Kristianstad University
SE-291 88 Kristianstad
Sweden
+46 44 250 30 00
www.hkr.se

Degree Project, 15 credits, for the degree of master program in Food and Meal Science
Autumn Semester 2020
Department of Food and Meal Science

Reducing Meat Consumption: A Mixed-Methods Study Investigating Attitudes of Young Adult Omnivores

Dimah Albenny

Author
Dimah Albenny

Title
Reducing Meat Consumption: A Mixed-Methods Study Investigating Attitudes of Young Adult Omnivores.

Supervisor
Elisabet Rothenberg

Examiner
Karin Wendin

Abstract

Background

Meat is one of the most nourishing and highly consumed foods, but the controversy around the consumption of meat products, and the negative effects around the consumption of meat products led to increased scholarly attention on the user willingness to alter their meat consumption.

In Sweden, a guideline by the Livsmedelsverket (The Swedish National Food Agency) in 2015 encouraged people to consume less red and processed meat. This was because 72 per cent of men and 42 per cent of women in Sweden have individual consumption levels that exceed the 500 grams per week of red and processed meats as recommended by the World Cancer Research Fund.

Objective:

This planned mixed-methods study inquires about the attitudes of young adult omnivores towards the reduction of meat intake, their expected liking of changing dietary habits, and motivation towards the reduction of meat consumption in Sweden. Changing dietary habits in the current context refers to the participant's willingness to favour meat alternatives.

Methods:

The current study is a convergent mixed method design using both a quantitative survey and qualitative interviews to collect primary data.

Results and conclusion:

The participants from both the qualitative and quantitative study are broadly worried about the health problems associated with high meat consumption and motivation for reducing meat consumption was based on health as well as ethical issues. Being opposed to reducing meat consumption is a common position for young adult omnivores.

Keywords:

Negative effects, Reduction of meat consumption, Meat alternatives, Expected liking, Consumer willingness, Diet habits and attitudes, Motivation toward meat consumption.

Sammanfattning

Bakgrund:

Kött är ett av de mest näringsrika och mest konsumerade livsmedlena. Med anledning av att man funnit negativa effekter av en hög konsumtion av kött har man vetenskapligt alltmer börjat intressera sig för konsumentens vilja att ändra sin köttkonsumtion.

I Sverige uppmanade Livsmedelsverket Sveriges befolkning att konsumera mindre rött kött och bearbetade köttprodukter. Bakgrunden till detta var att 72 % av männen och 42 % av kvinnorna i Sverige har individuella konsumtionsnivåer som överstiger 500 gram av rött kött och bearbetade köttprodukter per vecka, vilket är en maxrekommendation från Världscancerforskningsfonden.

Mål:

Denna blandmetodstudie undersöker attityden för att minska köttkonsumtionen hos unga vuxna allätare i Sverige, deras förväntade åsikter kring förändrade kostvanor samt deras motivation att minska sin köttkonsumtion.

Metoder:

I den aktuella studien ingår en metoddesign som innefattar både en kvantitativ undersökning och kvalitativa intervjuer för att samla in primära data.

Resultat och slutsats:

Deltagarna från både den kvalitativa och den kvantitativa undersökningen är i stort sett överensstämmande och visar att försökspersonerna är oroliga för de hälsoproblem som är förknippade med hög köttkonsumtion och deras motivation för att minska köttkonsumtionen baserades på frågor kring hälsa och etik. Det var vanligt förekommande bland försökspersonerna att vara bunden till köttkonsumtion.

Nyckelord:

Negativa effekter av köttkonsumtion, Minskning av köttkonsumtion, Köttalternativ, Förväntade åsikter, Kostvanor och attityder, Motivation att minska köttkonsumtion

Table of Contents

Tables

Figures

Introduction

Meat is one of the most widely consumed and nourishing foods, yet high consumption has frequently been linked to negative effects on the environment and human health (Bis-Souza et al., 2019; Tarrega et al., 2020). In recent years, there has been increased research on the psychological and sociological impacts of consuming meat products. Some of the research relates to human motivation for consuming meat (Milford et al., 2019), influential factors to meat consumption (Horgan et al., 2019), and the effect of demographics on meat consumption (Min et al., 2015).

The negative environmental and human health effects of meat products have led to increased scholarly attention on the willingness of users to alter meat consumption (Malek et al., 2019). Moreover, there has research on encouraging meat users to make a behavioural change (Weibel et al., 2019) and sensitizing people on the negative environmental effects of meat production (Sanchez-Sabate & Sabaté, 2019). As well, some researchers have examined whether leading food retailers might influence consumers to accept meat alternatives (Gravely & Fraser, 2018) and others have examined whether mixed meat and vegetable diet would be an appealing meat alternative to consumers (Tarrega et al., 2020).

Consequently, scholars within the food science industry have recently focused on the production of these meat substitutes with the ambition not to affect texture and taste qualities. For example, Kumar (2019) examined the use of fat replacers to develop low fat processed meat products without the loss of texture and taste qualities. Other examined areas include; meat processed with dietary fibres (Barretto et al., 2015) improving meat microbiological stability (Saldaña et al., 2018), replacing meat fat content (Bis-Souza et al., 2019), new meat fermentation processes (Maere et al., 2018), and adding probiotics as well as prebiotic microorganisms to meat products (Neffe-Skocińska et al.,

2016). Few studies have focused on measuring the attitudes and perceptions of adult omnivores towards reducing their meat consumption (Tarrega et al., 2020; Bis-Souza et al., 2019; Milford et al., 2019; Horgan et al., 2019; Min et al., 2015). Furthermore, the few studies measuring the attitudes and perceptions of reducing meat consumption among adult omnivores have primarily been from a quantitative perspective and lack understanding from a qualitative approach (Bis-Souza et al., 2019; Tarrega et al., 2020; Milford et al., 2019; Horgan et al., 2019; Min et al., 2015).

In Sweden, a guideline by the Livsmedelsverket (the Swedish National Food Agency) in 2015 encouraged people to consume less red and processed meat (Darnerud & Ilbäck, 2014). About 72 percent of men and 42 percent of women in Sweden have individual consumption levels that exceed the 500 grams per week of red and processed meats recommended by the World Cancer Research Fund (WCRF; Bjerselius, Konde, & Färnstrand, 2014). On average, Swedish women consume 480 grams of red and processed meats per week, whereof 35 percent is processed meat. Swedish men on average consume 800 grams of red and processed meats per week, whereof 35 percent is processed meat. In addition, when the average of the highest meat consumers was computed (5 percent of individuals with the highest consumption), it was established that Swedish men consumed 1670 grams and Swedish women consumed 1000 grams of red and processed meats per week (Bjerselius, Konde, & Färnstrand, 2014). These statistics highlight the need to investigate the attitude, perception, and motivations towards the reduction of meat consumption in Sweden, particularly red and processed meats. A study of reducing meat consumption is significant for several reasons.

First, understanding consumer motivations and habits toward meat consumption can help reveal their meat “involvement”. Involvement is a crucial characteristic that shapes consumer response towards food products according to Hung et

al. (2016). In this case, involvement reveals the perceived personal importance or interest evoked by meat products. For example, how users make decisions towards meat products, the importance of meat to a person, and the feelings of pleasure it provokes. This would help food manufactures and policymakers come up with strategies to change consumer motivations and habits towards meat consumption.

Second, a fundamental decision confronting all societies' concerns climate change. Research has found that meat production has a direct impact on the environment through the conversion of land for agriculture (Ramankutty & Foley, 1999), over-grazing (De-Sy et al., 2015), over-fertilization of grazing areas (Graesser et al., 2015), and greenhouse gas (GHG) emissions (Godfray et al., 2018). This study examines the perception of meat consumers towards the environmental impact of meat production. Knowledge of the attitude of meat consumers towards the environmental impact of meat production can serve as input for policymakers in making meat production policies.

Third, analyzing consumer perception towards their dietary needs, health, and habit of meat consumption can help stakeholders come up with strategies that improve consumers' confidence as well as motivation in reducing meat consumption. To this end, the study examines perception of the participants towards changing their dietary habits. Changing dietary habits in the current context refers to the participant's willingness to favour meat alternatives (Tarrega et al., 2020). Furthermore, food science practitioners and other stakeholders would understand the factors that both positively and negatively influence the reduction of meat consumption in Sweden.

Aim

This mixed-methods study inquires about the attitudes of young adult omnivores towards meat consumption, changing dietary habits, and motivation towards the

reduction of meat consumption in Sweden. A convergent mixed-methods study is used to discuss the observed differences and similarities between qualitative (text) and quantitative (numeric) data. The study answers the following specific questions:

(1) What are the common attitudes among young adult omnivores towards meat consumption in Sweden?

(2) What is the agreement between the quantitative and the qualitative findings on young adult omnivores' attitude towards changing dietary habits on meat consumption in Sweden?

(3) Do the young adult omnivores have the motivation to reduce their meat consumption?

Literature Review

Few studies have focused on measuring the attitudes and perceptions of meat users towards reducing their consumption. Nonetheless, meat consumption and the quantities of consumed meat have been rising, fuelled by increasing income levels as well as significant population growth according to the Food and Agriculture Organization (FAO, 2018). The FAO (2018) dataset contained projections on meat products, besides other agricultural commodities, and included data on production, output, prices, trade balance, consumption, ending stocks, and transformation, etc. The data dates back to 1970 and covered up to 2018. Advanced analyses indicate major changes in the type of consumed meats towards increased intake of pork and chicken. Moreover, and more important to the current study, a greater proportion of the consumed meat is often processed before purchase (FAO, 2018).

Health effects of meat consumption

In most western countries, statistics show that the mortality rates are moderately higher for individuals with high intake of both red and processed meat than individuals with low consumption levels (Wolk, 2016). However, there have been no similar associations between mortality and consumption of poultry meat (Jackson et al., 2016; Rohrmann et al., 2013). Strong evidence of the negative effects of processed red meat consumption on human health was found on colorectal cancer. For example, the International Agency for Research on Cancer (IARC) categorized processed red meat as a carcinogen to human health. This was because of the association between processed red meat and colorectal cancer. According to Bouvard et al. (2015), red meat is generally categorized as possibly carcinogenic because it correlates with colorectal cancer.

According to global estimates by IARC, 34,000 cancer-related deaths annually are related to high processed meat diets. Furthermore, high red meat diets might be attributable to approximately 50,000 cancer-related deaths per year globally if the reported link between red meat and cancer were proved as causal (IARC, 2015). The average processed meat intake in Europe calculated based on IARC classification would result in a 9% increase of colorectal cancer risk (Micha, 2015). High processed meat consumption has been linked to increased stomach cancer risk, but no strong evidence it might increase the risk of other cancers. These IARC classifications of red meat were based on the analysis of epidemiology data and mechanistic evidence from 800 human and animal studies (IARC, 2015). The study hypotheses established that using nitrite to preserve meats, smoking of meat, and cooking of meat at high temperatures produces different carcinogenic compounds such as N-nitroso compounds (NOCs), polycyclic aromatic hydrocarbons (PAHs), and heterocyclic aromatic amines (HAAs; Turesky, 2018). Also, the ingestion of heme from meat catalyses the formation of lipid peroxidation products (LPOs) and NOCs

in the digestive tract. These carcinogenic compounds form DNA adducts, which are covalent modifications of the DNA that can initiate carcinogenesis (IARC, 2015).

Consumption of processed meat has been further linked with increased risk to other diseases, albeit non-conclusive evidence. For instance, studies have reported high processed meat intakes are attributable to a moderate increase in mortality risk from cardiovascular illness (Rohrmann et al., 2013). The research suggested that high processed meat intake was responsible for an increased risk of diabetes (Wolk, 2016), and weight gain (Vergnaud et al., 2010).

In Western countries, reduced meat intake is an indicator of a healthy lifestyle, but in developing countries, reduced meat intake is an indicator of poverty and is correlated with risk factors of poor health (Farvid et al., 2017). For example, a meta-analysis in Asia and a recent Iranian cohort study suggested that meat consumption was significantly lower compared with the United States (US). Importantly, the studies found no correlation with the overall risk of mortality, cancer-related mortality, or mortality from cardiovascular illnesses (Farvid et al., 2017).

Nonetheless, red meat is highly nutritious, especially from naturally fed and raised animals. Red meat richly contains vitamin B12, a vital nutrient for proper functioning of the human body system. Research has found evidence that red meat can significantly contribute to the overall vitamin D intake, particularly for individuals consuming less oily fish diet or have limited exposure to direct sunlight (Wyness et al., 2011). Red meat contains 25-hydroxycholecalciferol, which is a vitamin D metabolite that is assimilated more easily and quickly than vitamin D from other dietary forms. For individuals with limited exposure to direct sunlight, red meat provides protection against rickets, which is caused by severe deficiency of vitamin D (Dunnigan & Henderson, 1997).

Additionally, red meat primarily contains heme iron, which is utilized and absorbed much more efficiently compared with the non-heme iron contained in plant – based foods (Wyness et al., 2011). According to Wyness et al. (2011) red meat is a rich source of zinc, which is highly bioavailable, and the smallest amount of red meat can significantly increase utilization of zinc from all other food sources. Zinc is a vital nutrient that is important for many physiological functions such as structure in some enzymes and proteins, as well as regulating gene expression (Hunt, 2003). Finally, red meat significantly contains other minerals including copper, cobalt, magnesium, chromium, phosphorus, selenium, and nickel (Wyness et al., 2011).

Overall, while meat has been linked to cancer- and cardiovascular-related deaths, meat still contains essential nutrients that are important for the body to perform its vital functions, such as high quality protein, essential amino acids, as well as micronutrients including iron, vitamin B12, and zinc (Wolk, 2016). However, these nutrients can still be obtained without eating meat by consuming a wide variety of other foods according to a study in the United Kingdom (Appleby et al., 2015).

Effects of meat consumption on the environment

Over the past 20 years, researchers in the life-cycle field have examined greenhouse gas (GHG) emissions (Godfray et al., 2018). The agricultural sector accounts for 25.5% of total global emissions. Methane is among the most significant GHGs, which has 21 times more potential for global warming compared with carbon dioxide. Ruminant livestock such as cows contributes the biggest share of total methane emission (Godfray et al., 2018). The emission produced by cows is not only related to environmental problems but is linked to energy losses. Research has found that meat produced increases GHG emissions per kcal than the production of plant-based foods. This is because, at each trophic level in the food web, the energy is lost (Godfray et al., 2018). There are four trophic levels:

producers that make their food (plants and algae), primary consumers (herbivores that consume plants), secondary consumers (carnivores that consume herbivores), and tertiary consumers (carnivores that consume other carnivores). At each trophic level, energy loss occurs as metabolic heat as organisms eat other organisms from the preceding trophic level (Godfray et al., 2018). When the production of different types of meat was analyzed, ruminant production led to high emissions compared with non-ruminant mammals. Production of poultry led to fewer emissions compared with mammals. According to Godfray et al. (2018), these differences were contributed by the fact that 8% of beef production occurs in extensive, grass-fed–only systems. Grazing has a complex effect on the environment such as emissions through erosion and overgrazing. The system of meat production is important to the environment. Per output unit, intensive rearing of animals produces fewer emissions compared with extensive systems.

Furthermore, the most significant direct impact of meat production on the environment is through the conversion of land for agriculture (Ramankutty & Foley, 1999). This includes converting natural habitats to grasslands for livestock grazing and to arable land for grain as well as soya production for livestock consumption. For example, De-Sy et al.'s (2015) analysis of South American rainforest conversion suggested that approximately 71% of conversion was for cattle ranching. Furthermore, another 14% conversion was for commercial cropping, which included soya for animal feed (Graesser et al., 2015). For the last two decades, soya exports from South America to the rest of the world had dramatically increased to constitute one of the leading global commodity flows.

In Europe and the US, most grazing areas are over-fertilized. Meaning the soil is overloaded with contaminants, particularly phosphorus and nitrogen, which contaminate surface and groundwater. The production of livestock negatively affects the environment through overgrazing, which has deleterious effects in drylands (Graesser et

al., 2015). The higher offtake from the ecosystem by livestock (compared with wild herbivores offtake) reduces and changes the diversity of plant species. Eventually, the trampling on slopes and reduced plant cover results in soil erosion as well as additional biodiversity loss (Graesser et al., 2015).

Habit attitudes towards reduction of meat consumption

The negative effects of meat consumption have led to increased scholarly attention on the user willingness to alter meat consumption (Malek et al., 2019). For example, Ruby (2012) through a meta-analysis reviewed the existing literature, studying vegetarianism motivations and existing dietary variants of meat reduction. The study examined the different attitudes, perspectives, values, and distinct gender differences between vegetarians and omnivores. The results indicated that non-omnivores were intensely criticised in traditionally farm-based cultures, in which meat contributed a significant percentage to the economy. Cultural shaped emotions and norms had a strong effect on the user's sense of immoral and moral attitudes. Based on the findings, the author recommended a broader analysis of meat consumption attitudes across different cultures.

Moreover, Lupton and Turner (2018) examined the attitudes of Australian participants towards a range of insect-based ingredients and laboratory-cultured meat combined using a three-dimensional (3D) printer. Data were collected using online surveys and discussions. The results showed that the food consumption priorities of the participants centred on qualities of taste, naturalness, and health. Meaning, 3D printed meat products were considered unnatural, and hence not fresh, not nutritious, lacking taste, and potentially harmful. Based on the findings, the authors concluded that the acceptability and appeal of using 3D printing technologies to combine ingredients like insects or cultured meat had to overcome major cultural obstacles.

Furthermore, Weinrich and Elshiewy (2019) analyzed the preferences of consumers towards meat alternatives based on microalgae. A quantitative conjoint analysis was performed involving 938 consumers in Germany, France, and the Netherlands to reveal user willingness as well as preferences to reduce meat consumption. The results revealed that non-frequent meat consumers had a high likelihood of reducing meat consumption by choosing meat alternatives based on microalgae. Nonetheless, frequent meat consumers showed significant difficulties with the reduction of their meat consumption. Based on the results, the study recommended the need for future research to understand user attitudes towards the reduction of meat consumption.

Diet, motivation, and ethical attitudes towards reduction of meat consumption

Siegrist and Hartmann (2019) examined the ethical effect of health consciousness, food preference, and disgust sensitivity on the consumption of organic meat. The study analyzed quantitative data drawn from 5586 participants of German and French origin in Switzerland. The results showed that omnivores with low levels of meat consumption, understanding the unethical effects of meat production, and low sensitivity of food disgust were more likely to reduce meat consumption. Also, high health consciousness, being young, female, and better education were other factors associated with the reduction of meat consumption. Based on these findings, the study concluded that high consumer knowledge of the ethical and environmental effects of foods would lead to a viable reduction of meat consumption.

Finally, Tarrega et al. (2020) investigated the readiness of omnivores to introduce 100 per cent vegetable protein and mixed beef-vegetable protein into their diet. Quantitative data was collected from 251 participants using a structured questionnaire focusing on habits, diet, ethics, health, the environment, and hedonism. The findings

revealed that the motivations of consumers favourable towards their reduction of meat consumption were based on health and ethics issues, whereas consumers opposed to reduction of their meat intake alluded to dietary and enjoyment habit. Based on the study findings, the authors concluded that meat alternatives could be a reliable, yet timid, option for attached omnivores (individuals opposed to reducing their meat consumption). However, unattached omnivores (individuals unopposed to reducing their meat consumption) would consider 100 per cent vegetable protein and mixed beef-vegetable protein a worthy alternative to meat.

Literature deficiencies

Overall, the aforementioned studies have examined attitudes and perceptions of consumers towards meat consumption, albeit from a quantitative perspective. Despite the increasing interest in the reduction of meat consumption, it is surprising that so little empirical research has been conducted on the topic in Sweden, especially from the qualitative perspectives. This is despite the significant evidence linking processed and red meat with negative effects on the environment and human health (Bis-Souza et al., 2019; Tarrega et al., 2020). Bullock et al. (2017) suggested that quantitative design is suitable for measuring attitude, opinion, and behavior. Quantitative designs are suitable for answering questions dealing with quantity such as when, how often, who, how much, or how many. However, the quantitative design is suitable to extend the understanding of a research area. On the contrary, a qualitative design is suitable when there is little knowledge concerning a specific issue and is applied to measure a variable's quality. Research on the attitude and perceptions of consumers towards meat consumption is especially scarce in Sweden. Therefore, because of the limited research in Sweden, it is suitable for this study to use a mixed-study design to enable the researcher to get a deeper understanding of the topic (Creswell, 2014). A qualitative focus would help gain an in-depth perspective on attitudes

and perceptions of consumers towards meat consumption. The in-depth perspective would benefit academia by providing new insight into the existing literature on consumer attitudes towards meat intake and perceptions of meat alternative foods in Sweden.

Materials and Methods

Sample size

The target population of this convergent mixed-methods study is young adult omnivores in Mälardalen University, Västerås, Sweden. This aligns with the prior research by Tarrega et al. (2020) that involved young adult omnivores. Mälardalen University has a population of 5,000 students. The educational programs offered by Mälardalen University include business courses, communication, engineering courses, health sciences, law, computer and information sciences, as well as mathematics. Additionally, approximately 95% of the students are below the age of 35 years (Mälardalen University, 2020). The simple random sampling technique is used to sample the participants, which is calculated using Yamane's sampling formula, assuming a 0.5 margin of error. The margin of error indicates how many percentage points the results will vary from the actual population value (Yamane, 1973).

$$n = \frac{5000}{(1 + 5000\ x\ (0.05)^2)}$$

$$n = 370.33$$

Hence, the study samples 370 young adults from Malardalens University in Västerås, Sweden to participate in the study. Data collection for the qualitative part of the study is from 30 out of the 370 participants included in the study and the remaining 340 participants are included in the quantitative part of the study. To this end, the process begins with an initial random selection of 370 participants out of the 5000 students for inclusion

in the study. Out of the 370, the researcher then randomly selects 340 participants for inclusion in the quantitative part of the study and 30 participants to take part in the qualitative part of the study.

Access is granted from the university's student database from the dean of studies. The study uses a simple random technique to sample the participants for both the qualitative and quantitative parts of the study. This means that all the students have an equal chance of inclusion in either part of the study if they satisfy the inclusion criteria. The participants' inclusion and exclusion criteria are presented in table 1.

Table 1

The participants' inclusion and exclusion criteria

Inclusion Criteria	**Exclusion Criteria**
• Students at Mälardalens University in Vasteras • Omnivore consumer of red meat at least once a week • Age of 18 and 35 years old	• Following any restrictive diet including reduced calorie intake or avoidance of specific foods

To screen the participants, both the inclusion and exclusion criteria are included in the questionnaire's profile section, where participants are requested to indicate their age and dietary habits. Where a participant's response violates the inclusion or exclusion criteria of the web-based survey, the data collection would end. Similarly, where the participant's response violates the inclusion or exclusion criterion of the qualitative questionnaire, the researcher would end the interview.

Data Collection

In this mixed-methods approach, data is collected simultaneously using a questionnaire adapted from the study by Tarrega et al. (2020) to measure young adult omnivore's attitude towards meat consumption, changing their dietary habits, and

motivation towards the reduction of meat consumption in Sweden. The rationale for using convergent mixed methods is to collect both qualitative and quantitative data in the same phase of the research process. Meaning both methods are equally assessed, independently analyzed, and the results triangulated to establish the differences or similarities between the responses.

Quantitative data is collected using a web-based survey. A questionnaire is developed to assess the participant's attitudes towards meat consumption, changing dietary habits, and motivation towards the reduction of meat consumption. The questionnaire comprises 36 statements (see Appendix A), all adapted from the previous questionnaire by Tarrega et al. (2020), that covered six aspects (Diet, Habits, Ethics, Motivation, Health, and Environment).

The study participants rate their level of agreement with each statement using a 7-point Likert scale represented as:

- 1 = Strongly disagree
- 2 = Mostly disagree
- 3 = Somewhat disagree
- 4 = Neither disagree nor agree
- 5 = Somewhat agree
- 6 = Mostly agree
- 7 = Strongly agree

The order of presenting the statements in the questionnaires is varied following a balanced design, where some statements are reverse coded. Similar to the study by Tarrega et al. (2020), the participants are grouped into PRO-meat reduction, ANTI-meat reduction, and intermediate (INTERM-) groups based on their scoring of these statements.

The qualitative data is collected using face-to-face interviews. A qualitative questionnaire (see Appendix B) is framed based on the six themes in the quantitative questionnaire (Diet, Habits, Ethics, Motivation, Health, and Environment). Several follow up questions are prompted based on the responses given by the respondents to allow the elaboration of answers as recommended by Johannesson and Perjons (2014). The researcher uses appointment to book interview time with the participants sampled for the qualitative study. It is estimated that each interview takes approximately 40 minutes to complete. Once a suitable time and date are agreed upon, the face-to-face interviews for qualitative data collection take place. Both the quantitative and qualitative participants have a maximum period of 21 days to give their responses. The researcher sends reminders every 7 days to help increase the response rate. An overview of the research methodologies for both the quantitative and qualitative data is presented in Appendix C.

Validity and Reliability

The questionnaire's content validity needs testing to ensure the collected data is both reliable and accurate. Tarrega et al. (2020) established that their questionnaire Cronbach's α values were higher than 0.6 for all the six dimensions. This indicated the statements had good reliability for measuring the attitudes and perception of consumers regarding each element related to reducing meat consumption. The researcher carries out a reproducibility study to test the questionnaire using pilot testing.

In the study, piloting is done on 20 participants for the quantitative design, who are recruited from the target population but excluded from the main study. The pilot study ensures any questionnaire errors are identified and corrected early to collect reliable and valid data. Table 2 below presents Cronbach's alpha findings from the questionnaire piloting. As table 2 presents, all the variables have Cronbach's alpha value of >.7, indicating good internal data reliability similar to the study by Tarrega et al. (2020).

Table 2

Questionnaire reproducibility testing

Variable	No of Items	Cronbach's alpha
Diet attitude	7	.910
Attitude toward meat alternatives	5	.892
Ethical attitude of animal suffering	6	.702
Motivations towards meat consumption	8	.766
Attitude toward health effects	5	.776
Environmental concerns	5	.792

In addition, qualitative data need testing for reliability. The intercoder agreement proposed by Creswell and Clark (2018) helps achieve the reliability of the collected qualitative data. This procedure involves establishing a codebook, and then several individuals code the transcript of the collected data. Comparison of the coded transcripts is done to establish any differences or similarities in the coding. The data is considered reliable if there are minimal differences in the coding.

Data analysis

Qualitative data analysis

The interpretation of the qualitative data involves the classification of data into meaningful and relevant categories before performing the thematic analysis (Saunders et al., 2016). During the categorization process, the collected raw data is organized into meaningful themes or categories, which are used to establish a codebook. The next analysis phase involves assigning relevant units of data to the identified themes. The researcher groups the qualitative data into relevant units, which allows thematic analysis. Because the aim is for the qualitative results to complement the quantitative findings, answers for each question are associated with the 36 statements in the study using keywords. For example, "if a participant indicates that it is a must to eat meat every day", then such answer is related

with the keywords “meat is irreplaceable” and associated with the statement “meat is irreplaceable in my diet”. Some of the other possible keywords include “unnatural”, “unhealthy”, “tasteless”, and “provides energy”, among others. A question can contain several keywords, indicating multiple responses. To this end, the researcher counts the number of mentions for each keyword (which is associated with each of the 36 statements) and the results are reported. Additionally, some direct quotations are considered important and are highlighted for inclusion in reporting the findings. A chart is developed, which records the pennames assigned to the participants as the main identification feature.

Quantitative data analysis

The statistical data analyses use the procedures described in the following paragraphs. Because the quantitative study collected Likert-type data, the aim is to establish the central tendency (where most participants have an agreement) and the spread of the responses (the level of agreement between participants). Two key statistics allowing this kind of analysis include the median and Inter-Quartile Range (IQR) of each item. The median shows the central tendency and IQR shows the level of agreement from the dispersion of the responses.

Multiple linear regression is a popular and the simplest statistical method that uses a set of explanatory variables to predict the outcome of a response variable (Field, 2013). This makes multiple linear regression suitable in the study to predict the attitude of participants towards the reduction of their meat consumption. To perform multiple linear regression, the sum of the Likert items for each of the six explanatory variables (Diet, Habits, Ethics, Motivation, Health, and Environment) is computed to derive the Likert scale score for each variable. The measurement level of the sum is treated as an interval scale if each variable has five or more items. According to Glass et al. (1972), and Lubke and

Muthen (2004), transforming Likert-type data into interval data can allow parametric tests to be performed where assumptions for each test are not violated.

To derive the dependent variable (the response variable), the individual sum of the 36 items allows the researcher to compute the average score for each participant, and the participants are grouped as PRO-meat reduction, ANTI-meat reduction, and INTERM groups. The groups include: Pro (participants willing to reduce their consumption of meat, mean scores spanning 4.6 to 7), Anti (participants not willing to reduce their consumption of meat, mean scores spanning 1 to 3.5), and Interm (participants having intermediate attitude between Anti and Pro, mean scores spanning 3.6 to 4.5).

Multiple linear regression is applied to analyse the relationship between the explanatory variables (from herein referred to as the independent variables – IV's) and the response variable (from herein referred to as the dependent variable - DV). The "enter" method is used, where all the covariates are entered at once and their level of significance determined. The model is represented by the following expression

$$\mathbf{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 \mathcal{E}}$$

Where

- **Y**= attitude towards the reduction of meat consumption (PRO, ANTI, and INTERM group)
- **β_1...B8**= coefficients of determination
- **X_1** = Diet attitudes towards meat consumption
- **X_2**= Habits towards meat consumption
- **X_3**= Ethics toward animal suffering and killing
- **X_4**= Motivation of meat consumption
- **X_5**= Health attitudes towards meat consumption
- **X_6**= Environment attitudes towards meat consumption
- **X_7**= Age
- **X_8**= Gender

- $\mathbf{\varepsilon}$ = Error term

This expression represents the correlation between the IV's and the dependent variable DV as a weighted average. In this case, the (β's) are the regression weights and the primary regression assumption is that each of the IV has an additive effect. Gender and age of the participants are used as control variables. Four assumptions are made by the researcher in using the regression model: the data is normally distributed, there is linearity (a linear relationship between the DV and IVs), the residuals are homoscedastic, and there is no multicollinearity.

Homoscedasticity test is done to check whether the residuals have an equal distribution. To test the homoscedasticity of the regression residuals, a visual examination is done on the Predicted Probability (P-P) plot of the standardized residuals. Regression residuals are normally distributed randomly around 0, which provides a relatively even distribution.

To check whether data is normally distributed, the P-P plot is visually examined to check the distribution of the regression residuals. As proposed by Berry and Feldman (1985), the regression residuals should follow the diagonal normality line for data to have a normal distribution. To test linearity and multicolinearity, the variance inflation factor (VIF) values and Tolerance values from the multiple linear regression test are applied. Multicolinearity between the independent variables results in a strong correlation. The VIF values for the IV's should have scores spanning >1 and <10. Moreover, the tolerance values are the reciprocal of the VIF values. The IV's should have tolerance values of >.10. Both the tolerance values and VIF values indicate there is linearity and there is no multicolinearity.

Ethical considerations

Generally, there are various ethical considerations made in the study. When approaching the study participants, the researcher explains the aim and purpose of study. As well, the researcher makes it clear that there are no risks, costs, or benefits for participating in the study. Furthermore, the researcher assures the participants that reasonable precaution is taken to protect the participant's responses and identity such as not revealing identification information such as an address, name, phone number, or phone number.

The researcher has the responsibility of selecting a site and population of study without any deliberated interests. Similarly, the study uses a questionnaire from a previous study (Tarrega et al., 2020). This allows the maintaining of the objectivity required for quantitative research and the full expression of varying perspectives needed in qualitative research (Creswell, 2014).

The researcher has the ethical responsibility of not pressuring participants into signing consent forms. Participation in the study is voluntary and participants receive all the instructions for the consent form to decide freely their participation in the study. Moreover, participants receive all the instructions that remind them about the purpose of the study. Other ethical issues considered involve ensuring no suppressing, inventing, or falsifying findings to satisfy the needs of the researcher or the study audience (Creswell, 2014).

Citations provide credit for other works paraphrased and quotation marks indicate the exact words claimed from others throughout the study (Johannesson & Perjons, 2014). This is because the researcher has the ethical responsibility of ensuring work by others is not presented as their own. This study maintains confidentiality of any information that could harm participants and the participants retain the ownership of their responses as

well as exercise their independence in decision-making. Regarding data storage, the researcher securely stores data in a password-protected drive, before permanently deleting the data after the master thesis is completed (Veal & Darcy, 2014).

Qualitative study ethical consideration

The researcher has the ethical responsibility of pre-anticipating the possibility of disclosure of harmful information during the interview process (Veal & Darcy, 2014). The qualitative questionnaire does not include any questions that might be considered ethically sensitive. The qualitative data ensures the anonymity of participants throughout the study by not collecting contact information and using pennames throughout the reporting of the findings. The ethical code for the researcher is to protect the participant's privacy and convey the protection to all involved individuals. The researcher has an ethical responsibility of not withholding important results and not to report the thematic results based on personal inclinations (Creswell, 2014). As such, the study reports the full range of qualitative findings, including results that contradict the study themes (Johannesson & Perjons, 2014). Similarly, the researcher does not support and embrace the participants' perspectives in the study by "taking sides" and only presenting the findings that place the participants favorably. Finally, the researcher uses pseudonyms for participants in qualitative research to protect their identity.

Quantitative study ethical considerations

The quantitative questionnaire does not include any questions that might be considered ethically sensitive. The quantitative study protects the anonymity of participants throughout the data collection process by not collecting names or contact information. During quantitative data analysis, the researcher has an ethical responsibility of not disregarding data that is contrary to the personal understanding of the topic (Veal & Darcy,

2014). The data analysis reflects the performed statistical tests in full and no results are underreported. The interpretation of data provides an accurate account of the collected information (Creswell, 2014).

Results

This chapter reports the findings from the data analysis and interpretation of the results from the qualitative as well as quantitative results. From the quantitative study, 51 responses from the quantitative study failed the inclusion or exclusion criterion, that gives 289 valid responses out of a sample of 340 participants. Moreover, data were collected from 28 participants out of the 30 participants selected for the qualitative study; meaning that two participants did not pass the inclusion or exclusion criterion. The participants in the qualitative part of the study were assigned pennames to protect their identity, from SP1 to SP28.

General information

Table 3

The characteristics of participants in the qualitative and quantitative part of the study, respectively.

	Quantitative		**Qualitative**	
	N	**Percent**	**N**	**Percent**
Gender				
Male	189	65	16	57
Female	100	35	12	43
Age				
18 to 25 years	96	33	9	32
26 to 35 years	193	67	19	63
Diet Habits				
Currently following a restrictive diet	0	0	0	0
I am currently avoiding meat products	0	0	0	0
My diet is purely vegetables	0	0	0	0
My current diet includes meat products	289	100	28	100
Total	289	100	28	100

The participants were requested to provide basic information such as age, gender, and current diet habits. Based on the findings illustrated in table 3, the majority of the study participants were males for both the quantitative (65%, N=189) and the

qualitative (57%, N=16) studies. Finally, the diet for all the qualitative and quantitative participants included meat products. Table 3 gives sample characteristics of participants in the qualitative and quantitative part of the study, respectively

Qualitative data results

This section reports the results from the qualitative study.

Diet attitudes towards meat consumption

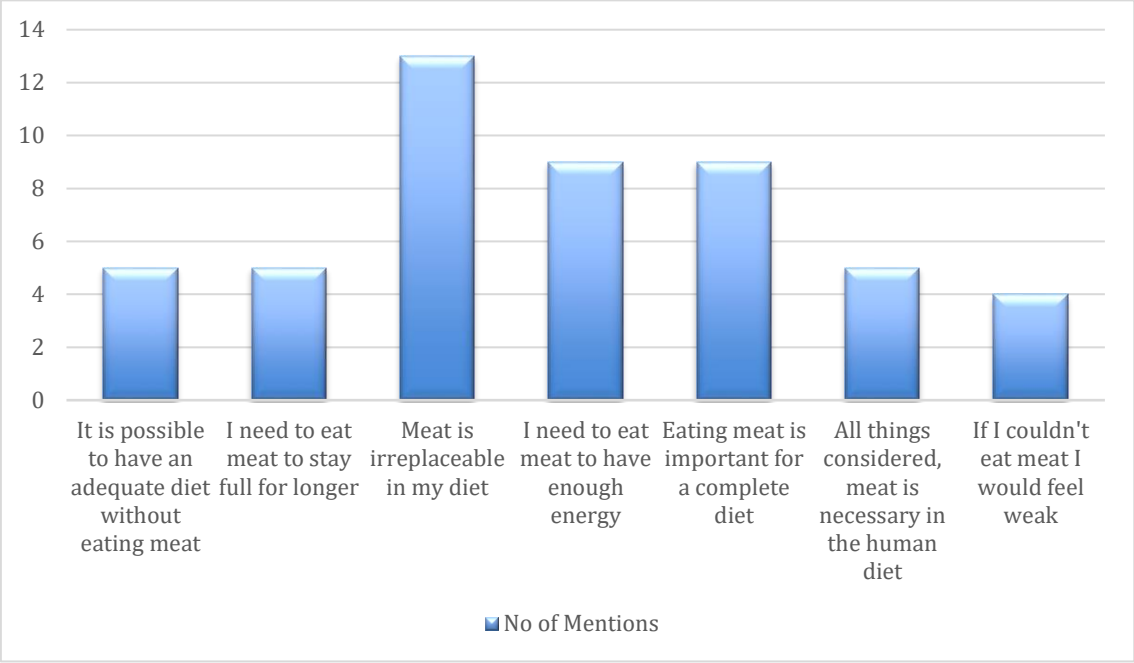


Figure 1: Attitude by the participants in the qualitative part of the study towards meat consumption, presented as the number of keywords mentions

The first theme examined in the qualitative study was related to diet attitude towards meat consumption. The majority of the participants had similar feelings and thoughts; however, each participant still had some distinct narrative to tell about their lifestyle. Their attitudes and lifestyles are personal stories that are different from the individuals themselves. Most of the keywords mentioned frequently in this variable related to meat being irreplaceable. As figure 1 presents, meat being irreplaceable was

mentioned 13 times. Furthermore, the participants mentioned that they needed to eat meat to have a complete diet and enough energy.

For example, participant SP8 noted that eating meat "provided more energy than other foods like vegetables, pasta or rice", and made him stay longer without getting hungry. According to participant SP24, failing to eat meat for a day would make him have less energy and nothing would replace meat in his diet. However, some participants mentioned that they would not have a problem reducing their meat consumption. For example, participant SP7 mentioned that she was a vegetarian when growing up but got influenced to eating meat by her spouse after getting married.

Habit towards meat consumption

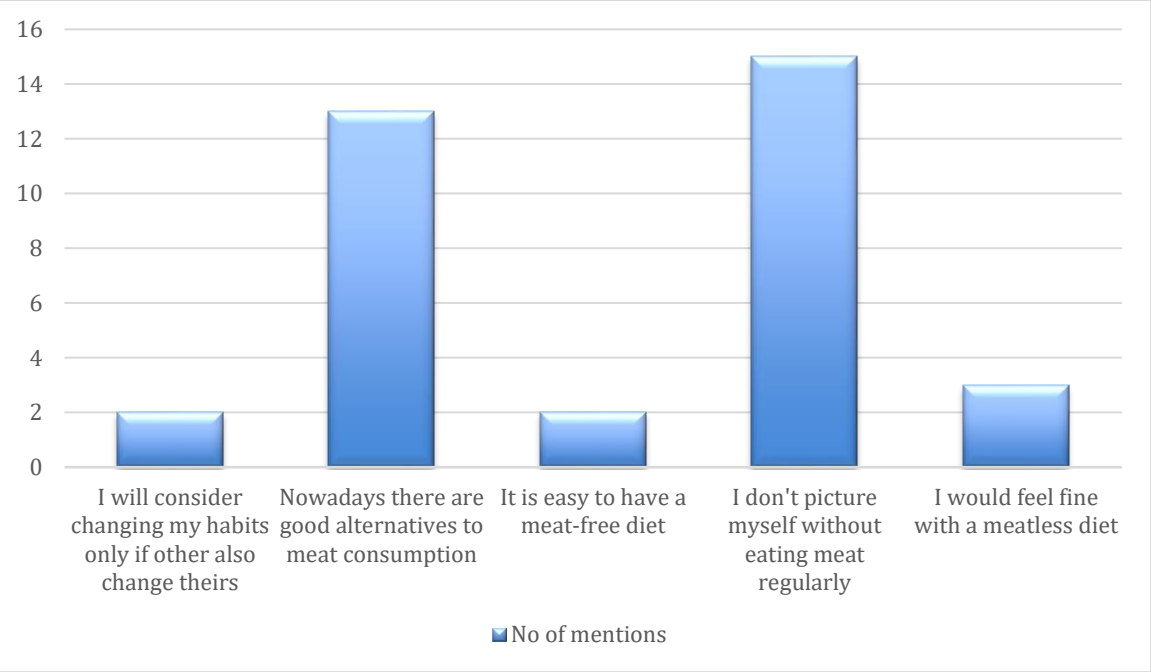


Figure 2: Habits by the participants in the qualitative part of the study towards meat consumption, presented as the number of keywords mentions

The study established from the qualitative data that the participants could not picture themselves without eating meat regularly as figure 2 presents. Whereas the participants acknowledged that there were good alternatives to meat consumption, most

of the participants indicated that they would only consider meat alternatives if they "tasted good, had sufficient nutrients, and were not expensive". According to some of the participants, they considered meat healthier than any vegetable or manufactured meat alternative. For example, participant SP19 mentioned that she had tried a meatless diet for three months and ended up gaining weight, feeling hungrier, as well as weak.

Ethics toward animal suffering and killing

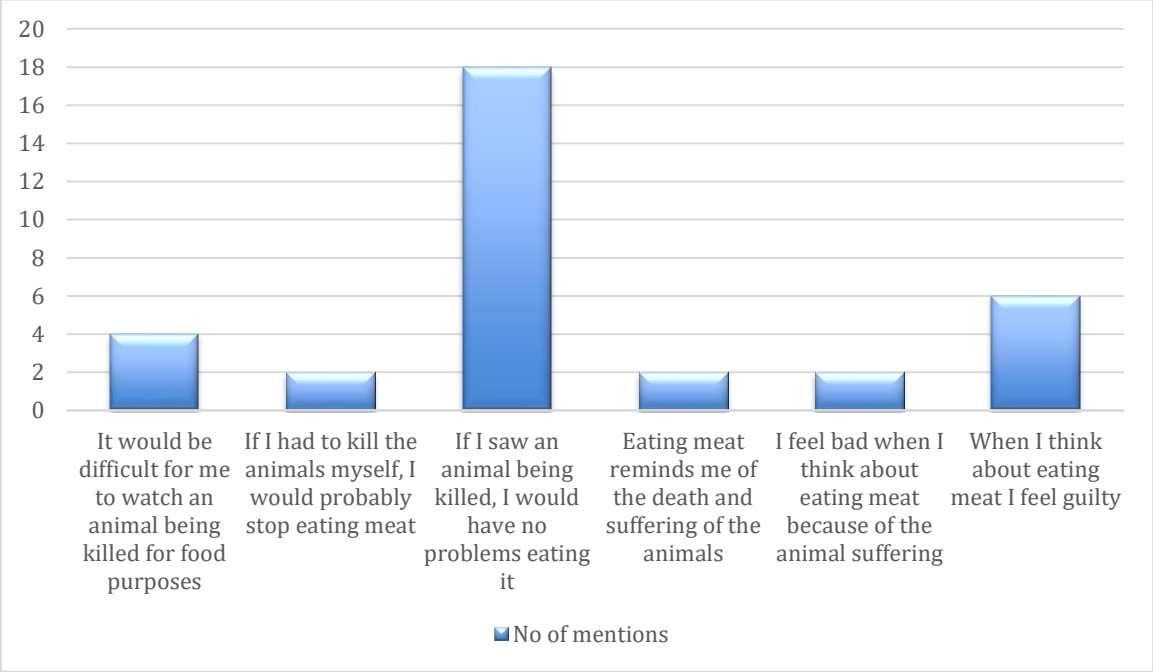


Figure 3: Ethical attitude by the participants in the qualitative part of the study towards animal suffering and killing, presented as the number of keywords mentions

From the qualitative data, it was established that the participants would have no problems eating meat even if they saw an animal being killed (no of mentions=18) as figure 3 presents. The majority of the participants considered the killing of animals for meat as part of the food chain and they did not think it was wrong. For example, participant SP21 mentioned, “it is ethical because it sustains the food chain, the same way the animals consume plants”. However, a few of the participants acknowledged that they had problems with animals being killed and their suffering. For instance, SP2 highlighted

that sometimes he feels guilty when thinking about the suffering of animals; however, this does not affect his meat consumption. Also, SP3 mentioned that he felt too guilty when thinking about the death and suffering of the animals.

Motivations of meat consumption

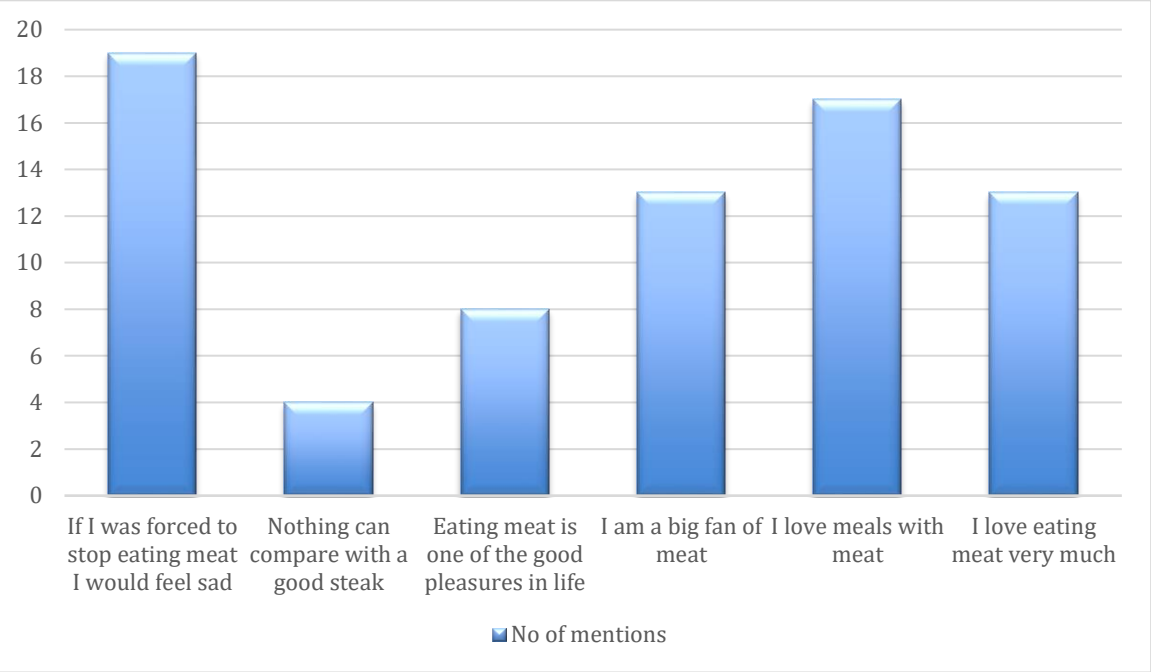


Figure 4: Motivation by the participants in the qualitative part of the study towards meat consumption, presented as the number of keywords mentions

Based on the findings of figure 4, the participants in the qualitative part of the study would be sad if they were forced to stop their meat consumption. According to SP17, the nutrients contained in meat are essential to the body, and it would be difficult to find another food that can provide a similar amount of nutrients. The participants love meals with meat because it made them stay full for longer. As such, the meat had to be part of their diet. Some participants stated that eating meat was one of the good pleasures in life. For example, SP5 mentioned that meat is tasty and full of proteins as well as other nutrients. Figure 4 presents a summary of the findings, which are presented as the number of mentions for keywords associated with each factor.

Health attitudes towards meat consumption

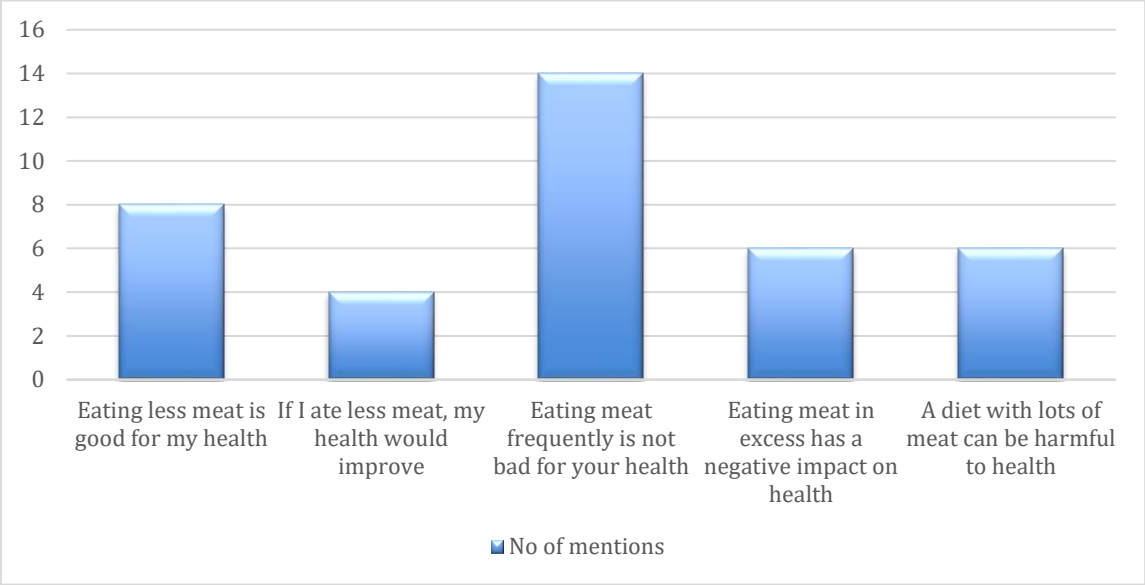


Figure 5: Attitude by the participants in the qualitative part of the study towards health effects of meat consumption, presented as number of keywords mentions

The participants in the qualitative part of the study showed differing opinions about the effect of meat consumption on health. While some participants indicated that eating meat in excess has a negative impact on health, others thought eating meat frequently was not bad for their health. For example, participant SP4 considered meat good for his health, full of essential nutrients, and that nothing could provide similar energy levels. It should be highlighted that the participants who considered meat healthy were sceptical about the production of vegetables and other meat alternatives.

They considered processed vegetables and other meat alternatives unnatural, not tasty, and expensive. In addition, some of the participants indicated eating less meat was good for their health, by eating less meat, their health would improve, and a diet with lots of meat can be harmful to health. For instance, participant SP8 thought that her body would feel better if she reduced meat consumption, especially processed meat. Figure 5 presents the results.

Environmental attitudes towards meat consumption

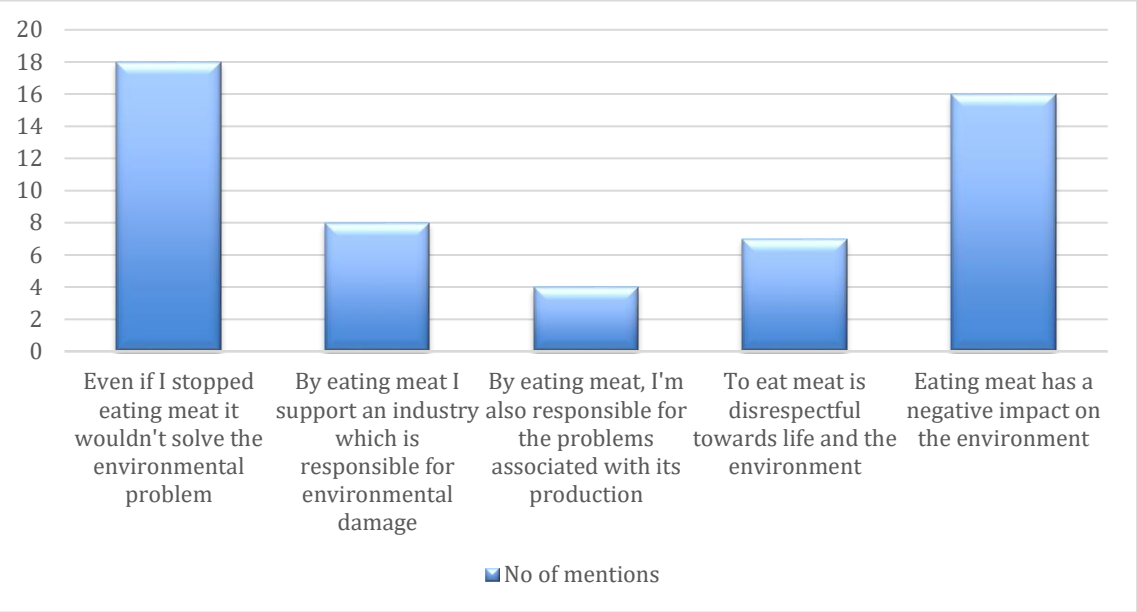


Figure 6: Attitude by the participants in the qualitative part of the study towards the environmental impact of meat consumption, presented as the number of keywords mentions

The qualitative study findings established that most of the participants believed that even if they stopped eating meat, it would not solve the environmental problems. The majority claimed that other industries such as the transport sector were more damaging to the environment than meat production. For example, participant SP1 mentioned that the environment would not be better just because she reduced her meat consumption. This was because the meat production industry was smaller compared to other industries that destroy nature and the environment. As well, SP5 suggested that the environmental issue was bigger than meat production; however, if there were proof that meat production affected the environment more than other factors, he would consider reducing meat consumption.

Nevertheless, some of the participants thought that eating meat had a negative impact on the environment and was disrespectful towards life. According to SP13, "… the industrial production of meat is affecting the environment badly since it disrupts the biological clock. This is because meat-farms tamper with the animals' biology and give them different medicines and supplements to make them grow faster for the changing food industry. This in turn ruins the natural biological cycle and clock of nature". Figure 6 presents the study findings.

Quantitative data results

This section reports the attitude of the participants towards meat consumption, changing dietary habits, and motivation towards the reduction of meat consumption based on the quantitative study. The quantitative study included 36 statements and the participants ranked their level of agreement for each statement using a 7-point Likert scale ("1"=strongly disagree and "7" = strongly agree). Table 3 illustrates the descriptive statistics of the quantitative study.

Corresponding concern on health and excessive meat consumption appeared to be the most potent reason for the willingness of the participants to reduce meat consumption. The quantitative study participants agreed that they love eating meat very much (Median=5, IQR=1), however, eating meat in excess negatively impacts health (Median=6, IQR=2). Watching the killing of animals was the key concern on ethics with a high agreement (median=5). The participants admitted that they would stop taking meat if they had to kill animals themselves.

Both these results on habit and health indicate that all the participants were generally worried about the health problems associated with high meat consumption. However, the ethical aspects of animal welfare were important only to some individuals.

Concerning the dimensions related to being attached to meat (diet and motivations), motivation was the major reason for the participant's reluctance to reduce their meat consumption. On diet, 50% of the participants disagreed they would feel weak if they did not eat meat (Median=2.00, IQR=4.00). Nonetheless, the participants agreed that eating meat is part of a balanced diet (median=4, IQR=5). On motivation, the participants agreed that they love meals with meat (Median=5, IQR=3). There was also high agreement on the available good meat alternatives in the market (Median=5, IQR=1). Concerning the environment, 50% of the participants strongly agreed that eating meat negatively impacts the environment (Median=6, IQR= 2). The rest of the results are presented in Appendix D.

The mean score for each participant was computed from all the 36 statements to classify the attitude towards meat reduction into three groups. The participants from the quantitative study were categorized as Pro-group, Anti-group, or Interm-group as presented in Table 4. The categorization was based on the participant's attitude towards consuming meat and its reduction. Out of 289 participants, 62 participants (21%) were categorized as favoring the reduction of meat consumption (Pro-group), 28 participants (10%) were categorized as being against the reduction of meat consumption (Anti-group), and 199 participants were categorized as intermediate (Interm-group).

The majority of the participants in all three groups were male. However, the differences were more pronounced among the anti-group (71%) and pro-group (71%). Similarly, the highest consumers are likely to have an anti-reduction attitude because of pleasure and satisfaction reasons. More women are classified in the Interm-group as compared with the other groups. This means that women are likely to consider their red meat consumption levels as average, hence no need for alteration. Moreover, the 26 to 35

years of age category has the majority of the participants across all the three groups. The age variations may be explained by the overall age distribution of the sample (33% = 18 <25 years, 67% = 26 >35 years).

Table 4

Classification of participants' attitudes towards meat consumption

Classification	**Male**	**Female**	**18>25 years**	**26>35 years**	**Total**	
	%	**%**	**%**	**%**	**N**	**%**
Anti-group	71	29	29	71	28	10
Interm-group	63	37	32	68	199	69
Pro-group	71	29	39	61	62	21

Multiple linear regression

Multiple linear regression was performed to establish the relationships between the variables and determine the effect of gender as well as the age of the participants. The first step of the multiple regression analysis was to test the assumptions that the data is distributed normally and homoscedastic. Appendix E presents the normality distribution results of the regression model. The analysis established that the regression residuals conformed to the diagonal normality line indicated in the plot. This indicated that the regression followed a normal distribution.

The next step after the normality test is checking the homoscedasticity of the regression residuals. The analysis established that the data was homoscedastic as evidenced by the lack of an obvious pattern in Appendix F. There are points distributed above equally and below zero on the X-axis, and to the right as well as left of zero on the Y-axis.

Table 5

Summary of the hierarchical regression model

Model	R	R-Square	Adjusted R-Square	Error	R-Square Change	F-Change	df1	df2	Sig. F. Change
1	.999[a]	.997	.997	.025	.997	18331.6	6	282	.000
2	.999[b]	.997	.997	.025	.0019	1.048	2	280	.352

Model 1 = relationship between the IV's: diet, habit, ethics, motivation, health, and environment on the DV: meat consumption attitude.

Model 2 = Controlling the effect of age and gender of the participants

Df= degree of freedom

The hierarchical regression model is presented in table 5. Model 1 estimated the relationship between the predictors: diet, habit, ethics, motivation, health, and environment on meat consumption attitude. In Model 2, the effect of gender and the age of the participants on the variables' relationships was controlled. Model 1 explained 99.7% ($R^2 = .997$) of the variance in meat consumption attitude.

Model 2 (controlling the age and gender of the participants) as a whole explained 99.7% of the variance in meat consumption attitude. The term in model 2 explained 0.19% ($R^2 = .073$) of variance in meat consumption attitude as indicated by the R-square change column. The level of change in significance for model 2 was not a statistically significant contribution as indicated by the change F=0.352.

Table 6 presents the ANOVA of the regression model. The results indicate that the models as a whole were statistically significant: F (6. 282) = 18331.677. P < 0.001 for model 1 and F (8. 280) = 13753.704. P < 0.001 for model 2.

Table 6

ANOVA of the hierarchical regression model

Model		Sum of Squares	Df	Mean Square	F-Change	Significance
1	Regression	70.995	6	11.832	18331.677	.000[b]
	Residual	.182	282	.001		
	Total	71.177	288			
2	Regression	70.996	8	8.874	13753.704	.000[c]
	Residual	.181	280	.001		
	Total	71.177	288			

Model 1 = relationship between the IV's: diet, habit, ethics, motivation, health, and environment on the DV: meat consumption attitude.

Model 2 = Controlling the effect of age and gender of the participants

Df= degree of freedom

The parameter estimates for the multiple regression models are presented in table 7. In model 1, all the variables were uniquely correlated with meat consumption attitude. For example, the diet dimension had the highest positive correlation (β =.708) with meat consumption attitude. In addition, habit was 18.5% (β =.185) positively correlated with meat consumption attitude, while the correlation for ethics = 38.1%, motivation = 41.6%, health = 25%, and the environment = 34.9%. After controlling for the gender and age of the participants in model 2, there was no significant change to the estimates.

Table 7

The parameter estimates for the model

	Steps	Beta	*β*	T-value	P-value	Tolerance	VIF
1	(Constant)	.007		.415	.678		
	Diet attitudes towards meat consumption	.027	.708	161.145	.000	.469	2.132
	Habit towards meat consumption	.027	.185	58.529	.000	.906	1.104
	Ethics toward animal suffering and killing	.028	.381	113.662	.000	.806	1.240
	Motivations of meat consumption	.028	.416	112.645	.000	.666	1.502
	Health attitudes towards meat consumption	.026	.250	70.669	.000	.727	1.375
	Environmental attitudes towards meat consumption	.026	.349	79.472	.000	.470	2.126
2	(Constant)	.011		.650	.516		
	Diet attitudes towards meat consumption	.027	.709	160.566	.000	.465	2.150
	Habit towards meat consumption	.027	.185	58.534	.000	.903	1.107
	Ethics toward animal suffering and killing	.028	.381	112.661	.000	.794	1.259
	Motivations of meat consumption	.028	.416	111.950	.000	.656	1.525
	Health attitudes towards meat consumption	.026	.250	70.612	.000	.724	1.381
	Environmental attitudes towards meat consumption	.026	.350	78.849	.000	.461	2.171
	Gender	.000	.000	-.053	.958	.982	1.018
	Age	-.005	-.004	-1.447	.149	.951	1.052

Model 1 = relationship between the IV's: diet, habit, ethics, motivation, health, and environment on the DV: meat consumption attitude.

Model 2 = Controlling the effect of age and gender of the participants

β= standardized beta

VIF= variance inflation factor

In addition, linearity and multicolinearity were tested to ensure there was no strong correlation between the independent variables. As indicated by the VIF values, all the independent variables had scores spanning >1 and <10. Moreover, all the variables have tolerance values of >.10. Both the tolerance and VIF results indicate there is no multicolinearity.

In summary, diet attitudes towards meat consumption appear to have the strongest correlation with meat reduction attitude, followed by ethics toward animal

suffering and killing. All the covariates have a positive and significant correlation. Gender and age do not affect the correlations as evidenced in Table 8.

Discussions

The quantitative study obtained 289 valid responses out the 340 sent to participants representing a response rate of 85%. Meaning, out of the 340 participants, 51 responses failed the inclusion or exclusion criterion and where not included in the analysis. Moreover, 28 participants successfully completed the qualitative interviews indicating a 93.3% response rate; however, two participants did not pass the exclusion criterion. Because there was limited time for data collection (21 days), the researcher would not recruit new participants as replacements. While the 85% response rate for the quantitative part of the study does not affect the results, it slightly alters the reliability. Nonetheless, the researcher is confident since the response rate was above 70% and very good for analysis and reporting. According to Babbie (2020, pp. 242), response rate of 50 percent is adequate, 60 percent is good, while 70 percent is very good.

Furthermore, the quantitative study sample disproportionately represented the gender of the participants, with the majority being males (65%). This may not give an accurate distribution of the student's gender, where females are the majority. However, it might be justifiable given the inclusion criterion was the participant being a frequent consumer of red meat (at least twice a week). The gender proportion corresponds with Bjerselius, Konde, and Färnstrand (2014) finding that 72% of Swedish men consumed more red and processed meats compared with 42% of women. This indicates that males had better odds for inclusion in the study compared with females. The whole sample includes participants aged 35 years or below. This is a fair representation of the population's age distribution with approximately 95% of the students being 35 years of age or below.

The quantitative data analysis established that both gender and age were not significant in explaining attitude towards meat reduction. This supports the finding by Bjerselius, Konde, and Färnstrand (2014) that both Swedish men and women had individual consumption levels that exceed the recommended 500 grams per week of red and processed meats by the WCRF. This means that both males and females have similar patterns concerning meat consumption and its reduction. The finding on the age of the participants might be explained by the fact that only two categories were included in the study. To this end, the finding might be explained by sampling differences. This is a limitation for the study and the findings are limited to students below 35 years of age. As such, the generalization of the results to populations outside the sample should be done with caution.

Attitudes towards the reduction of meat consumption

Overall, the qualitative study established that the participants agreed meat was irreplaceable in their diet and could not picture themselves without eating meat regularly. On the contrary, participants from the quantitative study mostly agreed (median=6) that it was possible to have an adequate diet without eating meat. Similar to the study by Tarrega et al. (2020), the quantitative study established that attitudes towards meat consumption and reduction may be described through two unfavourable dimensions and three favourable dimensions. The three key favourable dimensions, which likely guided the Pro participants, were related to animal welfare, health, and the environment. Among these, animal killing (ethics) and health (damage/ excess) factors had a higher degree of agreement by the participants. The factors were found to motivate strongly the personal willingness to reduce the consumption of meat for both the qualitative and quantitative study participants. These findings support previous research by Horgan et al.

(2019) and Tarrega et al. (2020) on consumer awareness on the negative effect of meat consumption on human health, animal welfare, and the environment.

Concerning ethical issues (both animal suffering and killing), it was established that both qualitative and quantitative study participants would be uncomfortable with the idea of violence being inflicted on animals. Nonetheless, Graça et al. (2016) had highlighted that when confronted with these ethical issues, people reluctant to decrease their consumption of meat would use numerous moral disengagement mechanisms to justify such harmful but valued practices. This was observed particularly among the Anti group, who cited the need to maintain the food chain and natural order of things, as well as the many irreplaceable nutrients in meat.

On the attitude towards health issues (both the benefits of reduction and damaging effects of excess meat consumption), there was evidence that the study participants had some level of understanding the long-term link between animal-based diets and mortality caused by cancers (Micha, 2015), cardiovascular illness (Rohrmann et al., 2013), diabetes (Wolk, 2016), and obesity (Vergnaud et al., 2010). This was because several participants from the qualitative part of the study mentioned health concerns towards consumption of red and processed meat; however, they need more education before they can alter their diets. Previous studies had found that participants had awareness that processed meat diets in Western countries were responsible for increased risk of heart disease even after controlling for factors such as smoking, social class, or body mass (IARC, 2015). Nevertheless, even with such acknowledgements, meat users were still reluctant to reduce their meat intake.

Finally, motivations were the major reason for both qualitative and quantitative study participants not to give up eating meat, followed by habits. This finding supported the Meat Attachment construct as proposed by Tarrega et al. (2020) and Graça

et al. (2016). The motivations can be defined generally as the attachment bond of consuming meat shown by some individuals. According to Graça et al. (2016), this notion includes four key dimensions: feeling dependent on the consumption of meat, feeling an entitlement to consume meat, a key source of pleasure, and affinity towards meat consumption. For example, some participants admitted they would feel weak if they did not eat meat, they would be sad if they were forced to reduce meat, they love meals with meat, and that no other food would provide similar taste as well as energy levels.

Changing dietary habits

Participants from both the qualitative and quantitative part of the study acknowledged that there were good alternatives to meat consumption. In addition, the participants would have no problems eating meat even if they saw an animal being killed. However, if the participants had to kill the animals, they would stop taking meat and switch to other alternatives. The participants mentioned keywords such as having a “good taste, sufficient nutrients, natural, and not expensive".

According to Gravely and Fraser (2018), and Tarrega et al. (2020), some meat substitutes are found frequently outside the conventional food sector, which makes them strange to consumers and are perceived as “unnatural”. Most participants from the qualitative part of the study considered meat healthier than any vegetable or manufactured meat alternative, supporting Horgan et al. (2019) finding that individuals maintain coherence between past food choices, cultural beliefs, and future intentions.

For the Anti-group and some participants in the Interm-group, the preference for meat alternatives would indicate that they would still make smaller steps towards changing their habit of meat consumption, similar to the findings by Tarrega et al. (2020) and Graça et al. (2016). In the Pro-group and some participants in the Interm-

group, there was a higher agreement of possible consideration of meat alternatives compared to the Anti-group. However, no evident dietary preferences were highlighted except for three participants who mentioned in the interviews that they grew up as vegetarians. This finding could mean that participants from the Pro-group who were previously vegetarian or favourable towards the reduction of animal products, would likely change their dietary habits. Conversely, both Pro- and Interm-group had a higher inclination for considering meat alternatives.

The participants from the qualitative study had a negative hedonic liking of meat alternatives; with some participants considering such products unnatural and unhealthy. Keywords such as “natural, animal, and good taste, quality, and essential nutrients” were associated with meat. However, “unnatural, unhealthy, tasteless” were the keywords associated with the alternatives. However, this may be explained by the possibility that the participants have not seen or tried any meat alternatives, hence, have little understanding of their taste and nutritional value. Consequently, this could have affected the dietary habits towards meat alternatives (and possibly attitude towards the reduction of meat consumption).

Motivation towards meat reduction

Most of the participants from both the qualitative and quantitative study agreed that they loved meals with meat. A good number of participants from the qualitative part of the study stated that they eat meat every day. While some participants agreed that eating meat in excess has a negative effect on health, others maintained that eating meat frequently was not bad for their health, and as such, they would not consider the reduction of meat consumption. Furthermore, most participants from the qualitative part of the study believed that even if they stopped eating meat, it would not solve the

environmental problems. Nonetheless, the participants from the quantitative study mostly agreed that eating meat has a negative impact on the environment and they would consider reducing their consumption. The participants from the quantitative part of the study agreed mostly that it was possible to have an adequate diet without eating meat and that there are good alternatives to meat consumption.

Previous studies supported the finding that the texture and taste of meat are the most treasured aspect by meat consumers (Malek et al., 2019; Milford et al., 2019; Kumar, 2019). It has been broadly suggested that meat consumers would consider the sensory and taste quality of meat alternatives to be lower compared to that of meat (Kumar, 2019). According to Tarrega et al. (2020), the meat alternative itself and its context (taste, texture, and appearance) are significant for determining the motivations to reduce consumption. This is important especially for users likely to oppose meat reduction because they treasure meat and is a key part of their habits and diet.

In the study by Kumar (2019) and Tarrega et al. (2020), some meat alternatives attained high scores on purchase intentions, which did not differ significantly from conventional meat products. Kumar (2019) further suggested that mixed products (meat and vegetables) with a sensory appeal comparable to conventional meat products could be developed. Based on the findings from this study, consumers need more understanding (especially through tasting the products) of the likely similarity of meat alternatives to conventional meat products. As such, the meat alternatives would be a significant step in the replacement of red and processed meat for users more attached to meat but willing to reduce their meat consumption, especially for health reasons.

Conclusion

This mixed-methods study inquires about the attitudes of young adult omnivores towards meat consumption, changing dietary habits, and motivation towards the reduction of meat consumption in Sweden. A convergent mixed-methods study is used to discuss the observed differences and similarities between qualitative (text) and quantitative (numeric) data.

The participants from both the qualitative and quantitative study are broadly worried about the health problems associated with high meat consumption and motivation for reducing meat consumption is based on health as well as ethical issues. The Anti participants are willing to try the products but not replace meat in their diet. However, Pro participants indicate the willingness to like and purchase the meat alternatives at the same level as conventional meat products. Being attached to meat consumption is a common position for young adult omnivores. The findings in this study could help the food industry in Sweden to develop strategies to reduce meat consumption, such as developing mixed meat-vegetable products to appeal to this young consumer niche.

References

Appleby, P. N., Crowe, F. L., Bradbury, K. E., Travis, R. C., & Key, T. J. (2015). Mortality in vegetarians and comparable nonvegetarians in the United Kingdom. *The American Journal of Clinical Nutrition, 103*(1), 218-230. doi:10.3945/ajcn.115.119461

Arora, D. R. (2017). Questionnaire Designing-Some Useful Tips. *International Journal of Contemporary Research and Review*. doi:10.15520/ijcrr/2017/8/07/269

Babbie, E. R. (2020). *The Practice of Social Research (MindTap Course List)* (15th ed.). Belmont, CA: Wadsworth Publishing.

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*,16(1), 74-94. doi:10.1007/bf02723327

Barretto, A. C. D. S., Pacheco, M. T. B., & Pollonio, M. A. R. (2015). Effect of the addition of wheat fiber and partial pork back fat on the chemical composition, texture and sensory property of low-fat bologna sausage containing inulin and oat fiber. *Food Science and Technology (Campinas)*, *35*(1), 100–107. doi: 10.1590/1678-457x.6496

Berry, W., & Feldman, S. (1985). Multiple Regression in Practice. doi: 10.4135/9781412985208

Bis-Souza, C. V., Barba, F. J., Lorenzo, J. M., Penna, A. L. B., & Barretto, A. C. S. (2019). New strategies for the development of innovative fermented meat products: a review regarding the incorporation of probiotics and dietary fibers. *Food Reviews International*, *35*(5), 467–484. doi: 10.1080/87559129.2019.1584816

Bjerselius, R., Konde, A. B., & Färnstrand, J. S. (2014). *Consumption of red and processed meats in relation to colorectal cancer* (ISSN 1104-7089). livsmedelsverket. Retrieved from https://www.livsmedelsverket.se/bestall-ladda-ner-material/sok-publikationer/artiklar/2014/2014-nr-20-consumption-of-red-and-processed-meats-in-relation-to-colorectal-cancer

Bouvard, V., Loomis, D., Guyton, K. Z., Grosse, Y., Ghissassi, F. E., Benbrahim-Tallaa, L., . . . Straif, K. (2015). Carcinogenicity of consumption of red and processed meat. *The Lancet Oncology, 16*(16), 1599-1600. doi:10.1016/s1470-2045(15)00444-1

Bullock, R., Little, M., & Millham, S. (2017). The relationships between quantitative and qualitative approaches in social policy research. *Mixing Methods: Qualitative and Quantitative Research,* 81-99. doi:10.4324/9781315248813-4

Creswell, J. W. (2014). *Research design: qualitative, quantitative, and mixed methods approaches*. Los Angeles: SAGE Publications.

Creswell, J. W., & Clark, P. V. (2018). *Designing and conducting mixed methods research*. Los Angeles ; Thousand Oaks, CA: SAGE.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative Inquiry & Research Design: Choosing Among Five Approaches*. Los Angeles: SAGE Publications.

Darnerud, P.-O., & Ilbäck, N.-G. (2014). *Colorectal cancer-incidence in relation to consumption of red and processed meat* (Livsmedelsverkets rapportserie nr 3/2014). Livsmedels Verket. https://www.livsmedelsverket.se/globalassets/publikationsdatabas/rapporter/2014/2014_livsmedelsverket_3_cancer_red_processed_meat.pdf

De-Sy, V., Herold, M. G., Achard, F. U., Beuchle, R. U., Clevers, J. U., Lindquist, E. U., & Verchot, L. U. (2015). Land use patterns and related carbon losses

following deforestation in South America. *Environmental Research Letters, 10*(12), 124004. doi:10.1088/1748-9326/10/12/124004

Djurens Rätt (2017). https://www.djurensratt.se/blogg/varannan-svensk-mer-intresserad-av-vego

Dunnigan, M. G., & Henderson, J. B. (1997). An epidemiological model of privational rickets and osteomalacia. *Proceedings of the Nutrition Society*, *56*(3), 939–956. https://doi.org/10.1079/pns19970100

FAO. (2018). Food and agriculture organization of the united nations. Retrieved from http://www.fao.org/faostat/en/#data

Farvid, M. S., Malekshah, A. F., Pourshams, A., Poustchi, H., Sepanlou, S. G., Sharafkhah, M., . . . Malekzadeh, R. (2017). Dietary Protein Sources and All-Cause and Cause-Specific Mortality: The Golestan Cohort Study in Iran. *American Journal of Preventive Medicine, 52*(2), 237-248. doi:10.1016/j.amepre.2016.10.041

Field, A. (2013) *Discovering Statistics Using IBM SPSS Statistics: And Sex and Drugs and Rock "N" Roll,* 4th Edition, Sage, Los Angeles, London, New Delhi.

Furlan, R., & Martone, D. (2011). Web Surveys. *Modern Analysis of Customer Surveys*, 89-105. doi:10.1002/9781119961154.ch6

Glass, G. V., Peckham, P. D., & Sanders, J. R. (1972). Consequences of Failure to Meet Assumptions Underlying the Fixed Effects Analyses of Variance and Covariance. *Review of Educational Research*, *42*(3), 237–288. https://doi.org/10.3102/00346543042003237

Godfray, H. C., Aveyard, P., Garnett, T., Hall, J. W., Key, T. J., Lorimer, J., . . . Jebb, S. A. (2018). Meat consumption, health, and the environment. *Science, 361*(6399). doi:10.1126/science.aam5324

Graesser, J., Aide, T. M., Grau, H. R., & Ramankutty, N. (2015). Cropland/pastureland dynamics and the slowdown of deforestation in Latin America. *Environmental Research Letters, 10*(3), 034017. doi:10.1088/1748-9326/10/3/034017

Gravely, E., & Fraser, E. (2018). Transitions on the shopping floor: Investigating the role of Canadian supermarkets in alternative protein consumption. *Appetite*, *130*, 146–156. doi: 10.1016/j.appet.2018.08.018

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis.* Andover, Hampshire: Cengage Learning EMEA

Horgan, G., Scalco, A., Craig, T., Whybrow, S., & Macdiarmid, J. (2019). Social, temporal and situational influences on meat consumption in the UK population. *Appetite*, *138*, 1–9. doi: 10.1016/j.appet.2019.03.007

Hung, Y., de Kok, T. M., & Verbeke, W. (2016). Consumer attitude and purchase intention towards processed meat products with natural compounds and a reduced level of nitrite. *Meat Science*, *121*, 119–126. https://doi.org/10.1016/j.meatsci.2016.06.002

Hunt, J. R. (2003). Bioavailability of iron, zinc, and other trace minerals from vegetarian diets. *The American Journal of Clinical Nutrition*, *78*(3), 633S-639S. https://doi.org/10.1093/ajcn/78.3.633s

IARC. (2015). Cancer: Carcinogenicity of the consumption of red meat and processed meat. Retrieved from https://www.who.int/news-room/q-a-detail/q-a-on-the-carcinogenicity-of-the-consumption-of-red-meat-and-processed-meat#:~:text=An analysis of data from,cancer is not as strong.

Jackson, J., Williams, R., Mcevoy, M., Macdonald-Wicks, L., & Patterson, A. (2016). Is Higher Consumption of Animal Flesh Foods Associated with Better Iron

Status among Adults in Developed Countries? A Systematic Review. *Nutrients, 8*(2), 89. doi:10.3390/nu8020089

Johannesson, P., & Perjons, E. (2014). *Introduction to design science*. Stockholm University, Kista, Sweden: Springer international pu.

Kumar, Y. (2019). Development of Low-Fat/Reduced-Fat Processed Meat Products using Fat Replacers and Analogues. *Food Reviews International*, 1–17. doi: 10.1080/87559129.2019.1704001

Livsmedelsverket. (2020). *Meat – beef, lamb, pork and chicken*. Swedish Food Agency. https://www.livsmedelsverket.se/(X(1)S(vroapnjxj5jjv34aqaxublvq))/en/food-habits-health-and-environment/food-and-environment/eco-smart-food-choice/meat--beef-lamb-pork-and-chicken?AspxAutoDetectCookieSupport=1#:%7E:text=The%20latest%20national%20food%20survey,the%20greatest%20impact%20on%20environment.

Lubke, G. H., & Muthén, B. O. (2004). Applying Multigroup Confirmatory Factor Models for Continuous Outcomes to Likert Scale Data Complicates Meaningful Group Comparisons. *Structural Equation Modeling: A Multidisciplinary Journal*, *11*(4), 514–534. https://doi.org/10.1207/s15328007sem1104_2

Lupton, D., & Turner, B. (2018). Food of the Future? Consumer Responses to the Idea of 3D-Printed Meat and Insect-Based Foods. *Food and Foodways, 26*(4), 269–289. doi: 10.1080/07409710.2018.1531213

Maere, H. D., Chollet, S., Brabanter, J. D., Michiels, C., Paelinck, H., & Fraeye, I. (2018). Influence of meat source, pH and production time on zinc protoporphyrin IX formation as natural colouring agent in nitrite-free dry fermented sausages. *Meat Science, 135*, 46–53. doi: 10.1016/j.meatsci.2017.08.024

Mälardalen University. (2020). Mälardalen University. Retrieved from https://www.mdh.se/

Malek, L., Umberger, W. J., & Goddard, E. (2019). Committed vs. uncommitted meat eaters: Understanding willingness to change protein consumption. *Appetite, 138*, 115–126. doi: 10.1016/j.appet.2019.03.024

Micha, R., Khatibzadeh, S., Shi, P., Andrews, K. G., Engell, R. E., & Mozaffarian, D. (2015). Global, regional and national consumption of major food groups in 1990 and 2010: A systematic analysis including 266 country-specific nutrition surveys worldwide. *BMJ Open, 5*(9). doi:10.1136/bmjopen-2015-008705

Milford, A. B., Mouël, C. L., Bodirsky, B. L., & Rolinski, S. (2019). Drivers of meat consumption. *Appetite, 141,* 104313. doi: 10.1016/j.appet.2019.06.005

Min, S., Bai, J.-F., Seale, J., & Wahl, T. (2015). Demographics, societal aging, and meat consumption in China. *Journal of Integrative Agriculture*, *14*(6), 995–1007. doi: 10.1016/s2095-3119(14)60984-9

Neffe-Skocińska, K., Okoń, A., Kołożyn-Krajewska, D., & Dolatowski, Z. (2016). Amino acid profile and sensory characteristics of dry fermented pork loins produced with a mixture of probiotic starter cultures. *Journal of the Science of Food and Agriculture*, *97*(9), 2953–2960. doi: 10.1002/jsfa.8133

Ramankutty, N., & Foley, J. A. (1999). Estimating historical changes in global land cover: Croplands from 1700 to 1992. *Global Biogeochemical Cycles*, *13*(4), 997-1027. doi:10.1029/1999gb900046

Rohrmann, S., Overvad, K., Bueno-De-Mesquita, H. B., Jakobsen, M. U., Egeberg, R., Tjønneland, A., . . . Linseisen, J. (2013). Meat consumption and mortality - results from the European Prospective Investigation into Cancer and Nutrition. *BMC Medicine, 11*(1). doi:10.1186/1741-7015-11-63

Ruby, M. B. (2012). Vegetarianism. A blossoming field of study. *Appetite*, *58*(1), 141–150. doi: 10.1016/j.appet.2011.09.019

Saldaña, E., Garcia, A. D. O., Selani, M. M., Haguiwara, M. M., Almeida, M. A. D., Siche, R., & Contreras-Castillo, C. J. (2018). A sensometric approach to the development of mortadella with healthier fats. *Meat Science*, *137*, 176–190. doi: 10.1016/j.meatsci.2017.11.027

Sanchez-Sabate, R., & Sabaté, J. (2019). Consumer Attitudes Towards Environmental Concerns of Meat Consumption: A Systematic Review. *International Journal of Environmental Research and Public Health*, *16*(7), 1220. doi: 10.3390/ijerph16071220

Saunders, M., Lewis, P., & Thornhill, A. (2016). *Research methods for business students*. Harlow (Essex): Pearson.

Siegrist, M., & Hartmann, C. (2019). Impact of sustainability perception on consumption of organic meat and meat substitutes. *Appetite*, *132*, 196–202. doi: 10.1016/j.appet.2018.09.016

Tarrega, A., Rizo, A., Murciano, A., Laguna, L., & Fiszman, S. (2020). Are mixed meat and vegetable protein products good alternatives for reducing meat consumption? A case study with burgers. *Current Research in Food Science*, *3*, 30–40. doi: 10.1016/j.crfs.2020.02.003

Turesky, R. J. (2018). Mechanistic Evidence for Red Meat and Processed Meat Intake and Cancer Risk: A Follow-up on the International Agency for Research on Cancer Evaluation of 2015. *CHIMIA International Journal for Chemistry*, *72*(10), 718–724. https://doi.org/10.2533/chimia.2018.718

Veal, A.J. & Darcy, S. (2014). *Research methods in sport studies and sport management: a practical guide*, Londres: Routledge.

Vergnaud, A., Norat, T., Romaguera, D., Mouw, T., May, A. M., Travier, N., . . . Peeters, P. H. (2010). Meat consumption and prospective weight change in participants of the EPIC-PANACEA study. *The American Journal of Clinical Nutrition, 92*(2), 398-407. doi:10.3945/ajcn.2009.28713

Weibel, C., Ohnmacht, T., Schaffner, D., & Kossmann, K. (2019). Reducing individual meat consumption: An integrated phase model approach. *Food Quality and Preference, 73*, 8–18. doi: 10.1016/j.foodqual.2018.11.011

Weinrich, R., & Elshiewy, O. (2019). Preference and willingness to pay for meat substitutes based on micro-algae. *Appetite, 142*, 104353. doi: 10.1016/j.appet.2019.104353

Wolk, A. (2016). Potential health hazards of eating red meat. *Journal of Internal Medicine, 281*(2), 106–122. https://doi.org/10.1111/joim.12543

Wolk, A. (2016). Potential health hazards of eating red meat. *Journal of Internal Medicine, 281*(2), 106-122. doi:10.1111/joim.12543

Wyness, L., Weichselbaum, E., O'Connor, A., Williams, E. B., Benelam, B., Riley, H., & Stanner, S. (2011). Red meat in the diet: an update. *Nutrition Bulletin*, *36*(1), 34–77. https://doi.org/10.1111/j.1467-3010.2010.01871.x

Yamane, T. (1973). *Statistics: an introductory analysis* (3rd ed.). Harper & Row.

Appendices

Appendix A: Quantitative questionnaire

Dear participant

This research study aims to discover the attitudes of young adult omnivores towards reduction of meat consumption in Sweden. There are no risks, costs, or benefits for participating in this study. The researcher has taken reasonable precautions to protect your responses and most importantly, your identity. The questions in this interview do not require you in any way to reveal any identifying information such as an address, name, phone number, or phone number. Furthermore, the collected data will be encrypted and stored in a password-protected disk.

Participants consent

You are participating in this interview voluntarily. You can also decline to respond to any question. You have the right to withdraw from this interview at any point without any consequences. If you desire to withdraw from contributing to the research or have any questions, contact the researcher using the contact listed below.

If you desire not to receive any more notifications about this research, kindly email the researcher at XXXXXXXX

Contact the researcher in case of additional concerns, discussions, or questions concerning your rights and obligation as a participant, or you feel intimidated by any aspect of the research.

If you have understood your rights and obligation, and you are willing to contribute, you will be prompted to complete the survey form.

Section A: Profile

a. Select your gender: [ ] Male [ ] Female

b. What is your age bracket?

[ ] 18 to 25 years [ ] 26 to 35 years

[ ] Above 35 years (Survey will end)

c. Which of the following would best describe you?

[ ] My diet is purely vegetables and I don't take meat

[ ] Currently following a restrictive diet i.e. reduced calorie intake and nutrient

[ ] I am currently avoiding meat products

[ ] My current diet includes red meat products

Section B: Diet attitudes towards meat consumption

Kindly select the level of agreement with the following statements regarding your dietary attitudes towards reducing meat consumption.

(1 = strongly disagree, 2 = mostly disagree, 3 = somewhat disagree, 4 = neither disagree nor agree, 5 = somewhat agree, 6 = mostly agree, 7 = strongly agree)

Diet

Statement	**Strongly Agree**	**Mostly Agree**	**Somewhat Agree**	**Neither Agree or Disagree**	**Somewhat Disagree**	**Mostly Disagree**	**Strongly Disagree**
If I couldn't eat meat I would feel weak	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
All things considered, meat is necessary in the human diet	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Eating meat is important for a complete diet	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
I need to eat meat to have enough energy	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Eating meat is part of a balanced lifestyle	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Meat is irreplaceable in my diet	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
I need to eat meat to have enough energy	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
It is possible to have an adequate diet without eating meat	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

Section C: Habit towards meat consumption

Kindly select the level of agreement with the following statements regarding your habits towards reducing meat consumption.

(1 = strongly disagree, 2 = mostly disagree, 3 = somewhat disagree, 4 = neither disagree nor agree, 5 = somewhat agree, 6 = mostly agree, 7 = strongly agree)

Habit

Statement	**Strongly Agree**	**Mostly Agree**	**Somewhat Agree**	**Neither Agree or Disagree**	**Somewhat Disagree**	**Mostly Disagree**	**Strongly Disagree**
I would feel fine with a meatless diet	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
I don't picture myself without eating meat regularly	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
It is easy to have a meat-free diet	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Nowadays there are good alternatives to meat consumption	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
I will consider changing my habits only if other also change theirs	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

Section D: Ethics toward animal suffering and killing

Kindly select the level of agreement with the following statements regarding ethics towards reducing meat consumption.

(1 = strongly disagree, 2 = mostly disagree, 3 = somewhat disagree, 4 = neither disagree nor agree, 5 = somewhat agree, 6 = mostly agree, 7 = strongly agree)

Ethics

Statement	**Strongly Agree**	**Mostly Agree**	**Somewhat Agree**	**Neither Agree or Disagree**	**Somewhat Disagree**	**Mostly Disagree**	**Strongly Disagree**
When I think about eating meat I feel guilty	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
I feel bad when I think about eating meat because of the animal suffering	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Eating meat reminds me of the death and suffering of the animals	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
If I saw an animal being killed, I would have no problems eating it	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
If I had to kill the animals myself, I would probably stop eating meat	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
It would be difficult for me to watch an animal being killed for food purposes	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

Section E: Motivations of meat consumption

Kindly select the level of agreement with the following statements regarding your motivations towards reducing meat consumption.

(1 = strongly disagree, 2 = mostly disagree, 3 = somewhat disagree, 4 = neither disagree nor agree, 5 = somewhat agree, 6 = mostly agree, 7 = strongly agree)

Motivations

Statement	**Strongly Agree**	**Mostly Agree**	**Somewhat Agree**	**Neither Agree or Disagree**	**Somewhat Disagree**	**Mostly Disagree**	**Strongly Disagree**
I love eating meat very much	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
I love meals with meat	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
I am a big fan of meat	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Eating meat is one of the good pleasures in life	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Nothing can compare with a good steak	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Meat disgusts me	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
I do not like the taste of meat	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
If I was forced to stop eating meat I would feel sad	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

Section F: Health attitudes towards meat consumption

Kindly select the level of agreement with the following statements regarding your health attitudes towards reducing meat consumption.

(1 = strongly disagree, 2 = mostly disagree, 3 = somewhat disagree, 4 = neither disagree nor agree, 5 = somewhat agree, 6 = mostly agree, 7 = strongly agree)

Health

Statement	**Strongly Agree**	**Mostly Agree**	**Somewhat Agree**	**Neither Agree or Disagree**	**Somewhat Disagree**	**Mostly Disagree**	**Strongly Disagree**
A diet with lots of meat can be harmful to health	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Eating meat in excess has a negative impact on health	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Eating meat frequently is not bad for your health	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
If I ate less meat, my health would improve	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Eating less meat is good for my health	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

Section G: Environmental attitudes towards meat consumption

Kindly select the level of agreement with the following statements regarding your environmental attitudes towards reducing meat consumption.

(1 = strongly disagree, 2 = mostly disagree, 3 = somewhat disagree, 4 = neither disagree nor agree, 5 = somewhat agree, 6 = mostly agree, 7 = strongly agree)

Environment

Statement	**Strongly Agree**	**Mostly Agree**	**Somewhat Agree**	**Neither Agree or Disagree**	**Somewhat Disagree**	**Mostly Disagree**	**Strongly Disagree**
Eating meat has a negative impact on the environment	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
To eat meat is disrespectful towards life and the environment	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
By eating meat, I'm also responsible for the problems associated with its production	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
By eating meat I support an industry which is responsible for environmental damage	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Even if I stopped eating meat it wouldn't solve the environmental problem	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

THE END

Appendix B: Qualitative questionnaire

Dear participant

This research study aims to discover the attitudes of young adult omnivores towards reduction of meat consumption in Sweden. There are no risks, costs, or benefits for participating in this study. The researcher has taken reasonable precautions to protect your responses and most importantly, your identity. The questions in this interview do not require you in any way to reveal any identifying information such as an address, name, phone number, or phone number. Furthermore, the collected data will be encrypted and stored in a password-protected disk.

Participants consent

You are participating in this interview voluntarily. You can also decline to respond to any question. You have the right to withdraw from this interview at any point without any consequences. If you desire to withdraw from contributing to the research or have any questions, contact the researcher using the contact listed below.

If you desire not to receive any more notifications about this research, kindly email the researcher at XXXXXXXX

Contact the researcher in case of additional concerns, discussions, or questions concerning your rights and obligation as a participant, or you feel intimidated by any aspect of the research.

If you have understood your rights and obligation, and you are willing to contribute, we will proceed with the interview.

Section A: Profile

a. Select your gender: [ ] Male [ ] Female

b. What is your age bracket?

[ ] 18 to 25 years [ ] 26 to 35 years

[ ] Above 35 years (Survey will end)

c. Which of the following would best describe you?

[ ] My diet is purely vegetables and I don't take meat

[ ] Currently following a restrictive diet i.e. reduced calorie intake and nutrient

[ ] I am currently avoiding meat products

[ ] My current diet includes red meat products

Section B: Diet attitudes towards meat consumption

This section focuses on your current diet

1. How would you describe your dietary attitudes as far as red meat consumption is concerned?

……

……..……

……

……

……

……

……

How does eating meat/ not eating meat affect your energy levels

……
……..……
……
……
……
……
……

How does eating meat/ not eating meat affect your lifestyle?

……
……..……
……
……
……
……
……

Section C: Habit towards meat consumption

In this section, the focus is on your habits towards meat consumption.

2. How would you feel if you reduced you current meat consumption levels?

……
……..……
……
……
……
……
……

Would a meatless diet affect your habits?

……
……..……
……
……
……
……
……

Are you aware of meat alternatives products in the market?

……
……..……
……
……
……
……
……

Would you consider alternatives to meat products?

……
……..……
……
……
……
……
……

Section D: Ethics toward animal suffering and killing

This section focuses on ethics towards animal suffering and killing

3. What are your ethics towards meat consumption?

……

……..……

……

……

……

……

……

Does eating meat ever make you feel guilty?

……

……..……

……

……

……

……

……

Does it remind you death and suffering of the animals?

……

……..……

……

……

……

……

……

Section E: Motivations of meat consumption

The section focuses on your motivations of meat consumption.

4. What are your motivations towards meat consumption?

……

……..……

……
……
……
……
……

How would you feel if someone forced you to stop eating meat?

……
……..……
……
……
……
……
……

Sometimes people are forced because of health reasons. How would this make you feel?

……
……..……
……
……
……
……
……

Section F: Health attitudes towards meat consumption

This section focuses on your health attitude towards meat consumption.

5. How do you think meat consumption affects your overall health?

……
……..……
……
……

……
……
……

Would your health improve if you eat less meat?

……
……..……
……
……
……
……
……

Do you think reduced meat consumption is good for overall health?

……
……..……
……
……
……
……
……

Section G: Environmental attitudes towards meat consumption

This section focuses on your environmental attitude towards meat consumption.

6. How does meat consumption impact the environment?

……
……..……
……
……
……

……
……

By eating meat, do you think you are responsible for the environmental problems associated with its production?

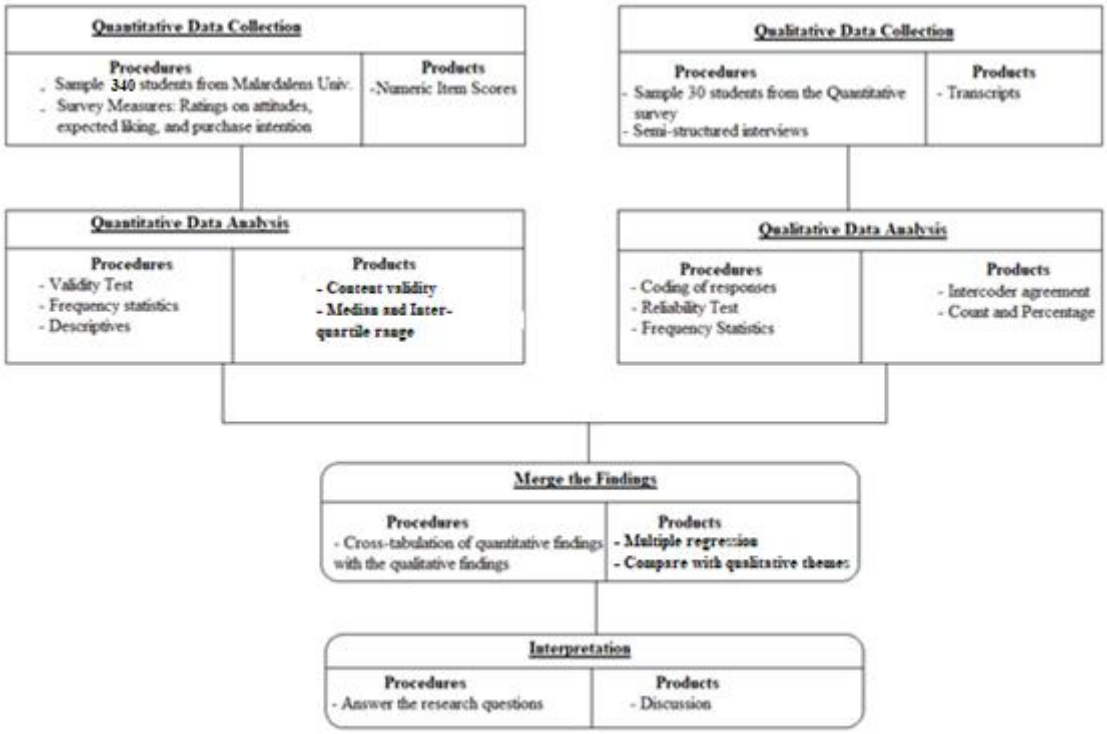
……
……..……
……
……
……
……
……

Do you believe that if you stopped eating meat it would improve the environment?

……
……..……
……
……
……
……
……

_____THE END _____

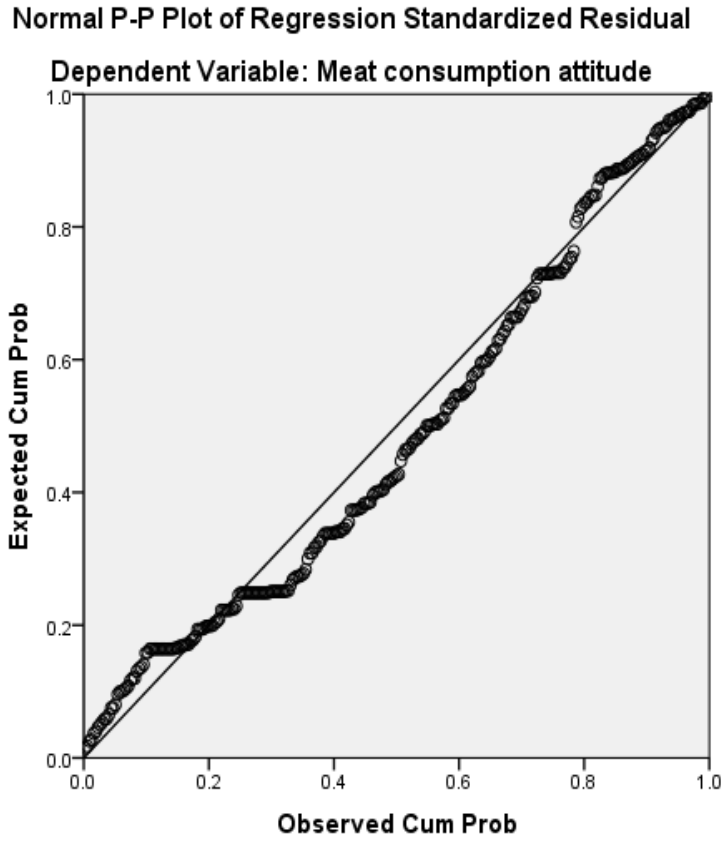
Appendix C: Overview of the research design



Appendix D: Descriptive statistics for the quantitative data

Variable	Factor	Median	IQR
Diet attitudes towards meat consumption	If I couldn't eat meat I would feel weak	2.00	4.00
	All things considered, meat is necessary in the human diet	3.00	4.00
	Eating meat is important for a complete diet	3.00	5.00
	I need to eat meat to have enough energy	2.00	4.00
	Eating meat is part of a balanced lifestyle	4.00	5.00
	Meat is irreplaceable in my diet	3.00	5.00
	I need to eat meat to have enough energy	2.00	4.00
	It is possible to have an adequate diet without eating meat	6.00	2.00
Habit towards meat consumption	I would feel fine with a meatless diet	5.00	3.00
	I don't picture myself without eating meat regularly	5.00	4.00
	It is easy to have a meat-free diet	3.00	1.00
	Nowadays there are good alternatives to meat consumption	5.00	1.00
	I will consider changing my habits only if other also change theirs	1.00	1.00
Ethics toward animal suffering and killing	When I think about eating meat I feel guilty	2.00	3.00
	I feel bad when I think about eating meat because of the animal suffering	2.00	3.00
	Eating meat reminds me of the death and suffering of the animals	1.00	1.00
	If I saw an animal being killed, I would have no problems eating it	5.00	4.00
	If I had to kill the animals myself, I would probably stop eating meat	5.00	4.00
	It would be difficult for me to watch an animal being killed for food purposes	3.00	4.00
Motivations of meat consumption	I love eating meat very much	5.00	1.00
	I love meals with meat	5.00	3.00
	I am a big fan of meat	5.00	3.00
	Eating meat is one of the good pleasures in life	4.00	4.00
	Nothing can compare with a good steak	3.00	2.00
	Meat disgusts me	1.00	1.00
	I do not like the taste of meat	1.00	1.00
	If I was forced to stop eating meat I would feel sad	5.00	5.00
Health attitudes towards meat consumption	A diet with lots of meat can be harmful to health	6.00	2.00
	Eating meat in excess has a negative impact on health	6.00	2.00
	Eating meat frequently is not bad for your health	6.00	2.00
	If I ate less meat, my health would improve	4.00	3.00
	Eating less meat is good for my health	4.00	2.00
Environmental attitudes towards meat consumption	Eating meat has a negative impact on the environment	6.00	2.00
	To eat meat is disrespectful towards life and the environment	5.00	2.00
	By eating meat, I'm also responsible for the problems associated with its production	6.00	3.00
	By eating meat, I support an industry that is responsible for environmental damage	5.00	2.00
	Even if I stopped eating meat it wouldn't solve the environmental problem	4.00	4.00

Appendix E: Normality distribution of the regression residuals



Appendix F: Homoscedasticity of the regression residuals