Replacing meat consumption with legumes in Sweden – a consumer analysis

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Popular Science Abstract

Swapping meat for legumes, what would it take?

If you live in Sweden, chances are you consume meat almost every day. Beans, lentils, and peas, on the other hand, probably appear on your plate only a few times a week or less. This difference matters because eating less meat and more legumes is one of the most impactful dietary changes a person can make for both personal health and planetary health. Meat consumption is associated with colorectal cancer, cardiovascular disease, and a significant percentage of greenhouse gas emissions in Sweden. In contrast, legumes are rich in fiber and folate, important nutrients that most Swedish consumers have too little of in their diets and have a fraction of the climate footprint of meat.

If there are such strong claims about the reduction of meat and increasing legumes, why aren't more people already making the swap? This is exactly what this study aims to understand. A survey was conducted among 398 adults living in Sweden, asking them about their meat and legume eating habits, what they think about both foods, and what would need to happen for them to replace some of the meat in their diet with legumes.

The answer came down largely to taste. The respondents rated tastiness as the most important factor when considering the swap. It was more important than health, cost, or environmental impact. And while people generally acknowledged that legumes are healthy, affordable, and good for the environment, those positive qualities were not enough on their own to motivate change. Meat simply tastes better to most people, and that is an important barrier to overcome to make this dietary change.

A few other findings stood out. Younger people tend to eat more legumes than older generations, possibly because legumes were historically associated with poverty in Sweden and older consumers grew up in a time when eating meat was seen as prosperous. Men also consume significantly more meat than women, a pattern that research suggests is tied to cultural associations between consuming meat and masculinity.

One of the more surprising findings was on the role of social influence. When asked directly, most respondents stated that what others eat around them has little impact on their own diets. Yet the data showed that people who eat more legumes or meat tend to be surrounded by people who also consume them frequently. This suggests that dietary change may spread more naturally through social environments than through individual persuasion. If legumes become more common in cafeterias, school lunches, and restaurant menus, people may naturally adopt them in their diets.

The takeaway for anyone working to make the Swedish diets healthier and more sustainable through popularizing legumes is to focus on making legumes taste great, making them easy to find and prepare, and familiarizing people with legumes in public settings where people can discover them without any pressure, the rest will come.

Abstract

Meat consumption is among the leading contributors to diet-related diseases and greenhouse gas emissions in Sweden, while legume consumption remains significantly below dietary recommendations. This study aimed to understand the beliefs, perceptions, and behaviors of adult consumers in Sweden regarding reducing meat consumption and increasing legume intake through a consumer survey. The survey collected responses from 398 eligible participants and investigated consumption frequencies of meat and legumes, beliefs and associations around both foods, and the factors that influence the consumers' intentions to swap some of the meat in their diets with legumes. Ten criteria were assessed across multiple questions using a seven-point Likert scale. The criteria were derived from a multicriteria decision analysis framework to evaluate the integrated health, environmental, economic and social impacts of dietary substitutions, adapted to a consumer survey format by selecting criteria directly perceivable by consumers, and supplemented with additional criteria from previous Swedish consumer research. The criteria covered tastiness, ease of preparation, familiarity, social compatibility, affordability, accessibility, local production, environmental sustainability, healthiness, and body weight control. Statistical analyses were performed to assess the answers using non-parametric tests for ordinal data.

The results from the survey reveal that swapping intentions are primarily driven by tastiness, healthiness, and accessibility, with tastiness being the highest rated criterion overall, and the only one receiving a score above 6 out of 7. Respondents already associate legumes with positive qualities such as healthiness, affordability, and environmental sustainability compared to meat, but these are not sufficient to overcome the perceived taste advantage of meat according to respondents. Social compatibility, which received the lowest score for respondents' regular diets, showed a behavioral correlation with both meat and legume consumption frequencies, suggesting that it is an indirect driver of dietary behavior. Younger consumers were found to eat more legumes than older consumers, while men consumed significantly more meat than women. The findings suggest that effective interventions should prioritize improving the sensory appeal of legumes, increasing exposure to legumes through public settings, and reshaping consumer perceptions around both legumes and meat simultaneously.

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1. Introduction

1.1. Background

Consumption of meat is a major contributor to adverse health effects in consumers and has a large environmental impact (1–4). In Sweden specifically, colorectal cancer, which is associated with red and processed meat consumption, is the third leading cause of cancer, and meat production contributes significantly to the country's greenhouse gas emissions, complicating Sweden's commitments to the Swedish Climate Act and the Paris Agreement (4–7). These factors have led authorities to adopt policies to reduce meat consumption, such as including statements suggesting eating less than 350 grams of red or processed meat per week (8).

Since meat consumption contributes to a significant amount of daily protein and energy requirements of consumers, as well as several vital micronutrients, experts have been looking for alternative food sources high in protein to partially replace the meat in people's diets (9). Some of these alternatives include legumes, cultured meat, insect protein, plant-based meat alternatives and algae protein (10). While progressing various alternatives to meat for health and environmental purposes is an impactful solution, legumes seem to be the alternative with the highest health benefits and lowest climate impact out of all options, and they have been a staple part of Swedish diets until recently (11,12). Historically, legumes, especially peas, were an important part of the diets of the Swedish working class. However, as Sweden became industrialized and living standards increased, meat consumption increased and legume consumption declined, as legumes became associated with poverty and a lower social status (12). Additionally, many countries, including Sweden, suffer from diet-related diseases associated with low legume consumption (4,13–15).

While health and environmental concerns have a major role in the dietary change from meat to legumes, there are other factors that need to be considered for decision makers to take an educated stance on how to inform the public and influence their consumption habits. Some aspects that need to be considered include: financial outcome for meat producers, lack of knowhow for the cultivation of legumes in Sweden, and consumer acceptance (9,11,13,14,16). The research on this topic is limited in Sweden in general, especially the ones that focus on the consumer's perceptions and attitudes. The attitudes and beliefs of consumers around this topic are vital for decision makers to comprehend to implement this change in the country.

1.2. Aim of the project and research questions

Since information on the consumer's perspective on the reduction of meat consumption and substitution with legumes in Sweden is limited, this project aims to address this knowledge gap by conducting a consumer survey. The consumer survey is targeted towards adults who have resided in Sweden for more than 1 year, as residents who live longer are registered in the population and represent the consumer statistics in the country. The main target demographic are the younger consumers who may potentially be more likely to incorporate new foods in their diets and whose dietary changes will have a bigger impact in the long term. The information

gathered from the survey on different demographics about meat and legume consumption can be useful for understanding the various dimensions of meat and legume consumption in Sweden, which can be used to inform consumers or further research. To address this knowledge gap, the following research questions (RQ) are answered with the findings from the survey:

RQ1. How do swapping intentions differ among consumers with different consumption frequencies of each food?
RQ2. How do the consumers' associations around meat and legumes compare to the criteria they consider important when swapping meat for legumes?
RQ3. How do general dietary preferences and consumption habits of consumers compare to their beliefs around meat and legumes?
RQ4. How do demographic factors such as age, gender, and location of residence relate differently to meat and legume consumption frequencies among Swedish consumers?

These four RQs are complementary to address the identified knowledge gap. RQ1 was formulated to give insight into which factors are most important when making the proposed dietary change for consumers with different meat and legume consumption habits. RQ2 was designed to compare thoughts and associations around meat and legumes with the intention to substitute meat with legumes, addressing the drivers and barriers related to consumer attitudes on dietary change. RQ3 linked the beliefs of consumers around meat and legumes to their consumption frequencies, as well as to their habits around what forms their regular diet. RQ4 established how the consumption of meat and legumes varies across different demographics to interpret the findings according to specific consumer segments. The answers to these questions create a multidimensional view of consumer perceptions of the dietary change from meat to legumes in Sweden, addressing the aim of the study.

1.3. Literature review

The literature review was conducted to settle the definitions of meat and legumes for clarification of the terms for the respondents and readers, so that the answers and interpretations of the data would be consistent. Furthermore, the consumption patterns of consumers in Sweden regarding these foods as well as health and environmental impacts were studied to establish the relevance of the project. Finally, similar work focusing on the dietary transition from meat to legumes in Sweden and other European countries were reviewed to provide an empirical basis on which the survey was created, and the findings were compared against.

1.3.1. Definitions of meat and legumes, and their nutritional values

According to the Swedish dietary guidelines, the term meat refers to red meat, poultry, and processed meat; but excludes fish and shellfish (8). The guidelines suggest decreasing the amount of red and processed meat people consume, increasing the amount of fish and shellfish, and do not have recommendations on poultry (8). The maximum consumption amounts are also given for boneless meat in the dietary guidelines; therefore, all data gathered is converted to boneless weight in this report, which is approximately half the weight of "carcass meat" (17).

The Swedish dietary guidelines do not have a specific definition for legumes, but list some examples such as beans, lentils, peas, green beans and wax beans under legumes (8). While a considerable amount of research comparing meat and legumes focuses on pulses or grain legumes, in this report legumes are considered as a whole, as the Swedish dietary guidelines list green beans and wax beans as examples. To clarify, grain legumes or pulses refer to the edible seeds of legumes, while legumes include other parts of the plants such as stems and pods (18). One important thing to note in the survey is that in the Swedish version of the survey, the term "baljväxter" is used in place of "legumes". There is a subtle difference between two terms, as baljväxter is a broader term than legumes that not only contains the seeds, stems, and pods, but corresponds to all plants in the family Fabaceae, which includes clover and alfalfa (13).

In the Swedish diet, red meat and poultry are among the major sources of protein, iron, zinc, selenium and vitamin B12; with the average consumption of meat being around 80 grams per day per person (8,13,17). On the other hand, since the consumption of legumes is quite low (contributing to only 2% of consumers' daily energy intake according to Steib et al. (2020), and around 2% of the protein intake according to Röös et al. (2020)), the legumes do not provide significant amounts of nutrients to consumers on an average Swedish diet (13,14). However, legumes are significantly richer in fiber, selenium and folate compared to meat, and also sources of protein, vitamins, antioxidants, iron, zinc, and calcium (8,13).

It is important to note that legume contain compounds called anti-nutrients that may decrease mineral bioavailability, and some types of anti-nutrients such as raffinose family oligosaccharides (RFOs) may cause gastrointestinal discomfort if not treated properly. Simple treatments such as soaking and cooking are sufficient in reducing most of these compounds to acceptable levels, which are standard treatments legumes go through before consumption (13,19). However, some anti-nutrients are more resistant to standard preparation methods. Phytates, which are found broadly across legumes, and vicine and convicine, which are found specifically in fava beans, are not substantially reduced by soaking and cooking alone. For these compounds, more advanced food processing techniques such as fermentation, germination, or emerging technologies including high-pressure processing and pulsed electric fields have shown more promising results in reducing their content, though these are not yet standard procedures, and not readily available for use in households (19).

1.3.2. Health effects of meat and legumes and their places in the Swedish dietary guidelines

Consumption of meat is associated with leading causes of several diet-related diseases and mortality in many populations including Sweden. A report from Livsmedelsverket published in 2014 shows that colorectal cancer, which may be associated with red meat and processed meat consumption, is the third leading cause of cancer in Sweden as well as the world (6). Another report from Livsmedelsverket reveals that diets containing high amounts of meat and processed meat are also associated with cardiovascular disease, type II diabetes, high blood pressure and higher long-term weight gain (8). Moreover, another publication related to the 2017 Global Burden of Diseases, Injuries, and Risk Factors Study reveals that a diet high in red meat and

processed meat is among the leading causes of mortality and non-communicable diseases in countries with high socio-demographic index, such as Sweden (4).

The Swedish dietary guidelines published by Livsmedelsverket state a maximum of 350 grams of boneless meat per person per week for red meat, of which only a small amount can be processed meat. Additionally, the World Cancer Research Fund states that the average consumption of these should be 300 grams per person per week (8). However, the meat consumption statistics of Sweden from Jordbruksverket reveal that the consumption of red meat per capita slightly exceeded 500 grams in 2024. When current consumption statistics and maximum recommended amounts are compared, a significant portion of the population seems to be exceeding the maximum amount stated in the dietary guidelines, and the World Cancer Research Fund. On the other hand, consumption of red meat and processed meat has decreased significantly compared to 2016, when the consumption was around 590 grams per person per week. Consumption decreased gradually from 2016 to 2020 and has been consistent ever since (17).

In parallel with the association of mortality, colorectal cancer and several other non-communicable diseases with red meat consumption, a diet low in legumes is also associated with mortality and non-communicable diseases such as cardiovascular disease, diabetes, and colorectal cancer in high socio-demographic countries such as Sweden (4). This is possibly due to the high fiber and folate content of legumes, which Swedish people consume significantly less than dietary recommendations, although they are vital constituents of a healthy diet (13,14). A study from Röös et al. (2020) reveals that just a 50% replacement of meat with locally grown legumes can significantly increase the consumption of fiber and folate in the Swedish diet. Moreover, this swap would still keep the recommended protein, iron, zinc and vitamin B12 intake within recommended levels; although the selenium levels would decrease around 5%, which is already slightly lower than recommended intake levels (13).

The Swedish dietary guidelines do not state a specific recommendation for the consumption of legumes; however, the guidelines cover legumes under "vegetables and fruits", and they recommend the consumption of at least 500 grams of different kinds of vegetables and fruits per day, including "a lot of legumes". The guidelines also associate legumes with a reduced risk of diet-related diseases such as cardiovascular disease, certain types of cancers and weight gain (8).

1.3.3. Environmental impacts of meat and legumes

Currently, around fifteen percent of global greenhouse gas emissions come from animal husbandry (2). The emissions can be attributed to feed production and digestion, fertilizers and land degradation and deforestation for the utilization of the livestock sector (8). Among animal products, meat and meat products have the largest contribution, also through their "eutrophication potential" and "photochemical ozone creation potential" (1). Moreover, livestock production and crop production for livestock needs approximately 14 times more land than plant-based food production (1), utilizes 70% of the agricultural land globally (2), and extensively uses other resources such as water and edible crops (16,20). Meat provides only around 17%-33% of the calories that could be taken by eating the crops that the livestock consume (20). Sweden

is bound by the national Climate Act and the United Nations' Paris Agreement to reduce emissions and eventually achieve zero net emissions by 2045 (21). As a country that consumes significantly more meat than the global average (22), working towards this goal by addressing the climate impact of meat production is necessary.

Legumes have a significantly lower climate impact than animal-based protein sources, especially meat and meat products (8,13). Dried legumes are also resilient against spoilage, being sustainable in terms of preventing food waste (8). Legumes can also decrease the environmental impact of other crops. As legumes decrease the need for fertilizers by fixating nitrogen into the soil, crops can be rotated with legumes to utilize this benefit (13).

1.3.4. Previous work on perceptions of meat and legume consumption and meat substitution with legumes in Sweden and other European countries

As stated previously, existing research on replacing meat consumption with legumes in Sweden is limited. Among the research that exists, it is indicated that such a swap is feasible, but there are some barriers regarding knowhow on legume cultivation and lack of processing facilities on the producer's and farmer's side (13), and a lack of awareness, motivation and action from the consumer's side (9,11,13).

A paper by Röös et al. (2020) considers the nutritional changes and the agricultural aspects of making a 50% decrease in meat consumption which would be replaced by legumes in Sweden (13). They calculated that the swap would maintain or keep most macro and micronutrients above required levels for an average person (e.g. protein, fat, zinc, vitamin B12 and total iron). Most importantly increase the fiber and folate in people's diets, which are below the required levels on an average diet in Sweden (13,14). In agricultural aspects, Röös et al. (2020) found that while the legume cultivation would increase to occupy 3.2% of the arable land from the previous 2.2%, the total land use would decrease because of the decrease in feed crops for animal husbandry. Additionally, the use of legumes in crop rotations of other crops would improve the climate impact of overall production, as legumes bind nitrogen to the soil and decrease the need for fertilizer. A similar evaluation was also made by Henn et al. (2022) that considers the replacement in different European countries (13,20).

Another study by Röös et al. (2022) explains the results of a consumer survey that investigated the consumer perceptions of legumes, legume-based meat substitutes, and meat, as well as their intentions to replace their meat consumption with the legume-based alternatives. The criteria they included in their survey were as follows: tastiness, healthiness, environmental impact, being fun, suitability in diet (familiarity), festiveness, popularity, ease of preparation, availability (accessibility), locality, weight control, and being organic. The results showed that most consumers know the environmental impact of meat and the health benefits of legumes, both of which are motivators for people to decrease their meat consumption and increase legume consumption. A study by Steib et al. (2020) supports these claims of consumers. The study is on the national nutrition intake survey "Riksmaten" in Sweden, and it discovered that people who eat more legumes generally have a diet associated with better health outcomes and a better

climate impact (14,23). Other motivators for the replacement of meat with legumes in Röös et al.'s study were tastiness, familiarity and local production (9).

An interesting finding from the study by Röös et al. (2022) is that consumers prefer lightly processed legumes to legume-based meat substitutes. According to the study, the taste, lack of suitability in their diets, and the overall attractiveness of the meat substitutes were what made them less preferred than lightly processed legumes (9). Spendrup and Hovmalm (2022) had similar findings regarding legume-based meat substitutes, but due to different reasons. The study reveals that meat alternatives are considered modern, artificial, and expensive (11). Moreover, lightly processed legumes are seen as healthier and better for the climate (11). Henn et al. (2022) also validates this for consumers from various other European countries (20).

Röös et al. (2022) and Spendrup and Hovmalm (2022) revealed the importance of tastiness for the replacement of meat by legumes in Swedish people's diets (9,11). This finding is in parallel with the study by Henn et al. (2022) on consumers from Denmark, Germany, Poland, Spain, and the United Kingdom (20), and other consumer studies regarding perceptions of food. Taste is generally the leading factor when it comes to the food preferences of consumers. This is why appealing to people's sense of taste should be considered the primary objective to increase the replacement of meat by legumes. Similarly, local production and healthiness are among the most important factors for consumers as well according to their studies (9,11).

Henn et al. (2022) explains that in Denmark, Germany, Poland, Spain, and the United Kingdom, there are already a significant percentage of consumers who consume legumes in place of different types of meat, especially beef and pork, although the type of meat they replace with legumes depends on the country (20). Contrary to the previous findings on Swedish consumers, one of the common leading factors for the replacement in the 5 countries was sustainability. On the other hand, similarly to the Swedish consumers, healthiness is also an important criterion. Additionally, the study reports that the biggest aspects that demotivate consumers in the 5 countries from swapping were the lack of tastiness and the convenience of legumes or legume-based meat alternatives (20).

Another theme mentioned in Röös et al. (2020) and Röös et al. (2022) as a barrier to increasing legume consumption is gastrointestinal discomfort, which has been linked to the RFOs found in legumes (9,13,19). Uche (2025) investigated the consumer acceptance of emerging food processing technologies, such as high-pressure processing, pulsed electric fields, and ultrasound, developed to reduce the bloating and flatulence caused by RFOs and phytates. The study reveals that while consumers are not highly informed on these emerging processing techniques, willingness to consume legumes processed with these techniques increased with higher awareness about these technologies, and that food safety, health benefits and taste were the primary drivers of accepting these processing techniques (19).

1.3.5. Previous work on systematic dietary changes through meat substitution with legumes using multi-criteria decision analysis (MCDA)

Dietary changes on a societal level have impacts on multiple sectors and dimensions, including health, environment, economic, and social. These impacts can involve trade-offs; a change can have a positive impact on one sector while it has a negative impact on another. Additionally, there are several stakeholders other than consumers, such as local producers and those who are affected most by the environmental impacts arising from a change. The interests of all stakeholders should be considered by decision makers for truly sustainable changes on all grounds. To facilitate this decision-making process, structured analytical frameworks such as multi-criteria decision analysis have been developed. MCDA evaluates different parameters and weighs them against each other to create a decision-making model (16). The MCDA concept is explained more in depth in Section 2. Materials and Methods.

A comprehensive MCDA for different dietary substitutions was proposed in the research article published in 2026 by Pires et al. (16). In their analysis, the health, environmental, economic and social aspects were considered using the dietary swap of meat with pulses in different percentages in Denmark and Portugal. With the contribution of several experts on different subjects, they created a model with multiple criteria across the four aspects. The model weighs the different dimensions of the dietary change against each other to evaluate the overall impact of the substitution. Their work found that among the 14 criteria that they assessed, diet-related health impacts, effects on climate change and effects on biodiversity had the highest weights according to the group of experts (16). An MCDA with a different approach was published by Springmann (2024), who considered the nutritional, health, environmental, and cost aspects of 24 meat and milk alternatives, including unprocessed legumes. The analysis revealed that unprocessed plant-based foods such as legumes were the best performing foods across all dimensions evaluated in the paper, which were nutritional, health, environmental and cost dimensions (3).

2. Materials and Methods

2.1. Research design

The dietary change from meat to legumes has many tangible aspects of which the impact can be evaluated without the input of consumers. However, it is crucial to reflect on the fact that consumer behavior and acceptance are the cornerstones of making this dietary change because the change cannot move forward without changing consumption habits. That is why the purpose of this research was to understand the beliefs, perceptions, and behaviors of consumers in Sweden around meat consumption, legume consumption, and around making the dietary swap by directly asking what matters the most. It was decided to use a quantifiable method, a survey, to paint an initial picture of how the current situation is in Sweden.

This research was designed to inform consumers and further research aimed to support interventions in Sweden by investigating the consumer perceptions on the dietary substitution of meat with legumes through a consumer survey. The criteria for the survey were mainly based on the work by Pires et al. (16), who developed an MCDA model to evaluate the integrated health, environmental, economic and social impacts of substituting beef with pulses in Portugal and Denmark, which can be extended to other populations. Their model includes both direct and indirect criteria related to consumers, and some changes needed to be adapted to a consumer survey.

The criteria from their work that could not be directly perceived or evaluated by individual respondents were excluded, such as biodiversity impacts, water usage, land use, profitability, impact on local development, and employment. Additional criteria relating to consumer experience were taken from similar survey-based publications by Röös et al. (2022) and Spendrup and Hovmalm (2022), who identified tastiness, ease of preparation, familiarity, social compatibility, and local production as key drivers and barriers for this topic (9,11). The book by Phillips et al. (2025), which focuses on survey methods for health-related education, was used to create the survey format using the combination of criteria from the three studies (24).

2.1.1. Preparation of the survey

The survey was created in English and translated into Swedish with the help of classmates and friends. In the online version of the survey, respondents were initially asked if they wanted to answer the survey in English or Swedish, and the survey continued accordingly.

The survey consisted of two parts: “background questions” and “questions about meat and legume consumption”. The background questions included questions on country of birth, duration of residence in Sweden, age group, gender, size of place of residence, and frequency of consumption of meat and legumes. The latter part consisted of 4 questions that included 10 statements that were ranked 1-7 on a Likert scale (1 corresponding to very unimportant/strongly disagree, 4 corresponding to neither important nor unimportant/neither agree nor disagree and 7 corresponding to very important/strongly agree), and an additional open-ended question. The scaled questions were on consumers’ attitudes on their daily diets, their thoughts around meat

and legume consumption, and what would influence them to replace part of the meat in their diets with legumes. A summary of the questions and criteria can be found in Table 1. The ten statements correspond to these criteria in order: tastiness, ease of cooking or preparation, familiarity, social compatibility, affordability, accessibility, local production, environmental impact, healthiness, weight control. The open-ended question asked for any additional thoughts on increasing the consumers' legume consumption.

Table 1 – Summary of the questions and criteria in the survey and the corresponding labels used in the figures

Questions	**Statements/Criteria**
Importance of criteria for a regular diet	It is tasty (tastiness)
	It is easy to prepare a meal in a short time (ease of preparation)
Association of statements with meat consumption	It can be used to prepare meals that I am familiar with (familiarity)
	It is consumed regularly by the people that surround me (social compatibility)
Association of statements with legume consumption	It is affordable (affordability)
	It is easy to access or purchase the dish or the ingredients to prepare the dish (accessibility)
Importance of criteria for swapping some meat in the diet with legumes	It is produced in Sweden (locality)
	It contributes to an environmentally sustainable lifestyle (sustainability)
Additional thoughts on increasing legume consumption	It is good for my health (healthiness)
	It helps me control my body weight (body weight control)

Using these questions, the survey was created both digitally and physically, which were identical to each other. The digital version of the survey was created in Google Forms, and the physical version was printed. The physical form of the entire survey in both languages can be found in the Appendix. It is advised to read the results and discussion while keeping the Appendix on the side.

2.1.2. Pilot study

Phillips et al. (2025) suggested conducting a pilot study before publishing the survey. The pilot study was suggested to be done by consulting colleagues and people with no background on the topic of the survey to assess the comprehensibility of the survey and to locate any errors in the language of the survey (24). After the initial version of the survey was created, a pilot group consisting of 10 friends who study various professions such as food science, biotechnology and statistics were consulted to improve the format of the survey and the questions. The survey was

updated according to the comments received from the group. After the final version was approved, it was distributed.

2.2. Target demographic, distribution, and data collection

The target demographic of the survey was the adult population of Sweden. The number of adults who were registered in the population was approximately 8.6 million in the year 2025 (25). For the accurate representation of the population, the sample size was calculated as 385 minimum, corresponding to a 95% confidence level and with a ±5% margin of error (26).

The distribution of the survey was done through 3 methods: sharing a link through online platforms, distributing the printed QR code in various places, and creating physical copies of the survey. The link was shared with WhatsApp and Messenger messages to acquaintances and friends, and in Facebook groups and Reddit to others. The QR code was pinned to different information boards in Lund University, Malmö University, in several libraries and supermarkets around Skåne and Stockholm, and was also distributed directly to people in the street in Lund, Helsingborg, and Malmö. The physical copies were placed in the waiting room in the neurology clinic Neurokliniken in Lund, located in Måsvägen 14, 22733. The data collection took place between 03.03.2026 and 16.05.2026.

2.3. Demographics of Sweden, survey respondents, and possibility for bias

According to Statistikmyndigheten SCB, the adult population is 8.6 million in Sweden as of February 2026 (25). The demographics within the population can be seen in the charts given below in Figure 1. The data for the demographics are from 2025 or 2026, depending on availability.

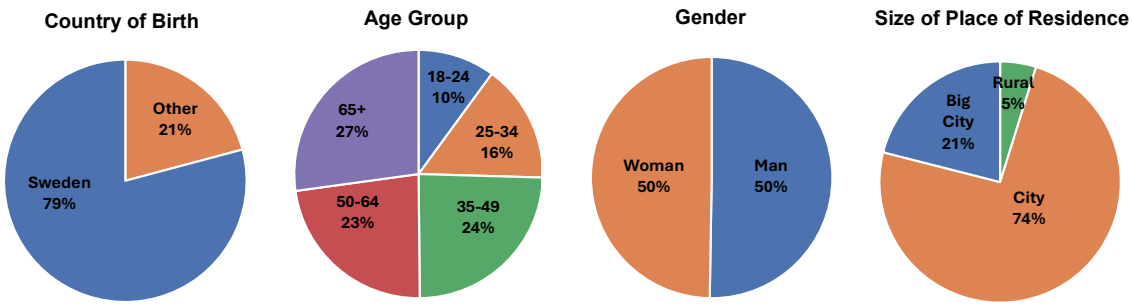


Figure 1 – Demographic data representing the adult population of Sweden

The demographics among the respondents of the survey can be seen in Figure 2. The total number of responses that were eligible to be included in the analyses was 398. Compared with the demographics of the population of Sweden, the respondents overrepresent women, the age group between 18 and 34, residents born in foreign countries, and residents living in rural areas and big cities. On the other hand, people aged above 65 and residents living in cities with 10k-200k residents are significantly underrepresented.

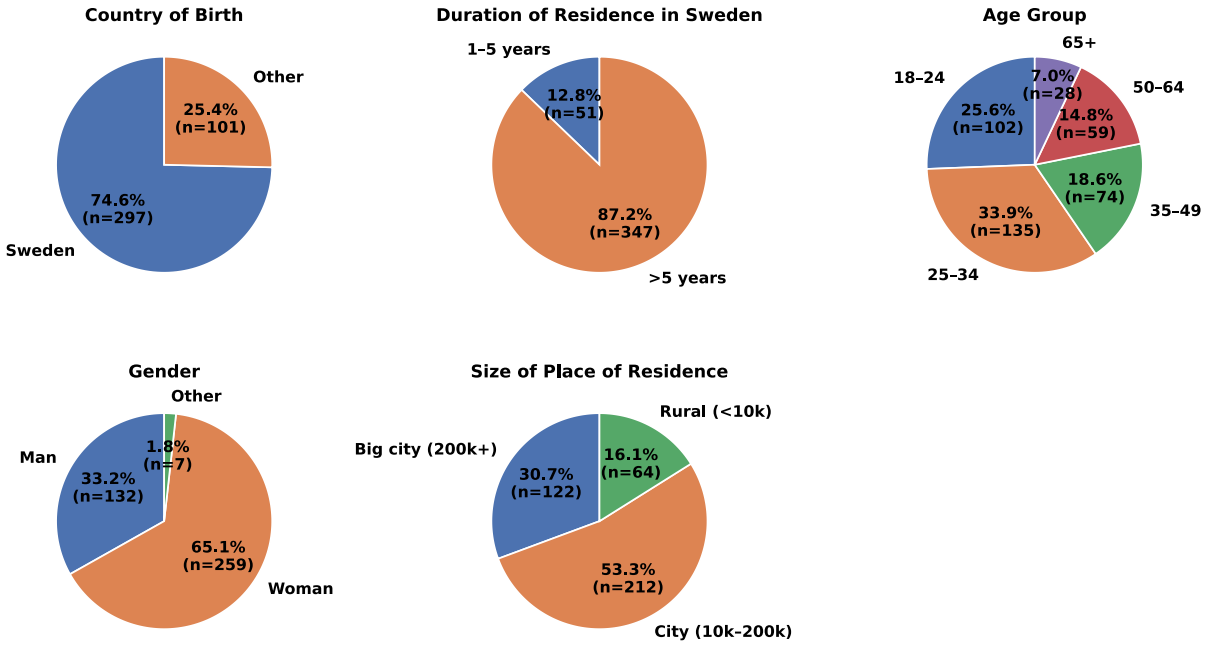


Figure 2 – Demographic data representing the respondents of the survey

Additional sources of bias should be considered while interpreting the results of the survey. First, the survey was mainly distributed in the Skåne region of Sweden, which may not be fully representative of Sweden as a whole due to regional demographic differences, including a concentration of university students in cities such as Lund and Malmö. Second, the data was collected during a specific time period, in spring 2026, which may have an influence on consumption habits among the respondents because of seasonal availability of foods or changing dietary preferences throughout the year. Third, as responding to the survey was voluntary, respondents who chose to answer the survey about meat and legume consumption may already have a stronger interest in the topic than the general population. This could skew the responses in both directions, some respondents may favor the decrease of meat consumption and increase of legumes in their diets due to interest in sustainable or plant-based diets, while others may have responded with a stronger preference for meat consumption in reaction to the perceived emphasis of the survey topic on reducing meat consumption.

2.4. Data preparation and analysis

The answers recorded from the link and the QR code were automatically collected on Google Forms, and the physical forms were collected and manually entered into Google Forms. The answers were then exported as an Excel file, where the demographic questions' answers and the question on additional thoughts were collected as text and the Likert scale questions' answers were collected as numbers.

The Excel file was loaded into a Jupyter notebook in Python (version 3.13.9). Responses from respondents who live outside Sweden, and who have lived in Sweden for less than a year were omitted. The Swedish and English responses were combined by mapping all text answers to the

demographic questions to numbers. The numbers for these questions were then transformed back into text for use in chart axes and legends.

Statistical tests were performed on the Likert scale questions and the answers to the additional thoughts question were analyzed manually, by reading them and grouping them into common themes and points. All statistical analyses were done using Python with the SciPy library. Appropriate non-parametric tests were selected per analysis for ordinal Likert scale data, as these tests do not assume a normal distribution of responses (27). The statistical significance of answers was determined according to whether the p value was smaller than 0.05. The Wilcoxon signed-rank test was used for comparing responses to different questions by the same person, such as the charts where scores to different questions were displayed on the same chart, as in the analyses addressing RQ2 (27). This test evaluates whether the median of the differences between two measurements taken from the same subject is significantly different from zero (28). Mann-Whitney U (2 groups) and Kruskal-Wallis test (3 or more groups) were used for comparing answers from different groups, such as for comparing responses from consumers with different consumption frequencies of a specific food, or for RQ4 charts comparing different demographics' consumption frequencies (27). The Mann-Whitney U test assesses whether one group tends to consistently score higher than the other group, while the Kruskal-Wallis test is used to see if at least one of the groups has a difference that significantly differs from the other groups (28).

Additional variables were created for varying analyses. For the calculation of weekly consumption frequencies, the choices "Never", "Once a month or less", "Once every two weeks", "Once every week", "2-3 times per week", "4-6 times per week", "Once a day", and "Several times per day" were converted to the numerical values of 0, 0.25, 0.5, 1, 2.5, 5, 7 and 14 times per week, in order.

For the analyses related to swapping intentions, any analysis containing data from the final Likert question in the survey excludes respondents who reported that they do not consume any meat. This was because the answers from these consumers did not address the study aims, as the aim was to investigate the factors that influence the willingness to decrease meat consumption and increase legume consumption in Sweden, which is not applicable for consumers who do not eat meat at all.

2.5. Ethical considerations

The survey did not include personal questions which may reveal the identity of any of the respondents. Moreover, the respondents were informed in the beginning of the survey that it was voluntary to participate, the responses were anonymous, and they will not be shared with anyone with the following statement: "The responses are anonymous, and they will not be shared with anyone. Participation in the survey is voluntary."

3. Results and Discussion

3.1. General results and discussion from the survey

In this section, results are explained by the interpretation of the data from the survey with the help of figures, followed by discussions of the findings of each figure. Mean consumption frequencies of meat and legumes among respondents are shown in Figure 3. On average, people consume meat almost 5 times a week with a standard deviation of 4.32. The average consumption of legumes is almost 3 times per week with a standard deviation of 3.10.

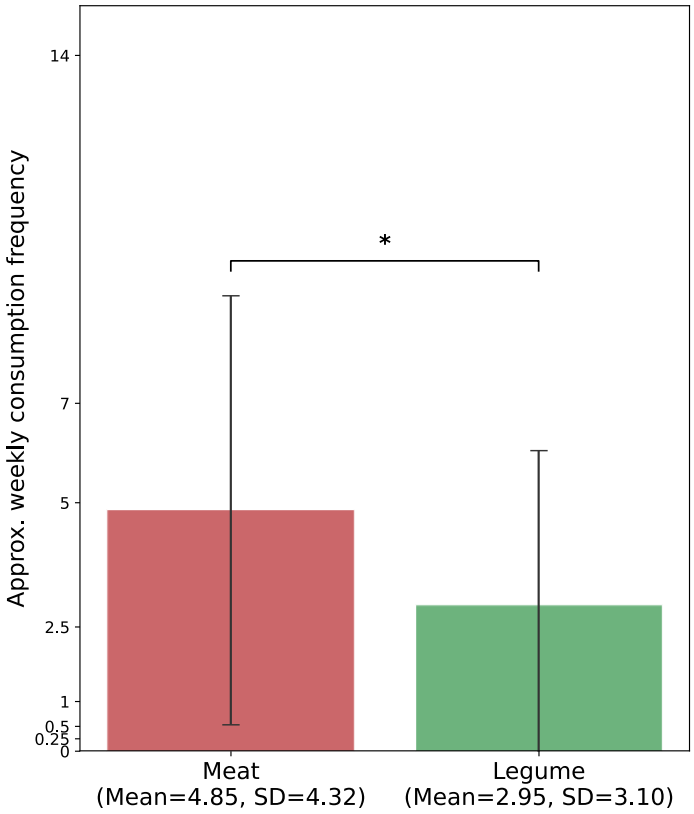


Figure 3 – Mean weekly meat and legume consumption frequencies of respondents

The findings of the survey are on par with those from Jordbruksverket for meat consumption. Jordbruksverket shows that meat consumption, including red meat, white meat and processed meat, is slightly above 750 grams per week per person (17), which corresponds to a mean consumption of 4.85 servings of 155 grams of raw meat, or around 120 grams of cooked meat. On the other hand, according to Riksmaten, the food consumption survey conducted in Sweden in 2010-2011 (23), consumption of legumes was around 85 grams per person per week, which seems to be much lower than what corresponds to an average of around 3 servings per week among the respondents. However, the consumption survey made in 2011 is outdated and may not represent the average consumption habits of Swedish consumers today. Unfortunately, a

more recent national survey does not exist in Sweden. If the findings of the 2011 survey remain true, meals with legumes might contain a very small amount of legumes, which needs to be increased for health reasons. If the consumption of legumes did increase as the survey responses suggest, there has been a significant increase in legume consumption since 2011 among consumers in Sweden.

Figure 4 depicts the answers given to the question, "Imagine a situation where you are trying to reduce your meat intake and increase your legume intake. For this purpose, you are planning to make a change in your regular diet by swapping some of the meat you consume with legumes. In order to make that change, which of the following is important to you?" The intentions of consumers to decrease their meat consumption and replace the decreased amount of meat with legumes, in other words, the intention to swap, is addressed in this question. The responses from respondents who never consume meat were excluded from the analyses for swap intentions including RQ1 and RQ2 analyses for relevancy; however, they are included in other analyses.

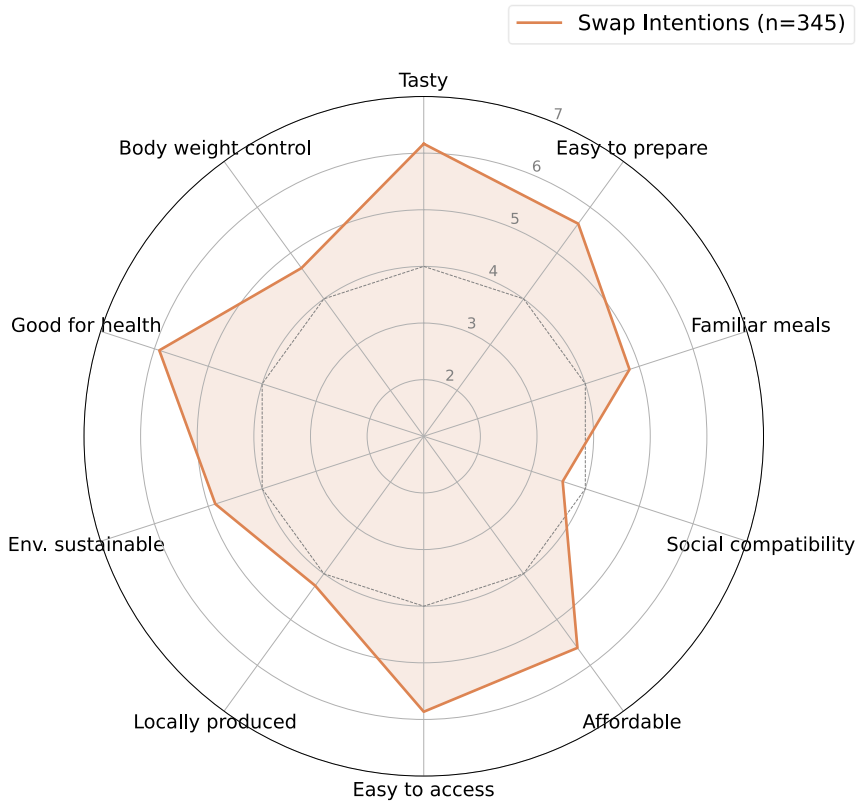


Figure 4 – Mean scores given to the criteria for the swapping intentions question

According to the consumers, the highest rated criteria on average, so the most important criteria, regarding legumes that are supposed to replace the meat are in order: "It is tasty", "It is good for my health", "It is easy to access or purchase the dish or the ingredients to prepare the dish", "It is easy to prepare meal in a short time", and "It is affordable". All these criteria have a mean score above 5, with tastiness being the only criterion receiving a score above 6. On the other

hand, “Making this change will not affect my social relations with friends and family in a bad way”, “It is produced in Sweden”, and “It helps me control my body weight” are rated as the least important criteria, with social compatibility being the only criterion receiving a score below 4.

The findings of the survey on the importance of tastiness are in parallel with previous research on the consumers in Sweden and several other European countries. This research reveals that taste is the main factor people consider when choosing what to eat among meat and legumes, and consumers find legumes less tasty on average, which is a major barrier to reducing consumption of meat and increasing consumption of legumes (9,11,20). The importance of taste for consumers is a well-established criterion when it comes to food research on several grounds. This recurring conclusion shows the importance of creating tasty recipes or tasty legume-based products to motivate consumers to increase their legume consumption instead of meat.

The importance of healthiness and ease of preparation for increased intentions to swap for consumers is also supported by Röös et al. (2022) and Spendrup and Hovmalm (2022) (9,11). The importance of accessibility and affordability is a new finding compared to previous studies. The reason for the higher scores for accessibility and affordability could be the potential bias, which included more respondents from the ages 18-34, which contains a higher percentage of students, who may not have the financial situation of working adults, and who may not have the same opportunities to shop for ingredients or meals, putting more importance on accessibility. In contrast, Röös et al. (2022) finds that weight control is among the main motivators for decreasing meat consumption and increasing legume consumption, which may reflect the association of protein consumption with weight loss in society, while in this survey, it is among the least important criteria (9).

In Figure 5, the yellow radar visualizes the scores of the criteria for the question “Imagine a situation where you are trying to reduce your meat intake and increase your legume intake. For this purpose, you are planning to make a change in your regular diet by swapping some of the meat you consume with legumes. In order to make that change, which of the following is important to you?” and the blue radar visualizes the question “How important are these aspects for you when choosing which food to consume on a regular basis?” In summary, it depicts different scores for swapping intentions and regular diet criteria.

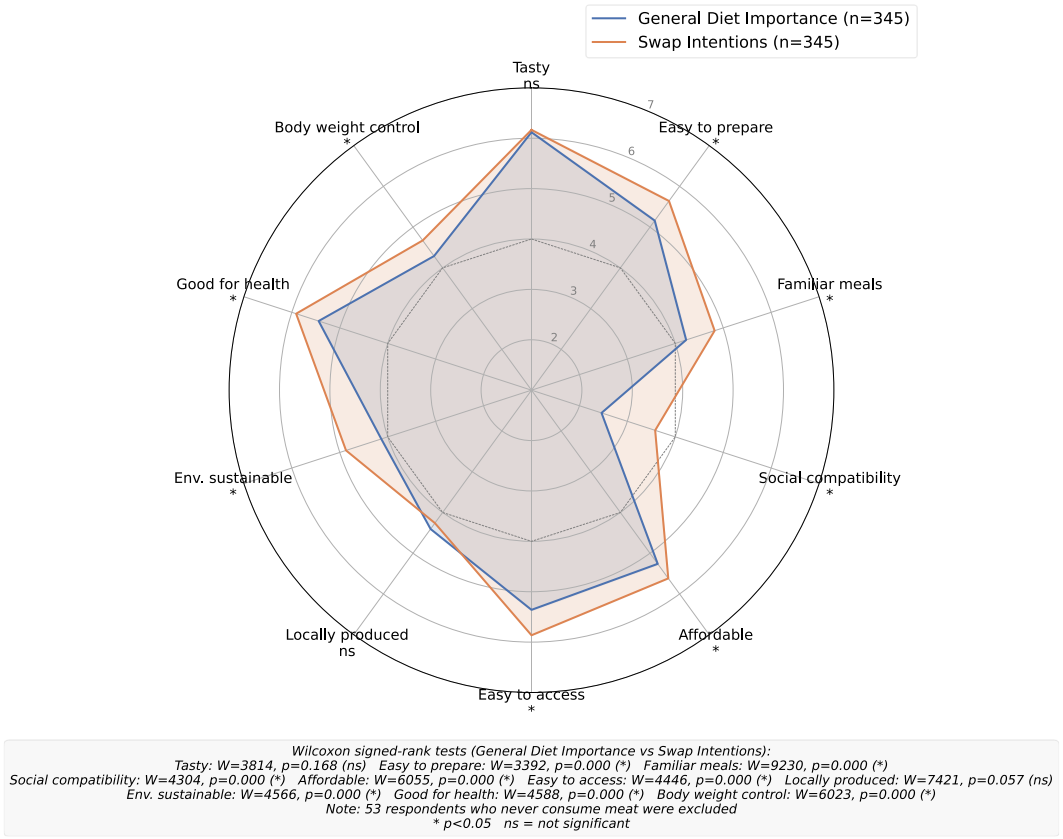


Figure 5 – Mean scores given to the criteria for the swapping intentions and general diet questions

The responses to these questions are compared for the verification of the reliability of the responses. Scores of different criteria are similar for both questions as can be seen in Figure 5. The overall scores for the swapping intention criteria are higher than those for the regular diet questions, except for the tastiness and local production statements for which the differences are insignificant.

Both the fact that the responses are similar for both questions, and that the swapping question has higher mean scores confirm that the respondents are comprehending the questions and answering intentionally. What people give importance to in their regular diet can also be important to them if they want to make a change in their diet. Moreover, the higher scores for the swapping question explain that people need more encouragement to make a dietary change, as it is easier to keep one's diet the same than make a change.

3.2. Survey analysis according to the research questions

RQ1 – How do swapping intentions differ among consumers with different consumption frequencies of each food?

Figure 6 visualizes the scores given to the criteria for the question "Imagine a situation where you are trying to reduce your meat intake and increase your legume intake. For this purpose, you are planning to make a change in your regular diet by swapping some of the meat you

consume with legumes. In order to make that change, which of the following is important to you?" The different colors correspond to the different legume consumption frequency groups, the darker the green, the higher the frequency.

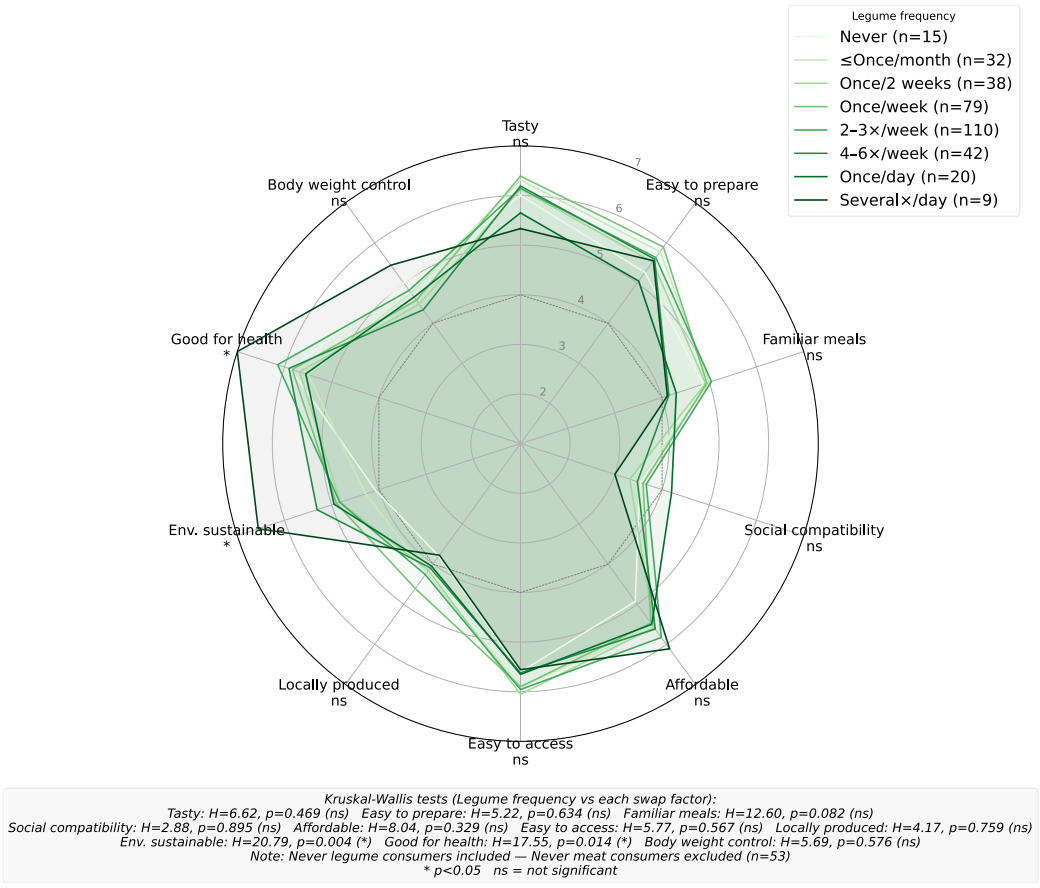


Figure 6 – Comparison of mean scores from different consumption frequency groups of legumes on swapping intentions

Figure 6 shows that respondents who consume legumes more often give higher scores to the environmental sustainability criterion regarding swap intentions. While the healthiness criterion shows statistical significance between consumption frequency groups, there does not seem to be a positive correlation trend between consumption frequency and healthiness scores. Other criteria have no significant correlations with legume consumption frequency. Previous research on Swedish consumer attitudes towards legumes has not covered differences in swapping intentions between frequent and infrequent consumers, so these findings are difficult to compare directly with existing literature but represent a new dimension of the topic.

Figure 7 depicts the scores given to the criteria for the question "Imagine a situation where you are trying to reduce your meat intake and increase your legume intake. For this purpose, you are planning to make a change in your regular diet by swapping some of the meat you consume with legumes. In order to make that change, which of the following is important to you?" The darker shades of red represent groups with higher consumption frequencies.

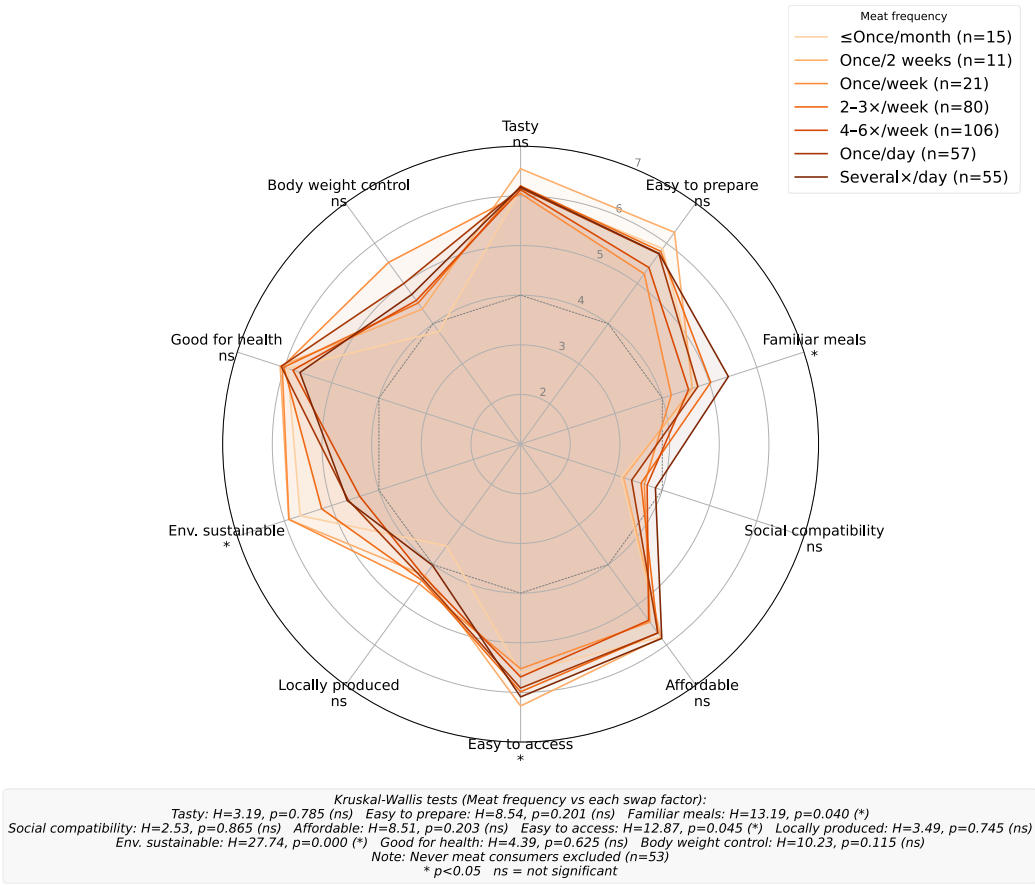


Figure 7 – Comparison of mean scores from different consumption frequency groups of meat on swapping intentions

Figure 7 shows that the respondents who consume meat less frequently give higher scores for the environmental sustainability criterion for swap intentions. While there is a significant difference between the meat consumption frequency groups' scores for familiarity, they do not follow a trend. The other criteria do not have significant correlations with meat consumption frequencies. Similarly to legume frequency, previous consumer studies on meat substitution in Sweden have not examined how beliefs around meat consumption differ with consumption frequency, making this a novel contribution of this study.

To address RQ1, the combination of results depicted in Figures 6 and 7 shows that environmental sustainability is a significant driver for consumers who consume less meat and more legumes. This may indicate that the environmental impact of meat has been more clearly communicated to consumers than its other attributes, such as health impacts.

Additionally, higher overall scores on swapping intention criteria can be interpreted as a higher intention to swap, as it shows that if certain conditions are met, the consumers are willing to make the change. If the scores are low on average, the willingness to change may be low. However, when different frequencies of legume consumption and meat consumption are compared with mean scores among all criteria for the swap intentions question (mean of scores of all 10 criteria), there seems to be no correlation between overall higher swapping intentions and consumption habits of either food.

RQ2 – How do the consumers' associations around meat and legumes compare to the criteria they consider important when swapping meat for legumes?

The overall scores on thoughts around meat and legumes are compared in Figure 8. The specific questions depicted in this figure are "How much do you associate each of these statements with meat consumption (red meat, white meat, processed meat, etc. excluding fish and seafood)?" depicted by the red radar, and "How much do you associate each of these statements with legume consumption (beans, peas, lentils, etc.)?" depicted by the green radar.

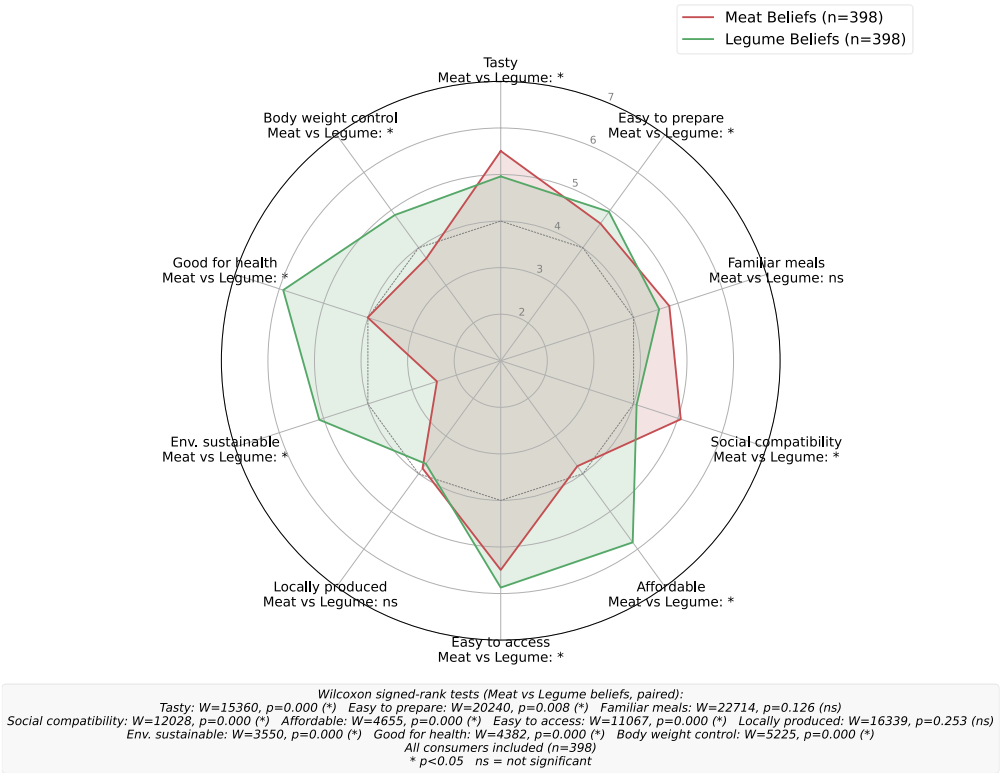


Figure 8 – Mean scores given to the criteria for the questions regarding thoughts around meat and legume consumption

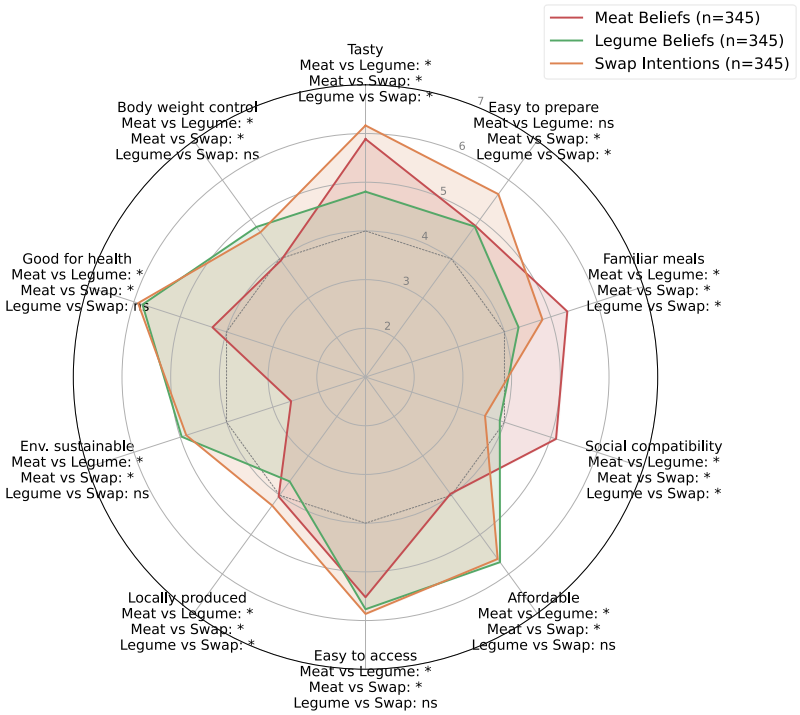
The scores for the statements regarding ease of preparation, affordability, accessibility, sustainability, healthiness, and aiding body weight control are significantly higher for legumes than for meat. Healthiness, affordability, and sustainability received the highest scores compared to meat; and healthiness, ease of preparation and accessibility received the highest standalone scores.

On the other hand, scores for tastiness and social compatibility are significantly higher for meat than for legumes, and accessibility and tastiness received the highest standalone scores. Environmental sustainability received the lowest score for meat below 3. Familiarity and locality scores are similar for both foods, with locality receiving a low score below 4.

Considering that tastiness is the leading factor when it comes to what people decide to eat in their regular diets (Figure 5), higher scores for the tastiness of meat might be the cause of higher consumption of meat on average. The higher scores for ease of preparation of legumes may be

related to the eating habits of younger consumers, who eat significantly more legumes than older age groups (discussed in more detail under RQ4). Traditional Swedish recipes containing legumes, such as pea soup, take a long time to prepare. On the other hand, more convenient forms of legumes are currently accessible in grocery stores for affordable prices, such as canned beans or lentils. While these foods do not fit into a traditional diet, they can be used to prepare more contemporary meals quickly, which might explain the higher scores for legumes for ease of preparation as well as accessibility and affordability.

The swapping intentions are compared with thoughts on meat and legume consumption in Figure 9. The three questions answered with this figure are "How much do you associate each of these statements with meat consumption (red meat, white meat, processed meat, etc. excluding fish and seafood)?" depicted by the red radar, "How much do you associate each of these statements with legume consumption (beans, peas, lentils, etc.)?" depicted by green, and "Imagine a situation where you are trying to reduce your meat intake and increase your legume intake. For this purpose, you are planning to make a change in your regular diet by swapping some of the meat you consume with legumes. In order to make that change, which of the following is important to you?" depicted by yellow.



Meat vs Legume:
Tasty: W=5754, p=0.000 (*) Easy to prepare: W=17428, p=0.959 (ns) Familiar meals: W=8992, p=0.000 (*)
Social compatibility: W=6773, p=0.000 (*) Affordable: W=4393, p=0.000 (*) Easy to access: W=9616, p=0.006 (*) Locally produced: W=9528, p=0.001 (*)
Env. sustainable: W=3224, p=0.000 (*) Good for health: W=4100, p=0.000 (*) Body weight control: W=4692, p=0.000 (*)
Meat vs Swap:
Tasty: W=5740, p=0.000 (*) Easy to prepare: W=7277, p=0.000 (*) Familiar meals: W=10166, p=0.000 (*)
Social compatibility: W=7328, p=0.000 (*) Affordable: W=3064, p=0.000 (*) Easy to access: W=6281, p=0.000 (*) Locally produced: W=10154, p=0.010 (*)
Env. sustainable: W=2838, p=0.000 (*) Good for health: W=3043, p=0.000 (*) Body weight control: W=5320, p=0.000 (*)
Legume vs Swap:
Tasty: W=2815, p=0.000 (*) Easy to prepare: W=5708, p=0.000 (*) Familiar meals: W=13944, p=0.000 (*)
Social compatibility: W=16188, p=0.034 (*) Affordable: W=9947, p=0.228 (ns) Easy to access: W=8816, p=0.279 (ns) Locally produced: W=7341, p=0.000 (*)
Env. sustainable: W=12638, p=0.276 (ns) Good for health: W=5836, p=0.289 (ns) Body weight control: W=6814, p=0.113 (ns)
Note: 53 respondents who never consume meat were excluded
** p<0.05 ns = not significant*

Figure 9 – Mean scores given to the criteria for swap intentions compared with thoughts around meat and legume consumption

When swap intention scores are introduced as a third dimension compared to Figure 8, they show a pattern that is a combination of meat and legume scores on differing criteria. Swap intentions score significantly higher than meat beliefs across all factors except social compatibility and familiarity, revealing that respondents generally consider these factors to be more important to practice a dietary change than they associate them with meat in their current diet.

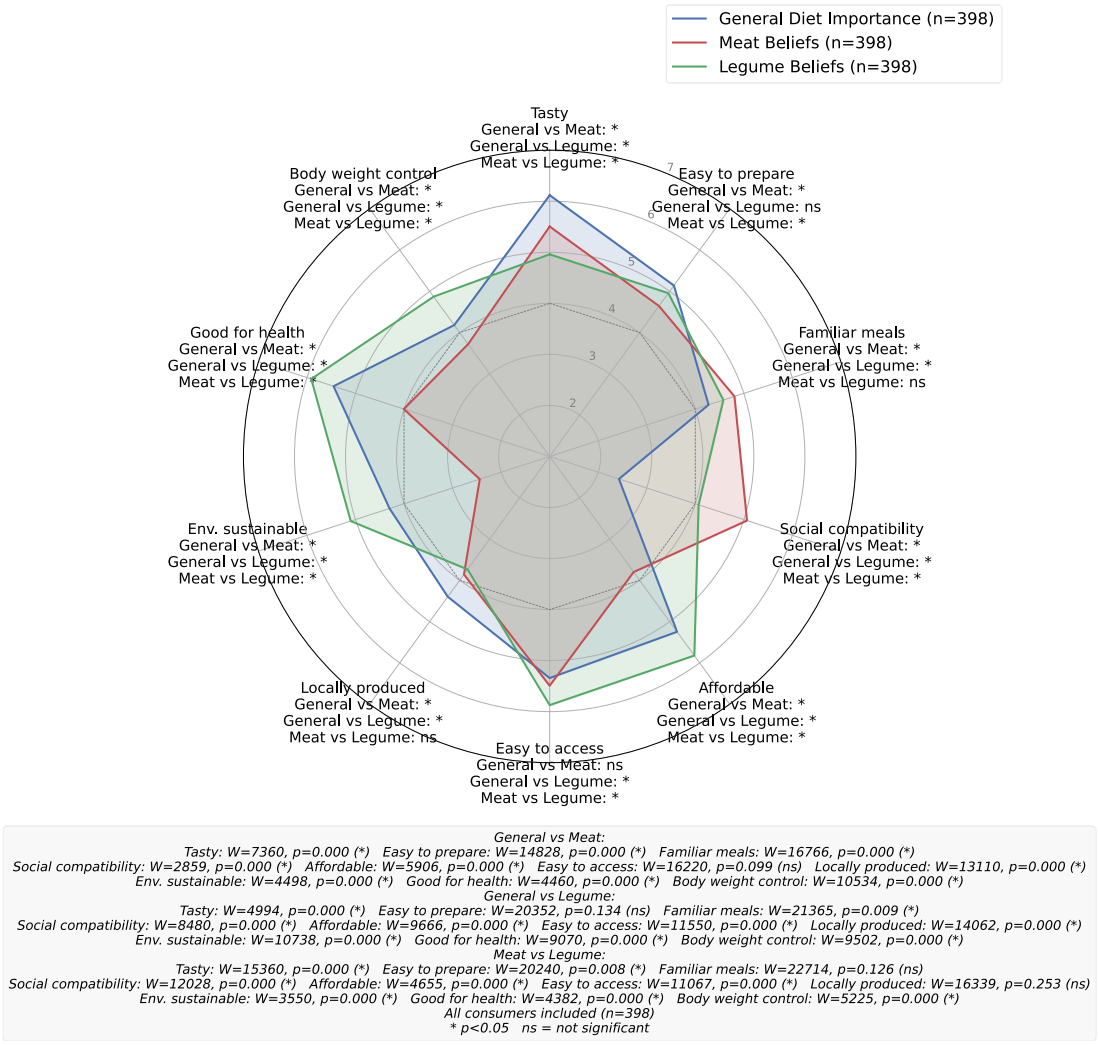
Compared to thoughts on legumes, swap intentions score significantly higher on tastiness, familiar meals, locality and ease of preparation. On the other hand, affordability, accessibility, sustainability, body weight control, and healthiness scores are similar between thoughts on legumes and swapping intentions, while social compatibility scores are higher for legumes.

To address RQ2, the increasing scores for tastiness from legumes to meat to swapping intentions support the notion that tastiness is a big barrier when it comes to decreasing meat consumption and increasing legume consumption. The score distribution on the plot may indicate that while consumers consider legumes to be healthy, affordable, and sustainable compared to meat, swapping the meat in their diets with legumes would compromise taste, and would make an unfamiliar meal that does not support local production. These findings reinforce the importance of tastiness for intentions to swap, as healthiness is the second-highest rated criteria for swapping (and affordability the fifth), but is not a good enough motivator to surpass the discouragement caused by a lack of tastiness.

Contrary to the respondent's low scores on locality for legumes, Röös et al. (2020) explain that a large variety of legumes are able to be produced in Sweden (13). They also explain that a significant proportion of meat that is being consumed in Sweden is of foreign origin, 50% for beef and 30% for pork and chicken. On the other hand, while consumers state local production to be more important for swapping than how much they score contribution to local production for meat or legumes, it is among the criteria with the lowest scores among all criteria for swapping.

RQ3 – How do general dietary preferences and consumption habits of consumers compare to their beliefs around meat and legumes?

The scores on criteria regarding respondents' regular diets are compared with thoughts around meat and legume consumption in Figure 10. The questions visualized with radars in this figure are "How important are these aspects for you when choosing which food to consume on a regular basis?" with blue, "How much do you associate each of these statements with meat consumption (red meat, white meat, processed meat, etc. excluding fish and seafood)?" with red, and "How much do you associate each of these statements with legume consumption (beans, peas, lentils, etc.)?" with green.



General vs Meat:
Tasty: W=7360, p=0.000 (*) Easy to prepare: W=14828, p=0.000 (*) Familiar meals: W=16766, p=0.000 (*)
Social compatibility: W=2859, p=0.000 (*) Affordable: W=5906, p=0.000 (*) Easy to access: W=16220, p=0.099 (ns) Locally produced: W=13110, p=0.000 (*)
Env. sustainable: W=4498, p=0.000 (*) Good for health: W=4460, p=0.000 (*) Body weight control: W=10534, p=0.000 (*)
General vs Legume:
Tasty: W=4994, p=0.000 (*) Easy to prepare: W=20352, p=0.134 (ns) Familiar meals: W=21365, p=0.009 (*)
Social compatibility: W=8480, p=0.000 (*) Affordable: W=9666, p=0.000 (*) Easy to access: W=11550, p=0.000 (*) Locally produced: W=14062, p=0.000 (*)
Env. sustainable: W=10738, p=0.000 (*) Good for health: W=9070, p=0.000 (*) Body weight control: W=9502, p=0.000 (*)
Meat vs Legume:
Tasty: W=15360, p=0.000 (*) Easy to prepare: W=20240, p=0.008 (*) Familiar meals: W=22714, p=0.126 (ns)
Social compatibility: W=12028, p=0.000 (*) Affordable: W=4655, p=0.000 (*) Easy to access: W=11067, p=0.000 (*) Locally produced: W=16339, p=0.253 (ns)
Env. sustainable: W=3550, p=0.000 (*) Good for health: W=4382, p=0.000 (*) Body weight control: W=5225, p=0.000 (*)
All consumers included (n=398)
** p<0.05 ns = not significant*

Figure 10 – Mean scores given to the criteria for general diet importance compared with thoughts around meat and legume consumption

As observed in Figure 5, regular diet scores and swapping intention scores across the 10 criteria follow a similar pattern. Therefore, similarly to swapping intention scores, regular diet scores seem to follow a pattern between meat and legume perceptions. The biggest difference in the mean score among any criteria between the regular diet versus both food items is for social compatibility. While respondents score the importance of social compatibility lower than any other criteria, specifically below 3, the scores for social compatibility of legumes are slightly above 4 and for meat, it is approximately 5.

To address RQ3, the biggest difference between the scores of the criteria regarding regular diets, legumes, and meat is in social compatibility. The score for social compatibility is the lowest for a regular diet, followed by legumes, then meat. The respondents evidently think that social compatibility is not important for their diet, but they also perceive meat to be consumed significantly more than legumes by the people around them. Meat consumption is much higher among respondents than legumes as shown in Figure 3. This indicates that while they might think that social compatibility does not have a major impact on deciding what to eat, it might influence their meat and legume consumption, particularly in eating more meat than legumes.

Figure 11 compares the consumption frequencies of meat and legumes with scores given to the criterion "It is consumed regularly by the people that surround me". Legume consumption seems to be positively correlated with social compatibility while meat consumption seems to be correlated with social compatibility among those who consume it once per week or more.

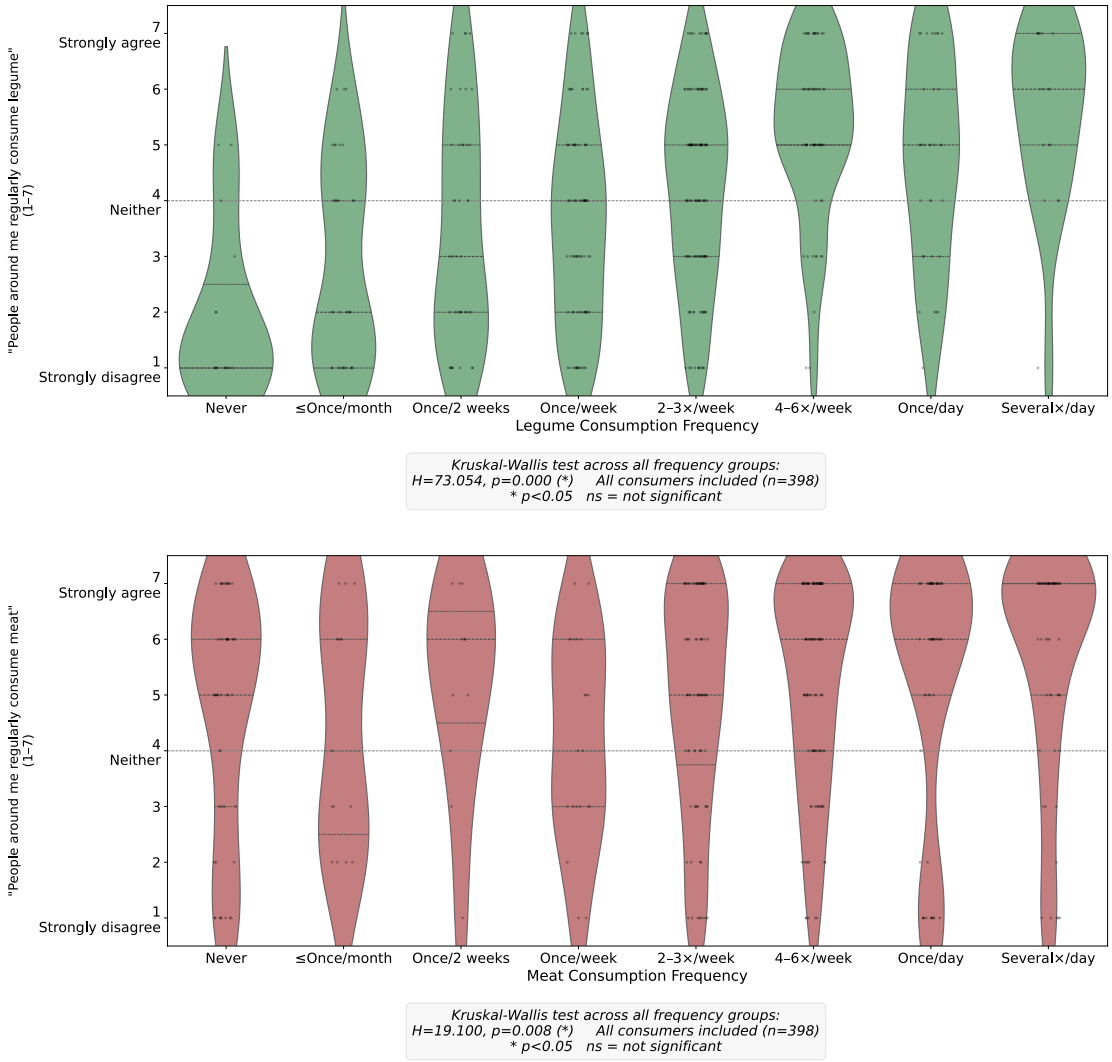


Figure 11 – Distribution of social compatibility scores for legume and meat consumption across consumption frequency groups

The contradiction between the low social compatibility scores for all questions and the increasing consumption frequencies with social compatibility can be due to the discrepancy between conscious reasoning and social influence. Respondents may believe that their social surroundings do not affect their food choices, while in practice their consumption patterns reflect the foods that appear frequently in their social environment. While Röös et al. (2022) discuss social norms in a broader context (9), the specific discrepancy between conscious thoughts around the importance of social influence and the actual behaviors has not previously been reported in literature.

Figure 12 shows that positive attributions towards legumes are positively correlated with legume consumption frequency, while they are inversely related to meat consumption frequency.

Similarly, the more meat people consume, the higher the scores they give to the criteria about meat. And the more legumes they consume, the lower the scores they give to the meat criteria.

Figure 12 – Mean scores given to the criteria for thoughts around legumes and meat across consumption frequency groups

Positive thoughts around a food item correlate positively with its higher consumption. This indicates that, in order to influence consumers to consume more healthier, lower climate impact foods such as legumes, familiarizing them with the positive attributes of the food is vital. It is supported by previous findings that it is highly unlikely for people to consume food in high quantities if they do not think highly of it. Therefore, it is also crucial to inform consumers about the shortcomings of meat to motivate the reduction of its consumption.

RQ4 – How do demographic factors such as age, gender, and location of residence relate differently to meat and legume consumption frequencies among Swedish consumers?

Correlations between age groups, genders, size of location of residence and legume consumption frequency are shown in Figure 13.

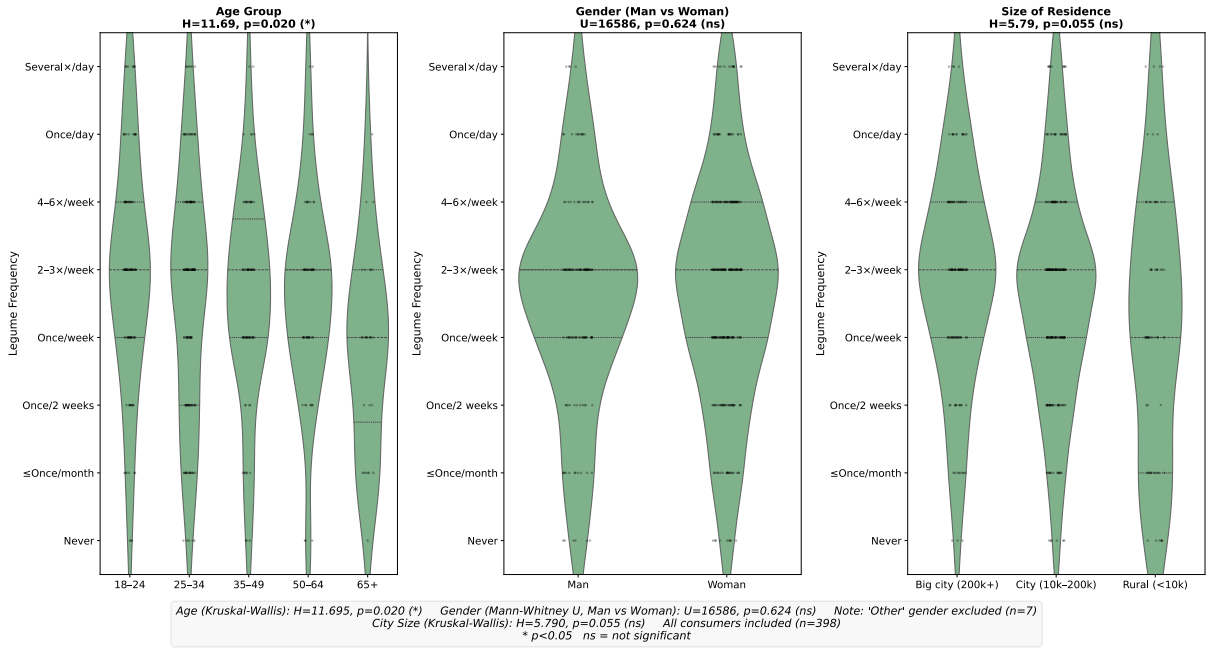


Figure 13 – Legume consumption frequency across age groups, genders, and sizes of place of residence

According to the comparisons, legume consumption frequency seems to decrease with age, while no significant correlation seems to exist for different genders and locations.

To address RQ4, the finding that legume consumption frequency decreases with age may be explained by the historical place of legumes in Swedish diets. In an article by Rytkönen (2022), it is mentioned that legumes, especially peas, were historically a central component in the working class's diets, which consisted of inexpensive and local ingredients. During this period, meat was an expensive ingredient and inaccessible to the majority of the population. As Sweden became more industrialized, the population became wealthier, and meat consumption increased while legumes, which were associated with poverty and a lower social class, gradually declined in consumption (12). The current legume consumption habits of the older respondents may reflect this phenomenon, causing them to consume less legumes than younger respondents. On the other hand, the younger respondents who did not grow up in the same conditions as the

older generations could be more inclined to eat more plant-based foods including legumes, as recent discussions around food and sustainability have brought attention to the environmental benefits of plant-based diets. As mentioned under Figure 8, convenient food items such as canned legumes may also be used by younger consumers to create contemporary meals, which older consumers may be more conservative about consuming. This connection between the historical and cultural context and the age-related legume consumption patterns represents a novel interpretation, as no previous consumer survey in Sweden appears to have drawn this conclusion by explaining generational differences in legume consumption.

Correlations between age groups, genders, size of location of residence and meat consumption frequency are shown in Figure 14.

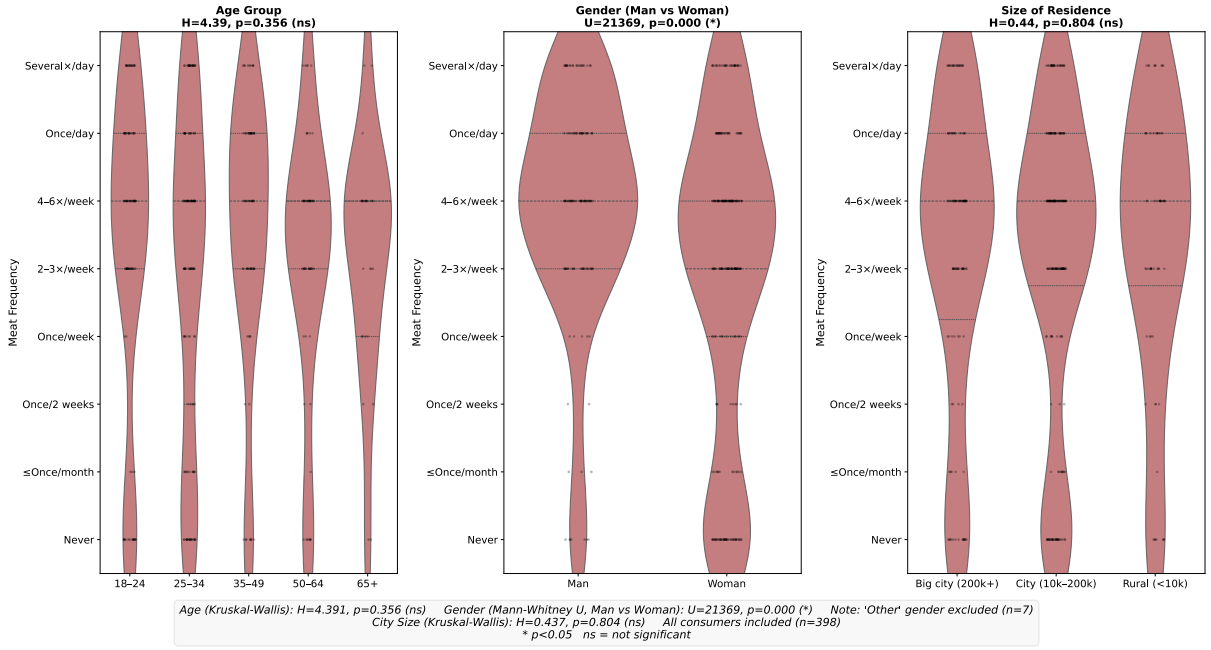


Figure 14 – Meat consumption frequency across age groups, genders, and sizes of place of residence

There seems to be a significant difference between men's and women's meat consumption frequencies. Men seem to consume significantly higher amounts of meat on average, and there seems to be fewer men who never consume meat compared to women. No significant correlation exists between age groups and locations for meat consumption.

To address RQ further, the finding from the survey that men consume significantly more meat than women, as shown in Figure 14, is supported by literature. Leer (2026) mentions in his study that women engage more readily in sustainable food practices than men, and he argues that men's higher meat consumption is tied to sociocultural associations between consuming meat and masculinity. He further argues that plant-based foods are seen as feminine and do not fit into the societal image of men (29). Supported by Leer's claims, the difference between men's and women's meat-eating preferences displayed by the results of the survey may reflect the cultural norms around food and gender.

3.3. Additional consumer perspectives on drivers and barriers to increasing legume consumption

The final question, which was optional to answer, asks: "Do you have any additional thoughts about what drivers or barriers might influence your decision to increase your consumption of legumes?" The question received 109 responses in total. The responses were manually grouped into common themes, which are summarized below.

The four most frequently mentioned themes were taste and sensory experience with 30 responses, lack of knowledge of recipes and cooking with 27 responses, gastrointestinal problems with 22 responses, and protein content with 15.

Taste and sensory experience were the most commonly addressed themes. Respondents stated that meat is tastier, has a better texture, and is overall more satisfying to eat than legumes. Several responses mentioned that even though they are aware of the health benefits of legumes and their lower climate impact, the taste was a major barrier for them. These comments match the findings from the rest of the survey, and it can be concluded that demonstrating tasty meals to consumers that include legumes is crucial to increasing their consumption. The tastiness of legume-based dishes through public meals such as cafeteria food, catering services, and restaurant dishes could be an effective strategy for reaching consumers.

Lack of knowledge regarding recipes with legumes and cooking methods was the second most mentioned theme. Many respondents stated that they do not know how to prepare legumes in such a way that they can incorporate them into their regular diets with tasty and practical meals. This theme reveals the importance of spreading information among consumers on how to incorporate foods into their diets rather than just advising what to include or increase and what to exclude or decrease.

Gastrointestinal problems were the third most common theme. The 22 responses grouped in this theme mention various gastrointestinal issues such as flatulence, bloating, IBS, or intestinal cramps as barriers to increasing legume consumption. Several respondents stated that they want to eat more legumes, but they cannot do so due to digestive issues. The importance of the appropriate preparation of legumes is displayed through this theme. According to Uche (2025), the gastrointestinal discomfort caused by legumes is mainly due to raffinose family oligosaccharides (RFOs). RFOs are indigestible carbohydrates present in legumes that are fermented in the colon, causing bloating and flatulence, as humans lack the enzyme to digest them (19). Soaking and fermentation are preparation methods that are traditionally used to reduce RFO content in legumes. Additional food processing methods are being developed such as high-pressure processing, pulsed electric fields, and ultrasound, which have been showing promising results in reducing the RFOs more efficiently while preserving sensory quality (19).

Protein content, the fourth most common theme, was mentioned by 15 respondents, who expressed their concerns about the protein quality and quantity of legumes compared to meat, particularly among respondents who reported that they exercise regularly. These concerns partially reflect the reality, as legumes generally have lower protein digestibility and content

compared to meat. However, previous research such as the study by Röös et al. (2020) show that a varied diet where some of the meat is replaced with legumes can meet protein requirements for most adults, and additional nutrients that many Swedish consumers lack for optimal health (13). Communicating this nuance to consumers rather than advertising legumes as a high-protein food may be more effective in addressing this barrier.

The remaining responses covered several additional themes. Price and affordability had 13 responses which address cost as a barrier to increasing legume consumption, although some respondents did note that certain legumes such as dried lentils are actually cheaper than meat per gram of protein. Social compatibility and family were mentioned in 13 responses, who mentioned that their family or cultural background makes it difficult to reduce meat consumption. Health and wellbeing were mentioned as a driver in 10 responses, with respondents noting that animal welfare, environmental concerns and personal health goals were drivers to increase legume consumption. Habits and routines were mentioned 9 times, who shared that it was difficult to change their consumption habits regardless of awareness or intention. Environmental skepticism was also mentioned in 9 responses, which were mainly addressing the sustainability of importing legumes instead of consuming locally produced Swedish meat. Smaller themes included satiety concerns, practicality, ultra-processed food concerns, misinformation and mistrust in online health information, additional nutritional concerns and allergies.

4. Conclusions

This study aimed to identify what is most important for consumers in Sweden for partially replacing their meat consumption with legumes. The findings show that swapping intentions are primarily driven by tastiness, healthiness, and accessibility, including ease of preparation and affordability. The importance of tastiness is consistently emphasized across all questions, supporting existing literature on Swedish and European consumers. While consumers reportedly recognize the healthiness, affordability and sustainability of legumes, these factors alone are not sufficient to motivate dietary change from meat to legumes. The perceived taste advantage of meat remains the largest barrier, and strategies aimed at increasing legume consumption in place of meat should focus on familiarization through exposure to tasty legume recipes, better legume products, and in public settings such as cafeterias and catering services.

Even though tastiness is the biggest factor for the dietary change from meat to legumes, the general consensus of the survey shows that positive perceptions of a food predict higher consumption of it, and vice versa. Consumers who have more positive thoughts about legumes eat them more frequently, and those who associate meat with positive attributes consume more meat. This shows that efforts to shift dietary patterns must work to reshape the associations consumers hold around both legumes and meat. Increasing awareness of the health benefits of legumes, their accessibility, and the impact of meat on health and the environment is a crucial part of intervention strategies. Gastrointestinal concerns, identified as the third most common theme among the open-ended responses, should also be addressed. Communicating that simple preparation methods such as soaking and cooking effectively reduce flatulence-causing compounds could help break a significant barrier for many consumers.

Social compatibility appears to be a nuanced finding of this study. In the survey, consumers rated social compatibility as the least important factor for their dietary choices. However, higher consumption of both meat and legumes was statistically correlated with stronger social norms around each food. This suggests that social compatibility has a more subtle correlation with personal diets than people consciously recognize. The gender dimension adds another layer to this dietary discussion; the higher consumption of meat by men seems to be tied to sociocultural associations between meat and masculinity; therefore, gender-sensitive communication strategies may be utilized in future interventions. These two findings can be combined to suggest that sociocultural aspects deserve more attention in future research that could further unpack the role of social life and culture in steering towards plant-based diets.

4.1. Recommendations and further research

For interventions, a systematic approach involving consumers, food producers, legume farmers, public institutions, and government bodies in coordination is likely to be more effective than isolated methods. Future research should follow up with interviews addressing the scores given to the criteria, and with behavioral observations to overcome the bias of consumers against the importance of sociocultural factors. Additionally, a parallel survey investigating the consumer perceptions around processed legume-based meat alternatives could be a useful comparison

with the findings of this study. Understanding consumer behavior and directly involving them in the discussion is vital for dietary change.

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Appendix

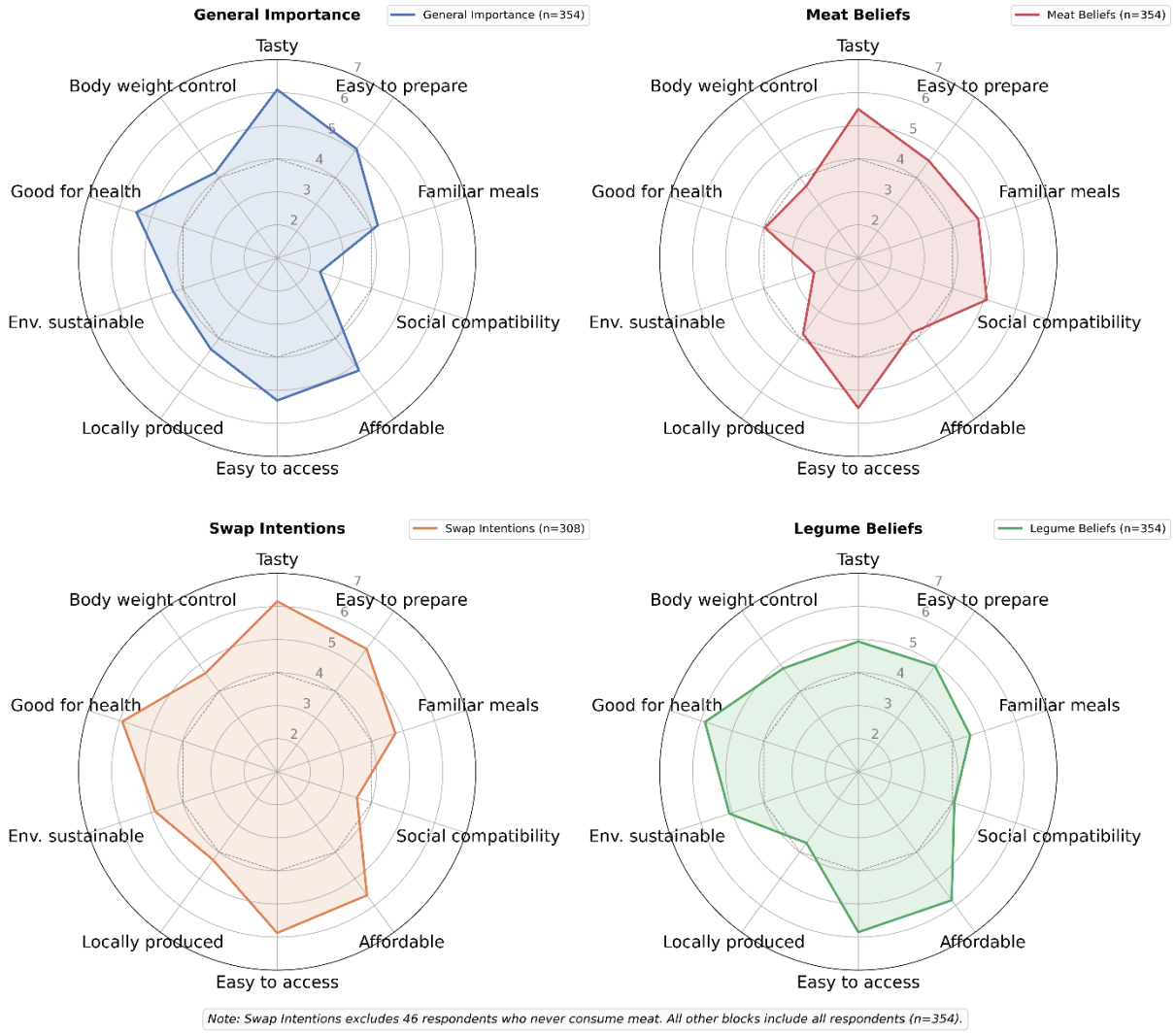

Figure A 1 – Mean scores given to the criteria for all four questions

Hello, I am Nehir Öncü from the Food Technology and Nutrition program in Lund University. As a part of my Master's thesis, I am conducting this short survey on meat (red meat, white meat, processed meat, etc. excluding fish and seafood) and legume (beans, peas, lentils, etc.) consumption habits and beliefs of the population of Sweden.

The responses are anonymous, and they will not be shared with anyone. Participation in the survey is voluntary.

Background Questions

Country of birth:

- ☐ Sweden
- ☐ Other: _____

Duration of residence in Sweden

- ☐ I do not reside in Sweden
- ☐ Less than 1 year
- ☐ 1-5 years
- ☐ More than 5 years

Age group

- ☐ 18–24 years
- ☐ 25–34 years
- ☐ 35–49 years
- ☐ 50–64 years
- ☐ 65 and older

Gender

- ☐ Man
- ☐ Woman
- ☐ Other

Size of place of residence

- ☐ Big city with 200k+ population
- ☐ City with 10k-200k population
- ☐ Rural area with less than 10k population

How often do you consume **meat (red meat, white meat, processed meat, etc. excluding fish and seafood)?**

- ☐ Never
- ☐ Once a month or less
- ☐ Once every two weeks
- ☐ Once every week
- ☐ 2-3 times per week
- ☐ 4-6 times per week
- ☐ Once a day
- ☐ Several times per day

How often do you consume **legumes (beans, peas, lentils, etc.)?**

- ☐ Never
- ☐ Once a month or less
- ☐ Once every two weeks
- ☐ Once every week
- ☐ 2-3 times per week
- ☐ 4-6 times per week
- ☐ Once a day
- ☐ Several times per day

Questions about meat (red meat, white meat, processed meat, etc. excluding fish and seafood) and legume consumption (beans, peas, lentils, etc.)

How important are these aspects for you when choosing which food to consume on a **regular basis?**

1 – Very unimportant
2 – Moderately unimportant
3 – Slightly unimportant
4 – Neither important nor unimportant
5 – Slightly important
6 – Moderately important
7 – Very important

	1	2	3	4	5	6	7
That it is tasty	☐	☐	☐	☐	☐	☐	☐
That it is easy to cook or prepare in a short time	☐	☐	☐	☐	☐	☐	☐
That I know the food and it is part of my usual diet	☐	☐	☐	☐	☐	☐	☐
That I consume similar food to other people around me	☐	☐	☐	☐	☐	☐	☐
That it is affordable	☐	☐	☐	☐	☐	☐	☐
That it is easy to access or purchase the food or the ingredients	☐	☐	☐	☐	☐	☐	☐
That it is produced in Sweden	☐	☐	☐	☐	☐	☐	☐
That it has a low environmental impact	☐	☐	☐	☐	☐	☐	☐
That it is good for my health	☐	☐	☐	☐	☐	☐	☐
That it is good for my body weight control	☐	☐	☐	☐	☐	☐	☐

How much do you associate each of these statements with **meat consumption (red meat, white meat, processed meat, etc. excluding fish and seafood)**?

1 – Strongly disagree
2 – Disagree
3 – Slightly disagree
4 – Neither agree nor disagree
5 – Slightly agree
6 – Agree
7 – Strongly agree

	1	2	3	4	5	6	7
It is a tasty food	☐	☐	☐	☐	☐	☐	☐
It is easy to cook a meat-based dish in a short time	☐	☐	☐	☐	☐	☐	☐
It is a familiar food that is a part of my usual diet	☐	☐	☐	☐	☐	☐	☐
It is consumed regularly by the people that surround me	☐	☐	☐	☐	☐	☐	☐
It is an affordable food	☐	☐	☐	☐	☐	☐	☐
It is easy to access or purchase meat	☐	☐	☐	☐	☐	☐	☐
By purchasing meat, I financially support local producers	☐	☐	☐	☐	☐	☐	☐
It has a low environmental impact	☐	☐	☐	☐	☐	☐	☐
It is good for my health	☐	☐	☐	☐	☐	☐	☐
It helps me control my body weight	☐	☐	☐	☐	☐	☐	☐

How much do you associate each of these statements with **legume consumption (beans, peas, lentils, etc.)?**

1 – Strongly disagree
2 – Disagree
3 – Slightly disagree
4 – Neither agree nor disagree
5 – Slightly agree
6 – Agree
7 – Strongly agree

	1	2	3	4	5	6	7
It is a tasty food	☐	☐	☐	☐	☐	☐	☐
It is easy to cook a legume-based dish in a short time	☐	☐	☐	☐	☐	☐	☐
It is a familiar food that is a part of my usual diet	☐	☐	☐	☐	☐	☐	☐
It is consumed regularly by the people that surround me	☐	☐	☐	☐	☐	☐	☐
It is an affordable food	☐	☐	☐	☐	☐	☐	☐
It is easy to access or purchase legumes	☐	☐	☐	☐	☐	☐	☐
By purchasing legumes, I financially support local producers	☐	☐	☐	☐	☐	☐	☐
It has a low environmental impact	☐	☐	☐	☐	☐	☐	☐
It is good for my health	☐	☐	☐	☐	☐	☐	☐
It helps me control my body weight	☐	☐	☐	☐	☐	☐	☐

Imagine a situation where you are trying to **reduce your meat intake and increase your legume intake**. For this purpose, you are planning to make a change in your regular diet by **swapping some of the meat** you consume **with legumes**. In order to make that change, which of the following is important to you?

1 – Very unimportant
2 – Moderately unimportant
3 – Slightly unimportant
4 – Neither important nor unimportant
5 – Slightly important
6 – Moderately important
7 – Very important

	1	2	3	4	5	6	7
It is tasty	☐	☐	☐	☐	☐	☐	☐
It is easy to prepare a meal in a short time	☐	☐	☐	☐	☐	☐	☐
It can be used to prepare meals that I am familiar with	☐	☐	☐	☐	☐	☐	☐
Making this change will not affect my social relations with friends and family in a bad way	☐	☐	☐	☐	☐	☐	☐
It is affordable	☐	☐	☐	☐	☐	☐	☐
It is easy to access or purchase the dish or the ingredients to prepare the dish	☐	☐	☐	☐	☐	☐	☐
It is produced in Sweden	☐	☐	☐	☐	☐	☐	☐
It contributes to an environmentally sustainable lifestyle	☐	☐	☐	☐	☐	☐	☐
It is good for my health	☐	☐	☐	☐	☐	☐	☐

It helps me control my body weight ☐ ☐ ☐ ☐ ☐ ☐ ☐

Do you have any additional thoughts about what drivers or barriers might influence your decision to increase your consumption of legumes?

End of survey

Thank you for your answers. If you are interested in reading the thesis when it is completed, it will be published in the Lund University database in June 2026. You can search my name "Nehir Öncü" as the author to find it. It is public access and free to read. Have a nice day!

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Figure A 2 – English version of the survey

Hej, jag heter Nehir Öncü och är student vid masterprogrammet i Livsmedelsteknik vid Lunds universitet. Denna korta enkät genomförs inom ramen för mitt examensarbete och syftar till att undersöka konsumtionsvanor samt föreställningar och uppfattningar kring kött (rött kött, vitt kött, processat kött m.m., exklusive fisk och skaldjur) och baljväxter (bönor, ärtor, linser m.m.) bland personer bosatta i Sverige.

Ditt deltagande är frivilligt och alla svar behandlas anonymt samt kommer inte att delas med tredje part.

Bakgrundsfrågor

Födelseland

- ☐ Sverige
- ☐ Other: _____

Åldersgrupp

- ☐ 18–24 år
- ☐ 25–34 år
- ☐ 35–49 år
- ☐ 50–64 år
- ☐ 65 år eller äldre

Kön

- ☐ Man
- ☐ Kvinna
- ☐ Annat

Hur länge har du varit bosatt i Sverige?

- ☐ Jag bor inte i Sverige
- ☐ Mindre än 1 år
- ☐ 1–5 år
- ☐ Mer än 5 år

Hur stor är den stad du för närvarande bor i?

- ☐ Storstad (över 200 000 invånare)
- ☐ Stad (10 000–200 000 invånare)
- ☐ Landsbygd (färre än 10 000 invånare)

Hur ofta konsumerar du måltider som innehåller **kött (rött kött, vitt kött, processat kött m.m., exklusive fisk och skaldjur)**?

- ☐ Aldrig
- ☐ En gång per månad
- ☐ Varannan vecka
- ☐ En gång per vecka
- ☐ 2-3 gånger per vecka
- ☐ 4-6 gånger per vecka
- ☐ En gång per dag
- ☐ Flera gånger per dag

Hur ofta konsumerar du måltider som innehåller **baljväxter (bönor, ärtor, kikärtor m.m.)**?

- ☐ Aldrig
- ☐ En gång per månad
- ☐ Varannan vecka
- ☐ En gång per vecka
- ☐ 2-3 gånger per vecka
- ☐ 4-6 gånger per vecka
- ☐ En gång per dag
- ☐ Flera gånger per dag

Frågor om konsumtion av kött (rött kött, vitt kött, processat kött m.m., exklusive fisk och skaldjur) och baljväxter (bönor, ärtor, kikärtor m.m.)

Hur viktiga är följande aspekter för dig när du väljer vilken mat du **regelbundet konsumerar**?

1 – Mycket oviktigt

2 – Ganska oviktigt

3 – Något oviktigt

4 – Varken viktigt eller oviktigt

5 – Något viktigt

6 – Ganska viktigt

7 – Mycket viktigt

	1	2	3	4	5	6	7
Att maten är god	☐	☐	☐	☐	☐	☐	☐
Att den är lätt att tillaga eller förbereda på kort tid	☐	☐	☐	☐	☐	☐	☐
Att jag känner till maten och att den ingår i min vanliga kost	☐	☐	☐	☐	☐	☐	☐
Att jag konsumerar liknande mat som personer i min omgivning	☐	☐	☐	☐	☐	☐	☐
Att den är prisvärd	☐	☐	☐	☐	☐	☐	☐
Att maten eller ingredienserna är lätta att få tag på eller köpa	☐	☐	☐	☐	☐	☐	☐
Att den är producerad i Sverige	☐	☐	☐	☐	☐	☐	☐
Att den har låg miljöpåverkan	☐	☐	☐	☐	☐	☐	☐

Att den är bra för min hälsa	☐	☐	☐	☐	☐	☐	☐
Att den hjälper mig att kontrollera min kroppsvikt	☐	☐	☐	☐	☐	☐	☐

I vilken utsträckning förknippar du följande påståenden med **köttkonsumtion (rött kött, vitt kött, processat kött m.m., exklusive fisk och skaldjur)**?

1 – Instämmer inte alls
2 – Instämmer inte
3 – Instämmer inte i liten grad
4 – Varken instämmer eller instämmer inte
5 – Instämmer i viss grad
6 – Instämmer
7 – Instämmer helt

	1	2	3	4	5	6	7
Det är gott	☐	☐	☐	☐	☐	☐	☐
Det är lätt att tillaga en kötträtt på kort tid	☐	☐	☐	☐	☐	☐	☐
Det är en välkänd mat som är en del av min vanliga kost	☐	☐	☐	☐	☐	☐	☐
Det konsumeras regelbundet av personer i min omgivning	☐	☐	☐	☐	☐	☐	☐
Det är prisvärt	☐	☐	☐	☐	☐	☐	☐
Det är lätt att få tag på eller köpa kött	☐	☐	☐	☐	☐	☐	☐
Genom att köpa kött stödjer jag lokala producenter ekonomiskt	☐	☐	☐	☐	☐	☐	☐
Det har låg miljöpåverkan	☐	☐	☐	☐	☐	☐	☐
Det är bra för min hälsa	☐	☐	☐	☐	☐	☐	☐
Det hjälper mig att kontrollera min kroppsvikt	☐	☐	☐	☐	☐	☐	☐

I vilken utsträckning förknippar du följande påståenden med **konsumtion av baljväxter (bönor, ärtor, linser m.m.)**?

1 – Instämmer inte alls
2 – Instämmer inte
3 – Instämmer inte i liten grad
4 – Varken instämmer eller instämmer inte
5 – Instämmer i viss grad
6 – Instämmer
7 – Instämmer helt

	1	2	3	4	5	6	7
Det är gott	☐	☐	☐	☐	☐	☐	☐
Det är lätt att tillaga en baljväxtbaserad rätt på kort tid	☐	☐	☐	☐	☐	☐	☐
Det är en välkänd mat som är en del av min vanliga kost	☐	☐	☐	☐	☐	☐	☐
Det konsumeras regelbundet av personer i min omgivning	☐	☐	☐	☐	☐	☐	☐
Det är prisvärt	☐	☐	☐	☐	☐	☐	☐
Det är lätt att få tag på eller köpa baljväxter	☐	☐	☐	☐	☐	☐	☐
Genom att köpa baljväxter stödjer jag lokala producenter ekonomiskt	☐	☐	☐	☐	☐	☐	☐
Det har låg miljöpåverkan	☐	☐	☐	☐	☐	☐	☐
Det är bra för min hälsa	☐	☐	☐	☐	☐	☐	☐
Det hjälper mig att kontrollera min kroppsvikt	☐	☐	☐	☐	☐	☐	☐

Föreställ dig en situation där du försöker **minska din köttkonsumtion och öka din konsumtion av baljväxter**. Du planerar att göra en förändring i din ordinarie kost genom att ersätta **en del av det kött** du vanligtvis konsumerar med **baljväxter**. För att genomföra denna förändring, vilket av följande är viktigt för dig?

1 – Mycket oviktigt

2 – Ganska oviktigt

3 – Något oviktigt

4 – Varken viktigt eller oviktigt

5 – Något viktigt

6 – Ganska viktigt

7 – Mycket viktigt

	1	2	3	4	5	6	7
Att det är gott	☐	☐	☐	☐	☐	☐	☐
Att det är lätt att tillaga en måltid på kort tid	☐	☐	☐	☐	☐	☐	☐
Att det kan användas för att laga rätter som jag är bekant med	☐	☐	☐	☐	☐	☐	☐
Att förändringen inte påverkar mina sociala relationer med familj och vänner negativt	☐	☐	☐	☐	☐	☐	☐
Att det är prisvärt	☐	☐	☐	☐	☐	☐	☐
Att det är lätt att få tag på eller köpa rätten eller ingredienserna	☐	☐	☐	☐	☐	☐	☐
Att det är producerat i Sverige	☐	☐	☐	☐	☐	☐	☐
Att det bidrar till en miljömässigt hållbar livsstil	☐	☐	☐	☐	☐	☐	☐

Att det är bra för min hälsa	☐	☐	☐	☐	☐	☐	☐
Att det hjälper mig att kontrollera min kroppsvikt	☐	☐	☐	☐	☐	☐	☐

Har du några ytterligare tankar om vilka drivkrafter eller hinder som kan påverka ditt beslut att öka din konsumtion av baljväxter?

Slut på enkäten

Tack för dina svar. Om du är intresserad av att läsa examensarbetet när det är färdigställt kommer det att publiceras i Lunds universitets databas i juni 2026. Du kan söka på mitt namn, ”Nehir Öncü”, som författare för att hitta det. Arbetet är offentligt tillgängligt och fritt att läsa. Ha en fin dag!

Figure A 3 – Swedish version of the survey