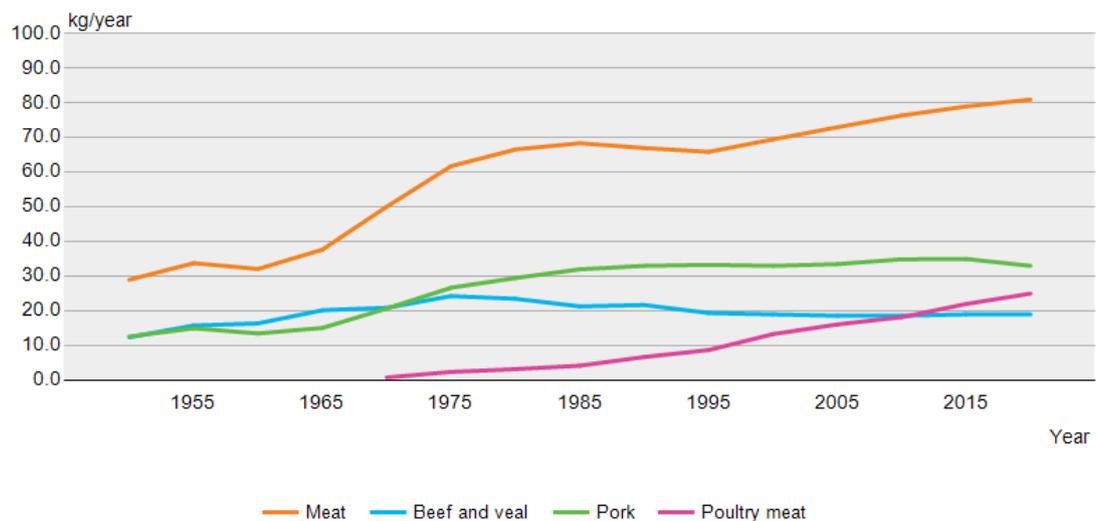


Figure 3rd Beef, pork and poultry meat production in Finland, tonnes (Natural Resources Institute Finland 2018)

The consumption of fish and vegetables in Finland is growing, but that has not made any remarkable difference in the amounts of meat that Finnish people eat. 94% of Finns eat meat in some form. Foodwest conducted a study about vegetarianism in 2017. In the study it was found, that 21% of the answerers (N = 723) had reduced their meat consumption, when the following number in 2012 was only 9%. Despite this, the decrease in meat consumption cannot yet be seen in statistics. (Penttilä 2017.)

In the Balance Sheet for Food Commodities 2017 and its statistical database made by Natural Resources Institute of Finland (Luke) it can be seen quite well (Figure 4), how the consumption of meat has been evolving over time. The table includes only the meat consumption in total and the consumption of beef and veal, pork and poultry meat, since the other meat categories are consumed in comparatively small amounts.



Source: Natural Resources Institute Finland, Balance sheet for food commodities

Figure 4th Consumption of food commodities per capita by commodity and year (Natural Resources Institute Finland 2018.)

In 2016, out of this approximately 80 kg of meat/capita/year, unprepared meat was 27,2 kg. The rest consists of sausages and cold cuts, grilled meat, and other processed meat products for example in ready meals. (Aalto 2018, 22-25, 59.)

3.1 Exports and imports

Out of all the food products produced in Finland about 15% are exported. Out of this 15%, meat products represent about 11%. (Vartia 2018.) According to FAO's food outlook report on global food markets (2018, 48), Finland is situated among the major meat exporters in the world as a part of the EU. In 2015 the amounts of exported meat in Finland were 4 million kilograms of beef, 34,3 million kilograms of pork and 19,3 million kilograms of poultry meat (Niemi & Väre 2017, 34-36).

In 2016 the amount of imported meat in Finland was 76 109 tonnes. Most of it came from Europe, but in the list of top ten importers are also Thailand, Brazil and New Zealand. The biggest importer with 25 497 tonnes of meat was Germany, and after that came Denmark (9 532 tonnes), Sweden (8 729 tonnes), Poland (6 410 tonnes) and the Netherlands (4 411 tonnes). (Hanhinen 2017.)

3.2 Finnish meat production and the environment

In Finland most of the feed that is given to production animals is grown locally. Still, the production chain is, in some cases, also global. For example, soy that is used for animal feed is imported from Brazil, other parts of South-America and the US (Pohjala 2018). Most of the soy imported to Finland goes to pig- and poultry farms, since cattle production has drastically decreased the use of soy as feed. Finland's self-sufficiency on proteinaceous feed is only about 15%, which is why the usage of soy- and rapeseed-based feeds that are brought from abroad is still common (Rinne & Kuoppala n.d.).

Efficient grass production is the strong side of the Finnish cattle industry. There are many areas in Finland, where the soil is not suitable for growing plants appropriate for human consumption. Instead, these areas are usually suitable for growing grass and feed for production animals. (Pesonen & Huuskonen 2014. 99.) Grass production has many positive effects on the environment; for example, it reduces erosion, improves the structure and quality of the soil – thus, helps with storing nutrients, and nutrient cycling – and works as a carbon sink (Steiner & Franzluebbers 2009, 76A).

According to WWF Finland (Luonnonlaidunliha 2013) one of the rare food production practices that are increasing nature's biodiversity is grazing in the natural pasture lands. In the new research coordinated by the Finnish Environment Institute (SYKE), it was found that these traditional environments – or biotopes – are severely endangered, and their quality has decreased. One reason for this is that the traditional livestock production's measures are not used anymore, or that the measures have changed so that they no longer maintain the biotopes' characteristics efficiently enough. (Lehtomaa, Ahonen, Hakamäki, Häggblom, Jutila, Järvinen, Kemppainen, Kondelin, Laitinen, Lipponen, Mussaari, Pessa, Raatikainen, Raatikainen, Tuominen, Vainio, Vieno & Vuomajoki 2018, 238.)

Therefore, Finnish meat production has an impact on biodiversity both locally and globally. Another effect it has globally, is the water usage. One fourth of Finnish people's water footprint comes from the production and consumption of meat, whereas the water consumption at home (for example showering, cooking, flushing the toilet etc.) is just about 3% of the total water footprint. 47% of Finnish people's water footprint locates outside of Finland's borders. (Vornanen 2016a, 107-108.)

Most of the eutrophication caused by humans, about 62-71% of phosphorous load and 55-61% of nitrogen load come from agriculture. Approximately 70% of the land that is used for agriculture in Finland belongs to animal agriculture. Most of the nutrient load that ends up in the waters comes from fertilizers and manure. All the manure can not be utilized as, for example, fertilizer, and the nutrient cycle has become inefficient over time. The storing and processing of the manure is one of the main causes of greenhouse gas emissions of animal agriculture. The other significant source of GHG-emissions is the digestion of ruminants (cattle and sheep). (Vornanen 2016b, 109-114.)

3.2.1 Cattle

The production chain of beef in Finland contains the following: defining the production methods and production environment (breeding, contract production, production buildings and other environment, production conditions etc.), feeding of the animals (and the production and storage of the feed), the animals' healthcare, loading, transport and slaughter, production of the meat products (production, packaging),

transport of the products and finally stores (storage and the presentation of the products) and consumption. (Elintarviketeollisuusliitto ry 2009.) The average lifespan of a cow in the livestock production is five years, and it calves on average 2,5-3 times in its lifetime (Vaara 2018).

Most of the beef produced, about 80%, comes as a by-product from the dairy industry; this means for example dairy origin bulls, heifers and calves. The rest, about 20%, consists of meat from beef breed animals. Meat coming as a by-product from dairy origins has a smaller environmental footprint, since the load is spread for both dairy and beef production. (Pesonen & Huuskonen 2014, 100.)

Beef production has a significant impact on climate and waters. Cows' metabolism creates a lot of methane, which is a strong greenhouse gas. Methane stays in the atmosphere a lot shorter time than carbon dioxide (CO₂), but it traps radiation more efficiently; methane warms the planet approximately 25 times more than same amount of carbon dioxide (Overview of Greenhouse Gases n.d.). Livestock requires a lot of feed, which takes a lot of land and causes emissions that have a negative impact on the climate and eutrophic impact on the waters (Nauta n.d.). On the other hand, Finnish livestock production uses mostly silage as feed (Rinne & Kuoppala n.d.) and has given up soy as feed. Pasture-based production protects the biodiversity of traditional biotopes.

Still, there lays a problem in pasture-based livestock production, too. It is estimated, that if the consumption of meat stayed the same, but the cattle would be fed pasture-based rather than with grains, it would take more time for the animals to reach their maximum weight. Thus, we would need more animals for the offer of meat to answer to the demand. (Hayek & Garrett 2018, 4.) This way the cattle would also require more land and other resources.

3.2.2 Pork

In production conditions the pigs' lives last for approximately 170-190 days (Sika tuotantoeläimenä, n.d.), which is a noticeably shorter time than cattle's lifespan. The production chain goes through the birth, piglets living with the sow until they weigh 8-9 kilograms, which stands for approximately 4-5 weeks, then growing to the weight

of 25-30 kilograms without the sow. After that they can be transported to the farms where they reach their ultimate weight (105-115 kilograms). Then they are transported to slaughterhouses. (ibid.)

WWF Finland mentions in their meat guide (Sika, n.d.), that the biggest environmental impacts of pig meat come from the soy that the animals are fed with. The amount of soy is not as big as in Europe on average, though. Still, growing feed for production animals contributes to the eutrophication of waters and climate change.

3.2.3 Poultry – broiler

The production chain of broiler is considerably faster than with cattle or pork. The production chain from the import of the grandparent chicks to consumption of the meat takes approximately 15 months. The process includes the import of the grandparent chicks, rearing them, egg laying and brooding of the eggs, raising the pullet (parent) chicks at the pullet farm, transporting pullets into breeder farms for egg laying, brooding the eggs in the hatchery, and then rearing the broilers and slaughtering them. (Lihatiedotus 2012, 2.) Broiler grows into its maximum weight in five to six weeks, and they are transported to slaughterhouses all at once; the population of one flock varies from 6 000 to 60 000 birds. (Eläintieto.fi n.d.) Since the chain is very efficient and fast, it does not have the considerably large environmental impact than for example cattle does.

On the other hand, poultry in Finland is mostly fed with rapeseed and soy, that are supplemented with vitamins, minerals and amino acids (Lihatiedotus 2012, 7). Soy causes the massive biodiversity loss in South-America's rainforests. In addition to soy and rapeseed, the birds also get wheat and oats that are usually grown either on the same farm or nearby (ibid.).

4 Meat as a part of Finnish food culture

Culture is a part of our identity. Culture includes the values, beliefs, attitudes and practices, that have been accepted and used by the community or group. Food habits, also, vary between different cultures. (Kittler & Sucher 2008.) Food is a necessity for us to stay alive, but it is also an important factor for our cultures. We do not eat

only because we biologically have to; we do it as a part of our social and cultural behavior, and because of that, food has become a very complex substance (Guptill, Copelton & Lucal 2013, 3-5).

According to Sillanpää (1999, 8), food culture researcher Matti Räsänen (1987) defines food culture as a part of cultural entity, in which cultural habits guide the acquisition, preparation and consuming of food. Food culture builds around other cultural habits of the time and the factors coming outside of the culture. Food choices can be a way of belonging to a group, or on the contrary separating oneself from it.

Western food cultures have one largely common characteristic: they include a lot of animal-derived products in them (Karmitsa 2017). Finnish people tend to think that the Finnish food culture is all about internationality and constant change. Still, they also see traditions and locality to have a major role in the food culture. (Mistä suomalaisen ruokakulttuuri koostuu? n.d.) Knowing Finnish history, Finnish food culture has taken a lot of influences from both east and west. We also have a very challenging climate when thinking about agriculture; short summers, long winters and low temperatures in general set constraints to which foods we can grow. It has forced Finnish people to create new innovations to support the production of food. (Kehitysvaiheita, n.d.)

In Finland, the regional food cultures are somewhat similar with differences, that are actually smaller than one could think. Throughout history, the differences in food choices have been more visible between different social classes than regions. (Sillanpää 1999, 9.) The biggest differences in regional food cultures have been tied to which types of ovens were used for, for example, baking. Considering both food preparations and behaviour, the clearest division might have been between Eastern- and Western Finland. (Mäkelä, Palojoki & Sillanpää 2003, 14-22.)

Just a few decades ago meat was a product, that was appreciated in an entirely different way than nowadays. It was an expensive ingredient, that was rarely available, and the availability was tied to seasonality. (Kotimaiset raaka-aineet 2016.)

In the 1920's and 1930's people ate mostly what they had money for. Food was available according to the seasons, and self-sufficiency was practiced both in rural and urban areas. Some foods were also bought from the local market or, for example, fish

could have been bought straight from the local fishers. Many families had their own farm animals and most houses had a little garden where the families could grow their own vegetables. (Sillanpää 1999, 58-81.)

In the time of World War II and scarcity there was seen a huge decrease in more expensive food products such as meat, milk, butter and sugar. Self-sufficiency became more and more important. In the cities, most of the food eaten consisted of root vegetables, potatoes and fish. If there sometimes was meat on the table, it was self-hunted. In the 1940's, game-meat and different kinds of birds were the most usual ones to eat, when they were available. Many food products were also bought from black markets. In the rural areas the situation was better, since having own farm animals made it possible to eat much like before. (ibid., 82-93.)

In the 1950's, the consumption of meat started to increase. After the years of scarcity Finnish people found the joy of fatty and sugary foods, and food was seen more and more as an indulgence. People began to eat more fatty meats, that gained a very popular position for example in restaurants. Processed meat products, such as sausages, started to gain popularity in the 70's, when technology made it possible to produce these earlier expensive hand-made products with lower expenses and higher volume. (Mäkelä, Palojoki, Sillanpää 2003, 26-28.)

In the past 40 years, the selection of foodstuff in Finnish supermarkets has grown massively. The biggest change in food consumption might be the increase in processed food products and ready-meals. People also buy more meat, fresh fruits and vegetables, cheese and different kinds of canned meats. (Viinisalo, Nikkilä & Varjonen 2008, 8-10.)

4.1 Consumer attitudes towards meat

Attitude, in the context of consumer behaviour, is defined as "a learned predisposition to behave in a consistently favourable or unfavourable way with respect to a given object". (Schiffman, Kanuk & Hansen 2012, 233.) Attitudes are learned and they are formed based on experiences, information gathered from others and exposure to direct or indirect marketing through different pathways. Personality traits and values and beliefs learned from family give a strong base for attitudes to form. In

countries like Finland, the mass-media has also a big role in the formation of attitudes, since there is a constant flood of information coming to us through such paths as newspapers, the internet and television. In consumer behaviour, attitudes guide people's motivation towards, or away from, certain types of products. (ibid. 244-245.)

Meat has, in general, always been seen as a manly food, as in history men were the ones to hunt, whereas women picked the plants, mushrooms and berries and took care of the children. There lays a clear separation between these activities; hunting is connected to violence, which is considered to be masculine, and on the other side, caring for others is considered feminine. Finland is no exception to this. These roles have been fading away for quite some time, but it can be seen on researches that men still eat almost twice as much meat as women. (Anttonen 2016, 48-49.)

There are other various factors behind the attitudes towards meat and its consumption, too. When making food choices consumers tend to think of the taste, healthiness, price, quality, availability, preparation methods and routine related to the specific food products. Animal welfare has sparked conversation among consumers, but environmental aspects of meat consumption have not been that big of a timely issue to most. (Pohjolainen, Tapio, Vinnari, Jokinen & Räsänen 2016, 38.) Many may also have difficulties with forming an opinion about the environmental aspect of meat because of this issue's complexity (ibid. 42), which might have a negative impact on the willingness to act, and thus also on the attitudes towards sustainable meat consumption.

5 Research

The objective of the thesis work was to find out if there were any differences in consumer attitudes towards sustainable meat consumption between different regions in Finland. The regions were Helsinki-Uusimaa, southern Finland (Etelä-Suomi), western Finland (Länsi-Suomi), and northern- and eastern Finland (Pohjois- ja Itä-Suomi) combined. Another objective was to get a better understanding of the differences in meat consumption habits and attitudes in general with cluster analysis, so that the

variation and distribution of attitudes could be estimated. The research was conducted based on an already existing data collected by Kantar TNS Agri Oy, assigned by WWF Finland.

5.1 WWF Finland: the main data source

World Wildlife Fund (WWF) is an organization that has a mission “to conserve nature and reduce the most pressing threats to the diversity of life on Earth” (WWF’s mission n.d.). It was founded in 1961 (History n.d.), and from there to this day it has developed into a broad network, that has offices in about 50 countries, and activity in over 100 countries. WWF Finland’s work started in 1972. (Tietoa meistä 2017.)

WWF has six key areas in which they work: forests, marine, freshwater, wildlife, food and climate. They think that by integrating these six areas into one approach, it is possible to move towards a more sustainable future, where we could use our resources to protect the now vulnerable areas, species and communities around the world. To help with their ambitious goals, they have been engaging their stakeholders from business world, academic world and such to partner in their projects and campaigns, through which they are trying to raise awareness of more sustainable choices. (Our work n.d.)

On their website, WWF Finland has stated five major threats that they are concentrating on: over consumption, climate change, deforestation, plastic waste in the oceans and biodiversity loss. (Uhat n.d.) They are trying to tackle these issues by working with different companies and producers globally and nationally, bringing their knowledge into policy-making, and providing up-to-date scientific information to consumers in the form of different kinds of campaigns. One of the campaigns that they have launched is their food guide, “Ruokaopas”, that offers guidance on consumption of meat and seafood. The point in their food guides is to lead consumers into making more sustainable food choices without “giving up” their favourite meals. (Ruoka 2017.) The three basic principles that WWF tries to promote to consumers are using more vegetables and alternative protein sources instead of meat, trying not to create food waste, and buying foodstuff that are responsibly produced (WWF:n Ruokaopas – herkuttele vastuullisesti n.d.).

5.2 Basic information from the data

The survey about the attitudes towards sustainable meat consumption was conducted on 8.-15.6.2018 through TNS Gallup Forum that is an answerer panel on the internet that consists of 40 000 Finnish people between ages 15 and 74. The number of answers gathered in this survey is N = 1000 and the sample consists of people between 18 to 74 years old from all over Finland. The distribution of the respondents by area is not quite even. The biggest group, about 34%, comes from the Helsinki-Uusimaa area. Southern Finland represents 21% of the answers, Western Finland 22% and Northern- and Eastern Finland 23%. It is important to acknowledge that Northern- and Eastern-Finland are combined in this data and the number of answers from those areas is the lowest, so the distribution is not equable, and thus might also affect the results.

The representation of men and women in the sample is well balanced – almost half and half (men N = 526, women N = 474). The age distribution, on the other hand, is very uneven. Most respondents represent the age groups of 65-years-old or older (30%) and 55-64-years-old (21%). The representation is the lowest (6,5%) in the age group of 30-34-years-olds and the group of younger than 30-years-olds (9,9%). This might affect the reliability of the results.

Majority of the respondents eat meat daily (37,9%) or a few times a week (33,5%). Eating meat daily or a few times a week is common all over the country; the percentage for people eating meat every day varies from 35,2% (Helsinki-Uusimaa) to 42,1% (Southern Finland) between the areas. In Western Finland the percentage is 41,7% and in Northern- and Eastern Finland 36,1%. In every region the majority – 70% or more – of the responses are spread between eating meat daily or almost daily and eating meat a few times a week.

There were no significant differences in the willingness of the respondents in different regions to reduce the amount of meat in their diets, either (Figure 5). Most responses situated to the option “Possibly”, varying regionally from 26,3% (Western Finland) to 34,5% (Southern Finland).



Figure 5th How likely will the respondents change their diets into a more plant-based direction

Most of the people found reducing meat intake to be either significant or very significant deed in one’s dietary habits from an environmental point of view (Figure 6).

From every region, the responses for options “Only a little bit significant” and “Not significant” represented under 20% of the answers.

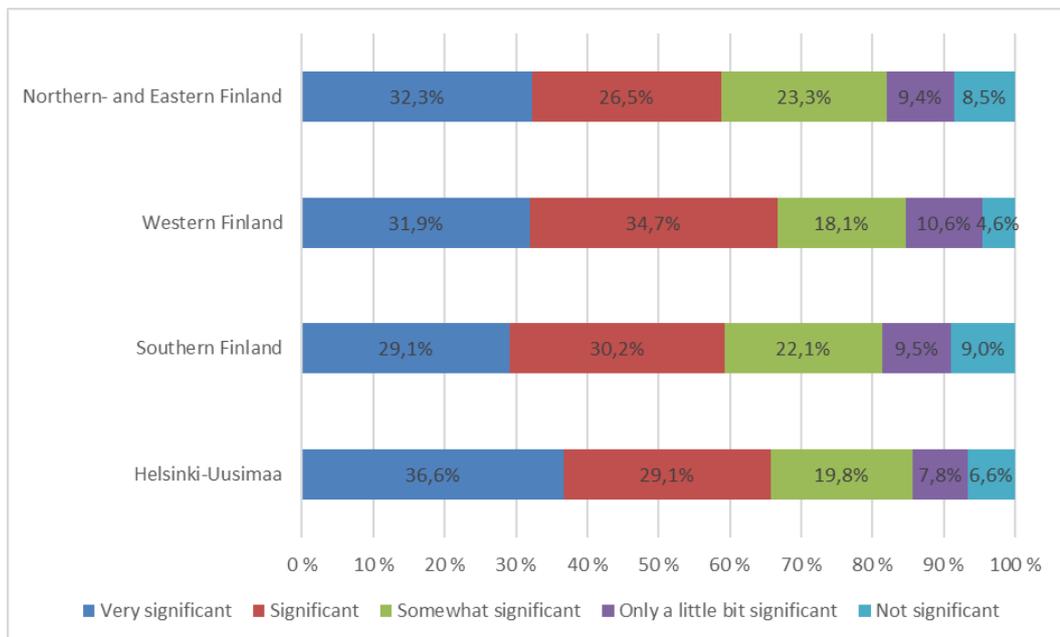


Figure 6th Attitudes towards how significant favouring more plant-based diet is when thinking of the environmental impact

5.3 Analysing methods

The analysis of the data was done using cluster analysis. Cluster analysis is used when wanting to classify the examinees into separate groups based on some exact traits.

With cluster analysis it is possible to find the variables from the data that have clear similarities and form homogenous groups based on that. (Nummenmaa 2004, 363.)

SPSS was used as a tool for the analysis. Clustering was done with a non-hierarchical method – K means clustering, with which it was possible to easily find the appropriate number of clusters from the data and compare the clusters with each other based on the selected questions from the survey with cross tabulation.

With the K means clustering method, the optimal number of clusters was found to be four. The clusters are of slightly different sizes, with the N being 376 in the first group, 157 in the second group, 280 in the third group and 147 in the last group.

The questions for cross tabulation and analyzing the differences between the four groups were:

1. Area
2. Statistical grouping of municipalities
3. Age
4. Education
5. Which of the following is, in your opinion, the most important change in food choices when thinking of the environment? (Favoring vegetables instead of meat, decreasing the amount of food waste, decreasing the amount of packaging materials, avoiding produce from long distances, favoring organic produce, I don't know)
6. Which of the following describes best the amount of meat in your diet? (I eat meat almost daily, I eat meat a few times a week, I eat meat approximately once a week, I eat meat less than once a week, I'm a vegetarian or pesco-vegetarian, I'm a vegan)
7. How significant is favoring vegetables over meat in your opinion, when thinking of the environmental aspect of changing one's food habits? (Scale of 1-5, from very significant, to not significant at all)
8. Are you going to lower your food choices' environmental impact by favoring a more plant-based diet in the future? (Scale of 1-5, from I will not, to I surely will)

The significance of the differences found in cross-tabulation were calculated in SPSS with the chi-square test that gives the results as the p-value. When the p-value is under 0,001 the differences are very significant. With the value being 0,01 or smaller the differences are significant, with 0,05 or smaller they are almost significant and with the p-value being larger than that there is no significance. (Kananen 2011, 83.)

The basic information was gathered from the data by using frequencies and cross tabulation.

6 Analysis results

6.1 Clusters

Group one, N = 376

“Meat lovers” – Meat eaters not willing to decrease their meat intake

The first cluster consists of people who eat meat mostly a few times per week or daily. They think that replacing meat with more plant-based options is not very significant when thinking about the environmental impacts on one’s diets. Most of them think that the possibility for themselves to switch towards plant-based diet is very unlikely.

49% of the age group 65+ are situated in this cluster. Most of the people from the educational background consisting of primary school (32,6%), old-time vocational education (41,4%), bachelor’s degree (42%) and master’s degree or higher (46,3%) are in this cluster.

Group two, N = 157

“Veggie lovers” – People who consume meat only once a week or less

The second cluster is formed of the vegans, vegetarians and those, who eat meat either once a week or less. Nearly 80% of them do not think that there is any significance in favoring plant-based products over meat.

This group has 28,3% of the respondents of the age group 30 or younger, and 22% of the respondents from the age group of 65 or older. The smallest representation (7,7%) is from the group of people from 45 to 54 years old. 20,3% of the answerers from the educational group of master’s degree or higher are in this group. From the group with background consisting of primary school education 17,4% are represented. The smallest percentage, 12,6%, stands for people from the background of old-time vocational education.

Group three, N = 280

“Reflective meat lovers” – Meat eaters, considering the possibility of decreasing meat intake

In the third cluster 57,9% of the people told that meat is included in their diet daily. 44% of the daily meat eaters are in this cluster. They think that switching meat to plant-based products is somewhat significant (61,4% of the cluster). 47% of them said that they will possibly change their diets to be more plant-based. 42% answered that they will make the change quite surely.

In this group are 40,5% of the answerers aged 35-44 years old, 36,9% of the 45-54 years old and 32,8% of the 30-34 years old. Here are also 34,2% of the answerers with educational background of vocational- or high school and 30,2% from the background of primary school.

Group four, N = 147

“Eco-conscious meat lovers” – Meat eaters, willing to decrease the meat intake

68,7% of this group enjoys meat daily. People who eat meat a few times a week represent 24,5% of the cluster. 100% of the people who answered that favoring plant-based foods instead of meat is very significant, and 90% of those who answered it is significant, are in this cluster. The people from this cluster are open to making the change in their own diets towards less meat and more plant-based foods: there’s a 43,5% response percent for both “I surely will” and “quite surely”.

21,9% of the people aged 30-34 are in this cluster, whereas only 10,1% from the 65+ years old’s group ended up here. 19,8% of the people with the educational background of primary school, 17,3% from the vocational- or high school background. The smallest percentage (11,9%) is from the people with background master’s degree or higher.

6.2 Analysis of the clusters

The results of cross tabulation between the four different clusters and the regions have no significance, with the P-values being 0,764 for the different regions and 0,546 for the statistical grouping of municipalities.

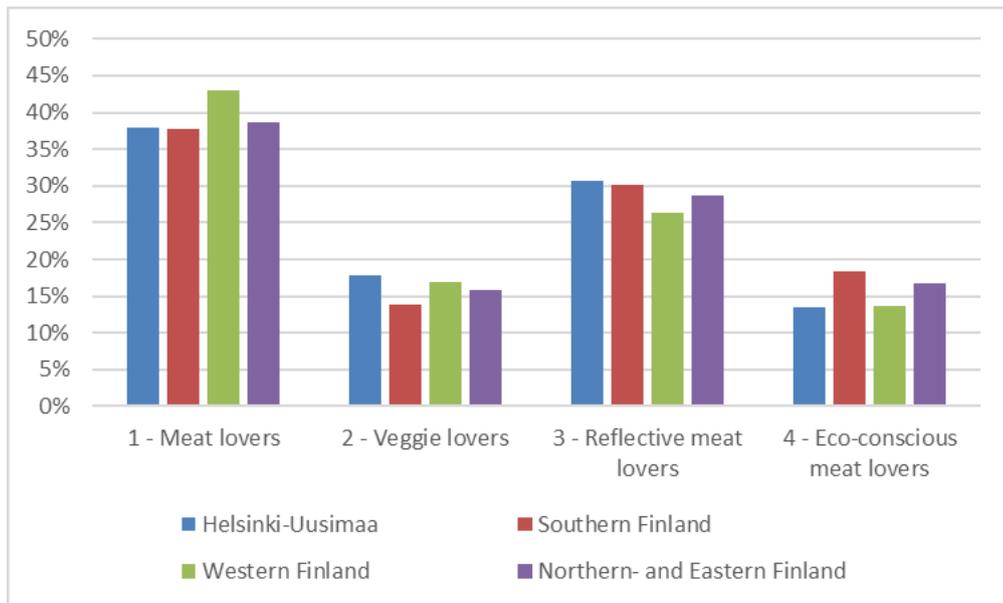


Figure 7th Division of the regions between the clusters

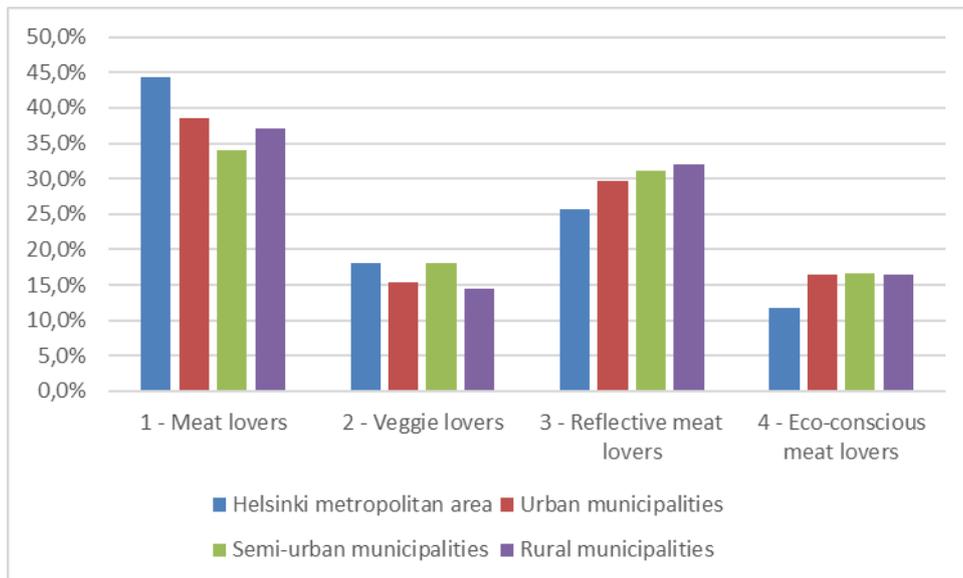


Figure 8th Division of the statistical grouping of municipalities between the clusters

What really seems to have significance when studying the reasons behind the attitudes is age (Figure 9), which has the P-value of 0,000. Educational background's P-value is 0,061.

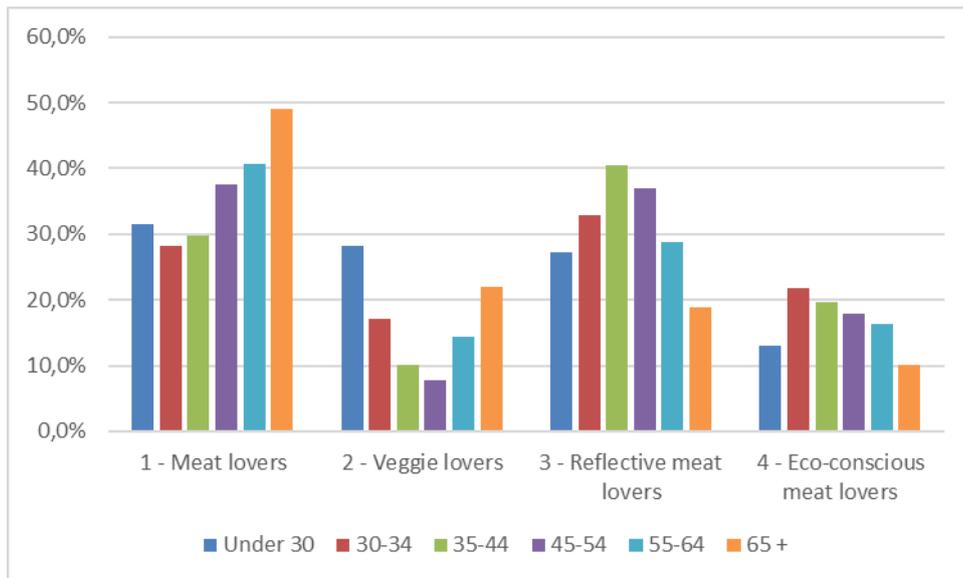


Figure 9th Division of age groups between the clusters

There are major differences between the clusters when looking at the meat-eating habits of the answerers. The only group with vegans and vegetarians is the second cluster. The second cluster includes also the majority – a little over 90% - of the people who eat meat less than once a week.

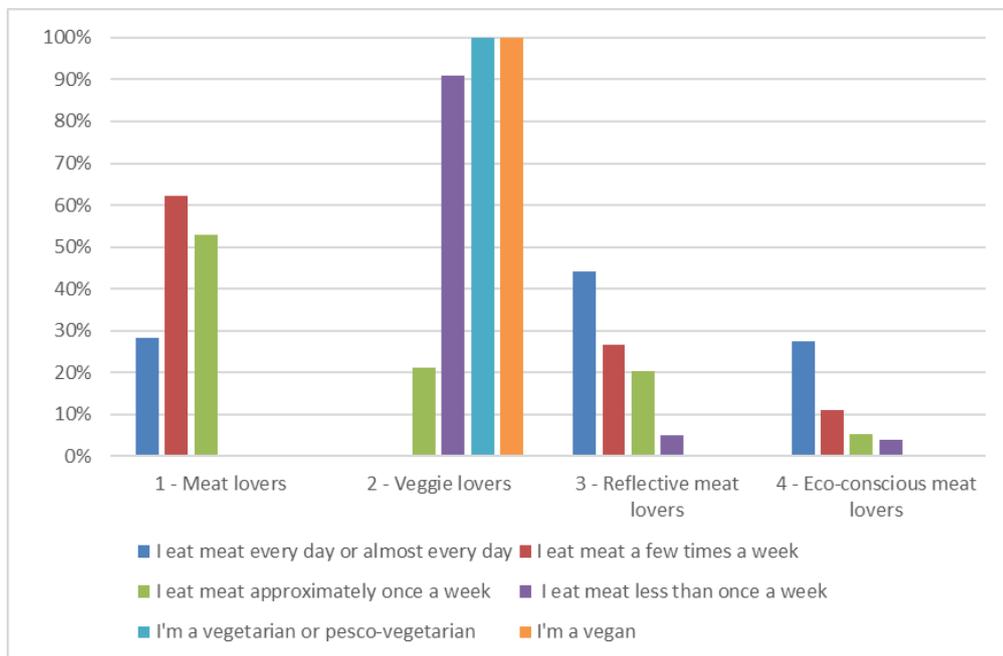


Figure 10th Division of the meat-eating habits between the clusters

When looking at the division of the meat-eating habits between people inside the clusters, the third and the fourth cluster are the ones where the majority are telling that they eat meat daily. In the first cluster the majority eats meat a few times a week. Nearly half of the people in the second cluster eat meat less than once a week. It is also the only group with vegans, but here it can be seen how small a number of vegans there really is.

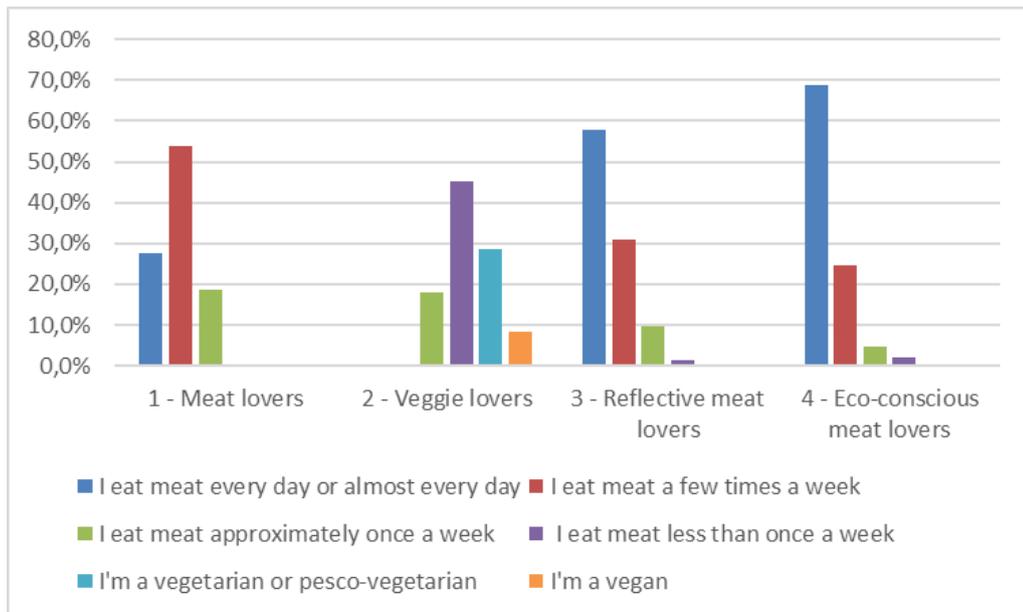


Figure 11th Division of the meat-eating habits between people inside the clusters

When comparing the opinions about the most important food choices from the environmental point of view (Figure 12) favouring vegetables instead of meat is thought to be the most important deed by very few. Instead, the most important deed is thought to be either decreasing the amount of packaging materials or avoiding produce from long distances. Favouring organic produce and decreasing the amount of food waste were important to many, too.

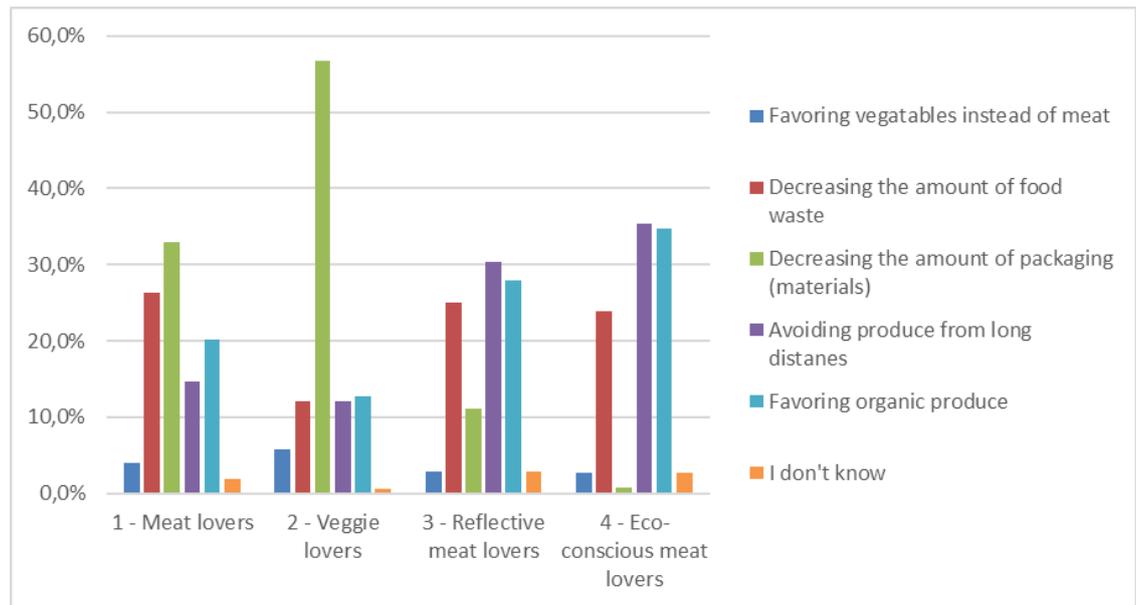


Figure 12th The most important food choices from the environmental point of view; division of opinions inside the clusters

7 Conclusions

The cluster analysis proves that the attitudes towards sustainable meat consumption do not differ between the four different regions that were defined in the data. This was an interesting result, since the preconception about this question was that there would have been bigger differences at least in the Helsinki metropolitan area compared to other parts of Finland.

In the theory part of this thesis it is stated that clear separations in the food cultural habits between different regions in Finland was not found, excluding the few local traditional foods and the different ways of preparing food in the past. The biggest differences have always been between east and west. In this research, the differences with attitudes towards meat consumption were not seen even between these regions, which is surprising. It may also be partly because of the very different sized samples from different areas, and because Eastern- and Northern Finland were put together in the data.

An interesting finding of the cluster analysis was that the ones thinking about decreasing their meat intake were the ones that ate meat the most. In the fourth cluster, the “eco-conscious meat eaters” majority of people told they eat meat daily, but they were also the ones who think that it is significant to make the change

towards a more plant-based diet, and they also will do it in the future. The third group “reflective meat eaters” also had a high number of people who eat meat daily, and they are at least considering the option of decreasing the amount of meat in their diets.

The first group of the “Meat lovers” that thinks there is no significance in the change towards more plant-based diets and are not willing to make the change quite surprisingly eat meat mostly only a few times per week. The preconceptions towards the people who are loudly against the decrease of meat consumption are in some cases that they eat meat at almost every meal, but here this preconception was shown to be wrong.

To put it briefly, it was noticed in the research that there were little to no differences between different regions in Finland about the consumer attitudes towards meat consumption, but four different kinds of consumption habits and attitudes were seen clearly. However, it would be reasonable to state that according to this analysis, the amount of meat in people’s diets is most likely going to be decreasing in the future, since the opinions amongst the people who eat meat the most are quite positive towards the idea of decreasing the meat intake. This is an encouraging result, leading to the conclusion that Finland is moving towards a more sustainable direction with meat consumption.

Based on the estimates that the analysis presented, it would be necessary to do more in-depth research about this topic to get surely reliable results. There is also a lot of further analysing potential in the data used in this research to obtain more information about meat consumption in Finland.

References

- Aalto, K. 2018. Elintarvikkeiden kulutus kotitalouksissa vuonna 2016 ja muutokset vuosista 2012, 2006 ja 1998. Kuluttajatutkimuskeskus 2018:80. Valtiotieteellisen tiedekunnan julkaisuja.
https://helda.helsinki.fi/bitstream/handle/10138/235324/Elintarvikkeiden_kulutus_kotitalouksissa_2016...pdf?sequence=1
- Ahokas, I., Ahvenainen, M., Pohjolainen, P. & Kuhmonen, T. 2016. Proteiinikysymys ja sen ratkaisumahdollisuudet Suomessa – Systeminen tarkastelu sekä kirjallisuuskatsaus järjestelmän nykytilasta ja muutospoluista. 2. korjattu versio. Tulevaisuuden Tutkimuskeskus, eJulkaisuja 4/2016.
https://www.utu.fi/fi/yksikot/ffrc/julkaisut/e-tutu/Documents/eTutu_4-2016.pdf
- Carrington, D. 2018. Avoiding meat and dairy is ‘single biggest way’ to reduce your impact on Earth. Article, The Guardian 31.5.2018. Cited on 15.1.2019.
<https://www.theguardian.com/environment/2018/may/31/avoiding-meat-and-dairy-is-single-biggest-way-to-reduce-your-impact-on-earth>
- Elintarviketeollisuusliitto ry 2009. Lihantuotannon hyvät toimintatavat – Nautaketju. Helsinki, 2009. Cited on 19.12.2018. http://www.etl.fi/media/aineistot/suosituksset-ja-ohjeet/hyvät_tuotantotavat_nauta.pdf
- Eläintieto.fi N.d. Kana ja broileri tuotantoeläiminä. Cited on 19.12.2018.
<https://www.elaintieto.fi/kana-ja-broileri-tuotantoelaimina/>
- Erilaiset mittarit ruuan ympäristövaikutuksille, N.d. Ruokatieto Yhdistys ry. Cited on 20.11.2018. <https://www.ruokatieto.fi/ruokakasvatus/ruokavisa-vastuullisuus-ruokaketjussa/ymparisto/ruuan-elinkaari-pelloilta-poytaan/ekologinen-jalanjalki-kertoo-kulutuksemme-ylittavan>
- FAO, N.d. Sustainable Development Goals - Overview. Cited on 30.12.2018.
<http://www.fao.org/sustainable-development-goals/overview/en/>
- FAOSTAT 2018. Food Supply – Livestock and Fish Primary Equivalent. Cited on 20.11.2018. <http://www.fao.org/faostat/en/#data/CL>
- Foley, J., Ramankutty, N., Brauman, K., Cassidy, E., Gerber, J., Johnston, M., Mueller, N., O’Connell, C., Ray, D., West, P., Balzer, C., Bennett, E., Carpenter, S., Hill, J., Monfreda, C., Polasky, S., Rockström, J., Sheehan, J., Siebert, S., Tilman, D. & Zaks, D. 2011. Solutions for a cultivated planet. Nature 478, 337-342. <https://janet.finna.fi>, eScholarship UC Open Access Publications. Cited on 16.1.2019.
- Food Outlook – biannual report on global food markets, 2018. Food and Agriculture Organization of the United Nations. July/2018.
<http://www.fao.org/3/CA0239EN/ca0239en.pdf>
- Garnett, T. 2010. Where are the best opportunities for reducing greenhouse gas emissions in the food system (including the food chain)? In the publication Food Policy 36 (2011), p. S23-S32. Cited on 8.1.2019.
<https://fcfn.org.uk/sites/default/files/Food%20Policy.pdf>

Garnett, T., Rööös, E. & Little, D. 2015. Lean, green, mean, obscene...? What is efficiency? And is it sustainable? Food Climate Research Network, University of Oxford. Cited on 29.3.2019.

<https://www.researchgate.net/publication/281864839> Garnett T Roos E and Little D 2015 Lean green mean obscene What is efficiency And is it sustainable Food Climate Research Network University of Oxford

Garrett, S. & Feenstra, G. 1999. Growing a Community Food System. Community Ventures: Partnerships in Education and Research Circular Series. Western Regional Extension Publication.

González, A., Frostell, B. & Carlsson-Kanayama, A. 2011. Protein efficiency per unit energy and per unit greenhouse gas emissions: Potential contribution of diet choices to climate change mitigation. Food Policy 36 (2011), 562-570. Cited on 8.1.2019.

<http://www.internationalegg.com/wp-content/uploads/2015/11/Gonzalez%20-%202011.pdf>

Grossi, G., Goglio, P., Vitali, A. & Williams, A. 2019. Livestock and climate change: impact of livestock on climate and mitigation strategies. Animal Frontiers, 9, 69-76.

Cited on 16.3.2019. <https://academic.oup.com/af>

Guptill, A., Copelton, D. & Lucal, B. 2013. Food & Society – Principles and Paradoxes. Polity Press, Cambridge.

Hanhinen, H. 2017. Täältä Suomeen tuodaan ulkomaista lihaa – katso lista. Yle uutiset, 21.3.2017. Cited on 13.12.2018. <https://yle.fi/uutiset/3-9521201>

Hayek, M. & Garrett, R. 2018. Nationwide shift to grass-fed beef requires larger cattle population. Environmental Research Letters, 13. Cited on 19.12.2018.

<http://iopscience.iop.org/article/10.1088/1748-9326/aad401/pdf>

Herrala, O. 2018. Mikä kumman vegebuumi? Yli 90 prosenttia suosii lihaa.

Kauppalehti 8.4.2018. Cited on 26.9.2018. <https://www.kauppalehti.fi/uutiset/mika-kumman-vegebuumi-yli-90-prosenttia-suosii-lihaa/CWJ5xs2d> <- ota tästä myös juttuja esim. lihantuotannon omavaraisuusasteesta

History, N.d. Cited on 6.11.2018. <https://www.worldwildlife.org/about/history>

HLPE, 2017. Nutrition and food systems. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.

<http://www.fao.org/3/a-i7846e.pdf>

Kananen, J. 2011. Kvantti: Kvantitatiivisen opinnäytetyön kirjoittamisen käytännön opas. Jyväskylä: Jyväskylän ammattikorkeakoulu.

Karmitsa, E. 2017. Sustainable food – Go vegan or raise your own pigs? University of Helsinki, press release 26.6.2017. Cited on 10.12.2018.

<https://www.helsinki.fi/en/news/sustainability/sustainable-food-go-vegan-or-raise-your-own-pigs>

Katajajuuri, J.-M., Usva, K. & Pulkkinen, H. N.d. Ruoantuotannon ja -kulutuksen vaikutukset ympäristöön ja ilmastoon. Luonnonvarakeskus. Cited on 20.11.2018.

<https://www.luke.fi/tietoa-luonnonvaroista/ruoka-ja-ravitsemus/ruoan-ilmastovaikutukset/>

Kehitysvaiheita. N.d. Ruokatieto.fi. Cited on 4.1.2019.

<https://www.ruokatieto.fi/ruokakulttuuri/kehitysvaiheita>

Kittler, P. & Sucher, K. 2008. Food and Culture – 5th edition. Thomson Higher Education: Belmont.

Kokkonen 2019. Amazonin metsien hakkuut kasvavat rajusti, syynä lisääntyvä lihankulutus – lähes kaikki hakkuut laittomia. Yle.fi 2.1.2019. Cited on 16.1.2019.

<https://yle.fi/uutiset/3-10578332>

Kortesmaa, T. 2018. Mitä Suomessa syötiin vuonna 2017. News article, 29.6.2018.

Luonnonvarakeskus. Cited on 16.1.2019. <https://www.luke.fi/uutiset/mita-suomessa-syotiin-vuonna-2017/>

Kotimaiset raaka-aineet. 2016. ELO-säätiö. Artikkelit 17.6.2016. Cited on 4.1.2019.

<http://www.elo-saatio.fi/kotimaiset-raaka-aineet>

Lehtomaa, L., Ahonen, I., Hakamäki, H., Häggblom, M., Jutila, H., Järvinen, C., Kemppainen, R., Kondelin, H., Laitinen, T., Lipponen, M., Mussaari, M., Pessa, J., Raatikainen, Kaisa J., Raatikainen, K., Tuominen, S., Vainio, M., Vieno, M. & Vuomajoki, M. 2018. Perinnebiotoopit. Julk.: Kontula, T. & Raunio, A. (toim.).

Suomen luontotyyppien uhanalaisuus 2018. Luontotyyppien punainen kirja – Osa 1: Tulokset ja arvioinnin perusteet. Suomen ympäristökeskus & ympäristöministeriö, Helsinki. Suomen ympäristö 5/2018. s. 227-254. Cited on 18.12.2018.

<http://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/161233/Suomen%20luontotyyppien%20uhanalaisuus%202018%20OSA1.pdf?sequence=1&isAllowed=y>

Lihatiedotus 2012. Tietopaketti vastuulisesta broilerituotannosta Suomessa. 4/2012.

Cited on 19.12.2018. <https://docplayer.fi/4406399-Tietopaketti-vastuullisesta-broilerituotannosta-suomessa.html>

Luonnonlaidunliha, 2013. WWF.fi. [https://wwf.fi/vaikuta-](https://wwf.fi/vaikuta-kanssamme/uhanalaiset/hankkeet/metsalaidun/Luonnonlaidunliha-1630.a)

[kanssamme/uhanalaiset/hankkeet/metsalaidun/Luonnonlaidunliha-1630.a](https://wwf.fi/vaikuta-kanssamme/uhanalaiset/hankkeet/metsalaidun/Luonnonlaidunliha-1630.a)

Mekonnen, M. & Hoekstra, A. 2012. A Global Assessment of the Water Footprint of Farm Animal Products. *Ecosystems* (2012), 15, 401-415. Accessed on 28 March 2019. DOI: 10.1007/s10021-011-9517-8.

Mikkonen, M. 2018. Länsimaalaisten pitäisi vähentää lihansyöntiä 90 prosenttia, muuten ilmastonmuutoksen hillintä ei onnistu, varoittavat tutkijat. HS.fi 13.10.2018.

Cited on 16.1.2019. <https://www.hs.fi/ulkomaat/art-2000005863309.html>

Mistä ruoan ilmastovaikutukset syntyvät? N.d. WWF Suomi. Cited on 26.9.2018.

<https://wwf.fi/ruokaopas/lisaa-kasvista/Mista-ruoan-ilmastovaikutukset-syntyvat--1867.a>

Mistä suomalainen ruokakulttuuri koostuu? N.d. Ruokatieto.fi.

<https://www.ruokatieto.fi/ruokakulttuuri/paikallista-kulttuuria/mista-suomalainen-ruokakulttuuri-koostuu>

Mäkelä, J., Palojoki, P. & Sillanpää, M. 2003. Ruisleivästä pestoon: Näkökulmia muuttuvaan ruokakulttuuriin. Porvoo: WSOY.

Mäki-Petäjä, P. 2018. Vain noin prosentti suomalaisista on vegaaneja, mutta kasvisruoka kiinnostaa laajasti – tuhansia kävijöitä Vegemessuilla. Mtv.fi 24.2.2018. Cited on 14.10.2018. <https://www.mtv.fi/uutiset/kotimaa/artikkeli/vain-noin-prosentti-suomalaisista-on-vegaaneja-mutta-kasvisruoka-kiinnostaa-laajasti-tuhansia-kavijoita-vegemessuilla/6784378#gs.ZeQw=H0>

Natural Resources Institute Finland 2016. Organic meat production by Variable, Species and Year. Pro Luomu 2012 – 2015. Balance Sheet for Food Commodities. Statistic Database. Cited on 20.11.2018. http://statdb.luke.fi/PXWeb/pxweb/en/LUKE/LUKE_02%20Maatalous_04%20Tuotanto_06%20Lihantuotanto/03a_Luomulihan_tuotanto.px/chart/chartViewLine/?xid=ad79f3db-8ae9-463b-8537-117bae62bcb6

Natural Resources Institute Finland 2018. Consumption of food commodities per capita by Commodity and Year. Balance Sheet for Food Commodities. Statistic Database. Cited on 20.11.2018. http://statdb.luke.fi/PXWeb/pxweb/en/LUKE/LUKE_02%20Maatalous_08%20Muu_t_02%20Ravintotase/01_Elintarvikkeiden_kulutus.px/chart/chartViewLine/?xid=dc711a9e-de6d-454b-82c2-74ff79a3a5e0

Naudanlihalla ja maitotuotteilla on suuri hiilijalanjälki, N.d. WWF Ruokaopas. Cited on 6.11.2018. <https://wwf.fi/ruokaopas/vahemman-ja-parempaa-lihaa/Naudanlihalla-ja-maitotuotteilla-on-suuri-hiilijalanjalki-1859.a>

Nauta, N.d. WWF Lihaopas. Cited on 11.12.2018. <https://wwf.fi/lihaopas/Nauta-2817.a>

Niemi, J. & Väre, M. 2017. Suomen maa- ja elintarviketalous 2016/2017. Luonnonvara- ja biotalouden tutkimus 17/2017. Helsinki: Luonnonvarakeskus. Cited on 17.1.2019. https://www.luke.fi/wp-content/uploads/2017/04/luke-luobio_17_2017.pdf

Nummenmaa, L. 2004. Käyttäytymistieteiden tilastolliset menetelmät. Helsinki: Tammi.

Our work, N.d. WWF.fi. Cited on 6.11.2018. <https://www.worldwildlife.org/initiatives>

Overview of Greenhouse Gases, N.d. United States Environmental Protection Agency. Cited on 11.12.2018. <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>

Paarlberg, R. 2013. Food politics – What everyone needs to know. Second edition. Oxford University Press.

Penttilä, E. 2017. Kasvisruuassa maistuu seikkailu. 7/2017, Foodwest.fi. Cited on 8.11.2018. <https://www.foodwest.fi/2017/06/07/kasvisruuassa-maistuu-seikkailu/>

Pesonen, M. & Huuskonen, A. 2014 Naudanlihantuotannon ympäristövaikutukset – kirjallisuusselvitys. MTT Raportti 156. <http://www.mtt.fi/mtrraportti/pdf/mtrraportti156.pdf>

Pohjala, M. 2018. Puolet Suomessa käytettävästä soijasta on geenimuunneltua – Brasilialainen soija korvautuu osittain yhdysvaltalaisella. News article, Maaseudun Tulevaisuus, 6.8.2018. Cited on 3.1.2019.

<https://www.maaseuduntulevaisuus.fi/talous/artikkeli-1.278923>

Pohjolainen, P., Tapio, P., Vinnari, M., Jokinen, P. & Räsänen, P. 2016. Consumer consciousness on meat and the environment – Exploring differences. *Appetite*, 101, 37-45.

Responsible Soy, N.d. WWF. 3.1.2019.

http://wwf.panda.org/our_work/markets/mti_solutions/certification/agriculture/soy/

Rinne, M. & Kuoppala, K. N.d. Eläinten rehut ja ruokinta. Cited on 19.12.2018.

<https://www.luke.fi/tietoa-luonnonvaroista/maatalous-ja-maaseutu/elainten-ruokinta/>

Ruoka, 2017. Vastuullinen elämäntapa, WWF.fi. Cited on 8.11.2018.

<https://wwf.fi/vaikuta-kanssamme/vastuullinen-elamantapa/ruoka/>

Salo, H. 2016. Vähemmästä viisaammin – Kestävän kulutuksen ja tuotannon ohjelman (KULTU) toimenpiteiden seuranta 2005-2016. Ympäristöministeriön raportteja 26/2016.

https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/75551/YMra_26_2016.pdf?sequence=1

Schiffman, L. G., Kanuk, L.L. & Hansen, H. 2012. Consumer behaviour: A European outlook. 2nd ed. Harlow, England ; New York: Pearson Financial Times/Prentice Hall.

Sika tuotantoeläimenä. N.d. Eläintieto.fi. Cited on 4.1.2019.

<https://www.elaintieto.fi/sika-tuotantoelaimena/>

Sika. N.d. WWF.fi lihaopas. Cited on 4.1.2019. <https://wwf.fi/lihaopas/Sika-2818.a>

Steiner, J. & Franzluebbers, A. 2009. Farming with grass—for people, for profit, for production, for protection. Article, *Journal of Soil and Water Conservation*, 64, 2, 75A-80A. Cited on 18.12.2018.

http://www.fao.org/fileadmin/templates/agphome/scpi/cgwg/2009ajfX02_-_Farming_with_grass_-_JSWC_64_75A.pdf

Stylianou, N., Guibourg, C. & Briggs, H. 2018. Climate change food calculator: What's your diet's carbon footprint? BBC News 13.12.2018. Cited on 16.1.2019.

<https://www.bbc.com/news/science-environment-46459714>

Tammenheimo, P. 2018. Ruoka on ympäristökysymys. Blog, Aromi-lehti 15.11.2018.

Cited on 16.1.2019. <https://aromilehti.fi/artikkelit/ruoka-on-ymparistokysymys/>

The World Commission on Environment and Development 1987. Our Common Future. Cited on 16.1.2019.

<http://www.un-documents.net/wced-ocf.htm>

Tietoa meistä, 2017. WWF.fi, updated on 24.11.2017. Cited on 6.11.2018.

<https://wwf.fi/wwf-suomi/tietoa-meista/>

Tilastokeskus 2018. Kansantalous. Updated on 3.8.2018. Cited on 15.1.2019.

https://www.tilastokeskus.fi/tup/suoluk/suoluk_kansantalous.html

Uhat, N.d. WWF.fi. Cited on 6.11.2018. <https://wwf.fi/uhat/>

Vaara, K. 2018. Lehmä elää vain pienen osan luonnollisesta eliniästään – ”Se on kuin huippu-urheilija”. News article yle.fi 4.6.2018. Cited on 19.12.2018. <https://yle.fi/uutiset/3-10028492>

Vartia, J. 2018. Elintarvikkeiden vienti virkoaa kasvuun. Article. Elintarviketeollisuusliitto 19.4.2018. Cited on 8.11.2018. <http://www.etl.fi/ajankohtaista/artikkelit/2018/elintarvikkeiden-vienti-virkoaa-kasvuun.html>

Viinisalo, M., Nikkilä, M. & Varjonen, J. 2008. Elintarvikkeiden kulutusmuutokset kotitalouksissa vuosina 1966-2006. Kuluttajatutkimuskeskus, julkaisuja 7. https://helda.helsinki.fi/bitstream/handle/10138/152387/Elintarvikkeiden_kulutusp_muutokset_kotitalouksissa_vuosina_1966-2006.pdf?sequence=1&isAllowed=y

Vinnari, M. & Vinnari, E. 2013. A Framework for Sustainability Transition: The Case of Plant-Based Diets. Journal of Agricultural and Environmental Ethics (2014) 27: 369-396. Cited on 8.1.2019. https://foodethics.univie.ac.at/fileadmin/user_upload/inst_ethik_wiss_dialog/Vinnari_Markus_Vinnari_Eija_2014_A_Framework_for_Sustainability_Transition_The_Case_of_Plant-Based_Diets.pdf

Vornanen, J. 2016a. Rajallisten resurssien suurkulutusta. From the book Lihansyöjien maa, toim. Anttonen, T. & Vornanen, J. Helsinki: Into Kustannus, p. 104-109.

Vornanen, J. 2016b. Vesistöjen ja ilmaston kuormittaja. From the book Lihansyöjien maa, toim. Anttonen, T. & Vornanen, J. Helsinki: Into Kustannus, p. 109-117.

Vähemmän ja parempaa lihaa, N.d. WWF:n ruokaopas – herkuttele vastuullisesti. WWF.fi. Cited on 8.11.2018. <https://wwf.fi/ruokaopas/vahemman-ja-parempaa-lihaa/>

Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., Garnett, T., Tilman, D., DeClerck, F., Wood, A., Jonell, M., Clark, M., Gordon, L., Fanzo, J., Hawkes, C., Zurayk, R., Rivera, J., De Vries, W., Sibanda, L., Afshin, A., Chaudhary, A., Herrero, M., Agustina, R., Branca, F., Lartey, A., Fan, S., Crona, B., Fox, E., Bignet, V., Troell, M., Lindahl, T., Singh, S., Cornell, S., Reddy, K., Narain, S., Nishtar, S. & Murray, C. 2019. Food in the Anthropocene: the EAT-Lancet Commission on healthy diets from sustainable food systems. The Lancet Commissions 02/2019. Vol 393, 447-492. Cited on 19.3.2019. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)31788-4/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)31788-4/fulltext)

WWF:n Ruokaopas – herkuttele vastuullisesti, N.d. WWF.fi. Cited on 8.11.2018. <https://wwf.fi/ruokaopas/>

WWF's mission, N.d. Cited on 6.11.2018. <https://www.worldwildlife.org/>