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Master's Thesis in Economics

Meat production preferences among Swedish consumers: A choice experiment with lasagna

Erik Nyberg

Abstract

Growing concerns over the environmental impact of an expanding global meat production has resulted in calls for more sustainable practices. This, however, is difficult since there exist several conflicts of aim regarding a sustainable production. In this thesis, Swedish consumers' preferences towards four environmental, ethical and health-related attributes of meat production are explored: restriction to antibiotics, animal keeping, reduction of carbon footprint, and the Swedish Keyhole label. Through a random parameter logit model, corrected for attribute non-attendance, the first two attributes are found to be ranked the highest, roughly three times higher than the latter two, given the specific attribute levels. Furthermore, differences among socio-demographic groups are explored and found to exist – primarily for gender and level of education, with small effects of age. Finally, a secondary experiment was conducted to compare the result of carrying attribute information in plain text and using colored circles. The latter case was found to increase the marginal willingness to pay for the highest level of carbon footprint reduction, and the Keyhole label.

Supervisor: Elina Lampi

Key words: Choice experiment, stated preference, random parameter logit, antibiotic usage.

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1. Introduction

The current extensive production and consumption of meat have several negative effects, which have spurred a movement to make the livestock industry more sustainable. One way of addressing this is to target consumers – either to decrease their consumption of meat and/or change to more sustainable alternatives (Dahlin & Lundström, 2011). There are, however, some conflicts of aim regarding sustainability and which type of meat is to be regarded as more sustainable. For example, while cattle and sheep are worse than poultry regarding carbon footprint and emission of greenhouse gases, poultry farms tend to have more animals confined to smaller spaces – increasing the risk of infections and the need for antibiotics. Additionally, cattle and sheep help preserve grazing lands and the landscape, cultural heritage, and biodiversity they contribute to. (Ibid.) To better inform consumers and make regulations in line with their preferences, it is important to understand their values when it comes to meat production. For this reason, this thesis is a pilot study of consumers' preferences for environmental, ethical and health qualities in processed meat – in the form of comparing willingness to pay for improvements in these qualities.

Climate change, with e.g. a rising global mean temperature, increased sea levels and changed weather patterns, is perhaps the most challenging issue of the 21th century, and livestock production contributes with roughly 18 percent of greenhouse gas emissions every year – which is more than the transport sector (Steinfeld et al, 2006). An increase in intake of meat can also have a detrimental effect on public health since red and processed meat have been linked to cardio-vascular diseases and colorectal cancer (Micha et al., 2012). This has led the World Cancer Research Fund (2007) to recommend restricting consumption of red meat to less than 500 grams when cooked per week, out of which little, if any, are to be processed meat. Yet, in the last three decades meat consumption in Sweden increased with 33 percent (Eidstedt & Wikberger, 2015). This while the share of domestic meat products consumed is declining and was in 2012 just over half of total meat consumption[1] (Lööv et al., 2013).

Further, bacterial infections that lead to severe diseases in animals is usually treated with antibiotics, which could lead to the bacteria developing resistance towards antibiotics or advance already antibiotic-resistance bacteria. This is, according to the World Health Organization, "[…] one of the biggest threats to global health, food security, and development today" (WHO, 2017). In Sweden, it is since 1986 the law to use antibiotics carefully and not

[1] The largest import countries for beef are the Netherlands, Ireland, Poland, and Germany while the largest import countries for pork are Germany, Denmark, and Poland (Statistics Sweden, 2018).

for growth-enhancing purposes. However, with the increase of imported meat (mainly used in processed products) and breeding stock from other, less restrictive countries, resistance has become a problem in Sweden as well (Dahlin & Lundström, 2011). Additionally, an increasing meat consumption causes new land to be made use of, old grazing areas to be used for crops, and forests to be cut down – leading to biodiversity losses (Foley et al., 2011).

In the literature, consumer preferences for environmental and ethical qualities in meat production such as animal welfare, climate footprint, biodiversity, and foody safety have previously been acknowledged (e.g. Cicia & Colantuoni, 2010; Koistinen et al. 2013). However, the increased threat of overuse of antibiotics and especially in the Swedish context, the increase in imported meat with a high level of antibiotics in the production, has received less attention. For these reasons it is interesting to examine consumers' preferences regarding this attribute in relation to others. This thesis aims to do so by performing a choice experiment where responders will be asked to make choices while facing quality trade-offs in price and four environmental, ethical, and health-related attributes: restriction to antibiotic usage, reduction of greenhouse gas emission, improvement in animal keeping, and having the Swedish Keyhole label (signifying a healthier meal option). By using a random parameter logit model to estimate an indirect utility function and correcting for attribute non-attendance, marginal willingness to pay for increased quality in each attribute can be calculated and tested for correlations to socio-economic or demographic status. Since meat production in Sweden are comparably restrictive regarding the use of antibiotics, the type of good to be used in the choice experiment needs to be imported to allow for less restricted use. It also needs to be a good that usual consumers tend to buy often, or at least not too rarely. For these reasons, lasagna was chosen as the good of choice – a processed good that is not uncommon in the Swedish context and potentially could contain imported meat.

Additionally, earlier literature has found framing and priming effects when it comes to information and food choices, where for example introducing color coding nutritional information on food increased healthier choices and aversion to red attribute levels (e.g. Balcombe et al., 2010; Koenigstorfer et al., 2014). For this reason, two versions of the experiment will be carried out – the main one with plain text and an alternative one with colored circles – to see if the type of information affects the respondents' relative preferences regarding these attributes.

So, the aim of this thesis is to study consumers' preferences regarding meat production and the four non-monetary attributes mentioned above – primarily the order in which they rank these after importance. Secondly, this thesis aims to see if there are heterogeneity in preference across some sociodemographic characteristics. Finally, the last aim of this thesis is to see if consumers' preferences are affected by a framing effect in the form of color schemes. Thus, my contribution to the existing stated preference and choice experiment literature regarding meat production is twofold. Firstly, I introduce the attribute of restriction of antibiotics usage – which, to the best of my knowledge, have not been studied considerably in these settings. Secondly, I add to the existing literature in the cases of animal keeping, carbon footprint, and healthier foodstuff through the Keyhole label.

The rest of the thesis is structured as follows. Section 2 presents a literature review of previous stated preference studies in the area. Section 3 describes the theoretical framework of discrete choice models and the econometric design. Section 4 describes the choice experiment, as well as data and the variables. Section 5 presents the results of the experiment, primarily average marginal willingness to pay estimations – for each attribute and broken down for relevant sociodemographic characteristics. Section 6 covers the discussion of results, potential caveats, and policy implications, while section 7 concludes the thesis.

2. Literary review

2.1 Earlier findings

Previous literature has reviewed stated consumer preference, and more specifically choice experiment, regarding meat production to a large extent for several aspects – especially food safety and traceability (e.g. Loureio & Umberger, 2007; Cicia & Colantuoni, 2010). Grebitus et al. (2012), for example, found that consumers' willingness to pay decrease the further the meat has been transported. For biodiversity, several studies consider preferences for organic production and find various results. Van Loo et al. (2011) e.g. found opportunity for premiums regarding organic production of chicken in the US, with a 35 percent increase in willingness to pay for a general label, and 104 percent for a label from the United States Department of Agriculture.

Concerning climate change, Koistinen et al. (2013) found relatively small effects of including information on carbon footprint on willingness to pay for Finnish minced meat. However, they did see a shift from beef towards pork – a more climate-friendly alternative. Additionally, they

found that consumers are willing to pay a premium for organic production and high animal welfare standards. Similarly, Van Loo et al. (2014) found that while Belgian consumers have a positive willingness to pay for organic and climate footprint labels on chicken, these are not as large as for free roaming and animal welfare. Additionally, they also found that those with high income had higher willingness to pay.

Regarding animal keeping, several studies examine attitudes towards features such as castration procedure, housing conditions, and transportation methods and found that consumers care a great deal about this issue (e.g. Huber-Eicher & Spring, 2008; Liljenstolpe, 2008). de Jonge and van Trijp (2013) compiled several studies regarding the meat sector and found that there seemed to be two extreme options regarding animal welfare for meat consumers – either very low or very high through conventional and organic production, respectively. Therefore, they concluded that there are many consumers willing to trade-off price for at least some improvement, and therefore called for more heterogeneity in production to meet consumer demand. Further, Lagerkvist et al. (2006) explored Swedish consumers' preferences concerning pork using a choice experiment and found that the respondents have positive willingness to pay for fixating the pigs less, larger areas or outdoor housing, tail docking to decrease biting, and more humane castration. Interestingly, female responders are on average found to receive less utility from the first two qualities compared to men. A meta-study on farm animal welfare by Lagerkvist and Hess (2010) found that willingness to pay is typically positively correlated with income and have a negative relationship with age.

Concerning health labels, Hieke and Taylor (2012) did a comprehensive overview on nutrition labeling literature and found that labels benefit "[…] some people sometimes under some circumstances" and that consumers prefer easy-to-use labels, but that misunderstandings can arise from such labels. A larger household size was indicated to take in more nutritional information, and age showed controversial results where older persons seemed to take in less information. Disparities between gender was not found and income had mixed results in the literature – only some found that household expenditure was linked to usage of nutritional information. Regarding the Swedish Keyhole label in particular, Nordström & Thunström (2015) examined the willingness to pay for healthy, Keyhole-labelled meals by performing a contingent valuation study for menu labeling in Sweden and found that approximately one third had positive marginal willingness to pay for the healthier option. Age, income, educational level, labor supply, and physical activity had a statistically significant effect on the willingness to pay for labelled meal, while gender and household composition did not.

The inclusion of antibiotics in stated preference studies has been less used. Lusk et al. (2010) found in a non-hypothetical experiment that American consumers are willing to pay a substantial premium for pork produced without antibiotics. Through contingent valuation questions, they also found that the respondents had a fairly high willingness to pay for a ban on subtherapeutic antibiotic usage. Additionally, Olynk et al. (2010) performed a choice experiment regarding pork chops and let respondents face trade-offs between restriction of antibiotics, pasture access, creates/stalls conditions, and certified transports. They found the respondents value the former two attributes the most, especially if certified by the United States Department of Agriculture. However, Mørkbak et al. (2011) found different results when performing a choice experiment on minced pork meat among Danish consumers. They examined whether including additional food safety information decreases the willingness to pay for the existing food safety attributes (due to insensitivity to scope) by comparing two experiments including restriction to antibiotic usage or not. In the inclusive version domestic production, salmonella-free meat, and a low fat-content was of most important for Danish consumers, while restriction to antibiotic usage and organic production came second.

These earlier findings suggest that we expect to find positive willingness to pay for improvement in environmental and ethical qualities, and that there could exist significant differences between sociodemographic groups, such as men and women. The literature also indicates that animal keeping will be of high importance for the respondents, while carbon footprint and the Keyhole label might not be as critical.

2.2 Societal concern

Every year, the SOM Institute at the University of Gothenburg gather information and attitudes about the Swedish population, and in 2017 they asked the following question: “Regarding the current state, how concerned are you for the following in the future?”. For climate change and environmental degradation, 62 and 61 percent respectively answered “Very concerned”, while slightly fewer (55%) answered the same for increased resistance to antibiotics. (Anderson et al., 2017) Consequently, this might indicate that reducing carbon footprint will be equally or more important compared to restricting antibiotic usage for the Swedish consumers.

3. Theoretical framework and econometric design

3.1 Choice experiments

Choice experiment is a form of stated preference method used for estimating economic values of separate characteristics or attributes of goods or services that, for one reason or another, is not feasible (or impractical) to achieve in a more natural setting (e.g. an existing market). It has, for example, frequently been used for environmental studies where market valuations are not possible (e.g. because of the lack of market), and for goods that have yet to be produced. It is based on the theory that the value of a good or service can be divided and explained by certain characteristics or attributes. By observing individuals' choices between different bundles of the attributes, information regarding preferences for these can be gained. Additionally, if cost is a factor to trade-off with other attributes, the marginal rate of substitution between money and an attribute can be found and welfare measures, such as marginal willingness to pay for improvement in one or more attributes, can be calculated.

In the experiment format, respondents are presented with multiple sets of multi-attribute alternatives and asked to make distinct, preferred choices. Since the attributes are bundled together, an individual observation between the choice of two or more alternatives is not that informative. In fact, a large variation of these attribute-bundles and multiple observations are needed to isolate the average preference for individual attributes. Therefore, many choice sets with varying levels of the attributes are produced and divided among the respondents in different versions of the experiment, in order to get variation without overloading the respondents – the more alternatives and/or choice sets the more observations and information, but also more taxing for the respondent.

While choice experiments can have problems with only dealing in hypothetical situation and therefore perhaps not yield accurate results, the freedom and accuracy with which experiments can be performed is an advantage over field experiments. For the purpose of examining consumers' preferences for improvement in meat production regarding four attributes and comparing the preferences between them, this method is very useful.

3.2 Theoretical framework

The theoretical framework of discrete choice models builds on traditional microeconomic theory and states that utility from a good comes not from the good itself but characteristics of said good (Lancaster, 1966). When an individual is presented with multiple alternatives of a good, their choice will be based on how they trade-off the good's characteristics, or attributes.

The underlying assumption of utility maximization leads to a choice mechanism such that individual n chooses alternative i over alternative j at choice situation t if and only if the utility received from alternative i is greater than that from alternative j (Louviere et al., 2000):

$$U_{nit} > U_{njt} \; \forall i \neq j$$

In accordance with random utility theory (McFadden, 1964), utility is assumed to consist of a deterministic and a stochastic part:

$$U_{nit} = V_{nit} + \varepsilon_{nit},$$

where V_{nit} is the deterministic and observable part (i.e. indirect utility), and ε_{nit} is the stochastic part that accounts for differences in tastes and is unobservable. Since utility cannot be observed directly, one can only make statements regarding the probability of individual n choosing alternative i given observed choices, and an econometric model is needed to estimate utility functions and attributes' parameters:

$$P_{nit} = P\big(U_{nit} > U_{njt}\big) = P\big(V_{nit} + \varepsilon_{nit} > V_{njt} + \varepsilon_{njt}\big) = P\big(\varepsilon_{njt} < \varepsilon_{nit} + V_{nit} - V_{njt}\big)$$

This can be shown to equal:

$$P_{nit} = \frac{\exp(V_{nit})}{\sum_{q=1}^{Q} \exp(V_{njt})}$$

To estimate the indirect utility function and calculate the valuation of consumers' preferences for different meat-related attributes in lasagna a linear random utility model framework will be applied:

$$U_{nit} = V_{nit} + \varepsilon_{nit} = \alpha + \beta_n' x_{it} + \varepsilon_{nit},$$
$$n = 1, \dots, N; \; i = 1, 2, 3; t = 1, 2, 3, 4$$

where the acquired indirect utility is allowed to vary between alternative i and individual n. α is the intercept, or alternative specific constant, included in the models for alternative 2 and 3 – signifying the propensity to choose one of those over the opt-out, basic lasagna in alternative 1. A positive α signifies a preference for change – utility is received from simply not choosing the opt-out. x_{it} is a vector of attribute levels associated with the ith alternative, β_n' is the corresponding individual parameter vector, and ε_{nit} is the error term. The parameters for the non-monetary attributes are allowed to vary across individuals and are assumed to have normal distributions among consumers, while α and the price parameter are assumed to be fixed. By

interacting sociodemographic variables with the non-monetary attributes, this variation (i.e. heterogeneity) in marginal willingness to pay for improvements can be evaluated among different groups.

Since utility is linear in parameters, marginal willingness to pay for improvement in a non-monetary attribute can be calculated by taking the ratio of the parameter of said attribute over the price parameter (for overviews of choice experiment, see Louviere et al., 2000):

$$MWTP = -\frac{\beta_{Non-monetary\ attribute}}{\beta_{Price}}$$

Further, to test if the marginal willingness to pay are statistically different from zero the delta method will be used to compute the estimated standard error and asymptotical t-values for stated functions of estimates, such as the ratio for marginal willingness to pay above. Similarly, the method can be used to examine if the differences between the average coefficients for medium and low carbon footprint, and satisfactory and very satisfactory animal keeping, respectively, are statistically different from zero (since the baseline for each attribute is either high emission level or lacking animal keeping). It is expected that willingness to pay for improvements, i.e. better levels of attributes, are positive in all non-monetary attributes.

3.3 Random parameter logit model

To estimate the utility functions and marginal willingness to pay for each attribute, two random parameter logit models (as well as one multinomial logit model for robustness) will be estimated using a simulation-maximum likelihood approach to simulate random parameters in the software Nlogit 6 from Econometric Software, Inc. The random parameter logit model is an extension of the multinomial logit model with the benefit of allowing for random taste variation, i.e. the attribute coefficients are not necessarily the same for each respondent. The distribution of each of these coefficients can take different shapes (e.g. constant/fixed, normal, or lognormal) and needs to be assumed. The model also accounts for dependence between observations for the same respondent, reveal the distribution of attributes' random parameters, and allow the derivation of marginal willingness to pay estimations when both estimates are random parameter estimates (Greene, 2016). To estimate the random parameters from the data, Halton draws with 1,000 replications will be used[2].

[2] For more information regarding simulated maximum likelihood and Halton draws see Halton, 1960 and Train, 2003.

4. Data and methodology

4.1 Data collection

The data for this thesis was collected through a survey conducted by Enkätfabriken, a statistics firm in Sweden, during March 26-29, 2018 with funding from the Swedish Environmental Protection Agency. The questionnaire was conducted together with researchers at the Department of Economics at the University of Gothenburg as a pilot study for a larger project and consisted of three parts, including the choice experiment[3]. Two versions of the experiment were made, the main one with attribute level information carried through plain text and an alternative one with a smaller sample size utilizing color (see more in *4.3 Alternative experiment*). Before the survey was sent out to respondents, pretesting was performed to improve on it and make sure that the questions were comprehensible and yielded testable answers. A focus group of four fellow economics students was formed and changes were made based on the group's critique. The online survey, conducted in Swedish, was then sent to a random selection of Swedish citizens and 437 respondents filled out the questionnaire for the main experiment, out of which 412 answered in full and was used in the analysis. The respondrate was rougly 30 percent.

The first part of the survey included questions regarding the respondent's purchase behaviors for processed meat and knowledge about certain production traits, e.g. the climate effect of the livestock industry and what constitutes as organic production. From the first question in this part, 14 percent of respondents (not included in the figures above) was screened out since they reported to not purchase processed food containing meat at all during the past year. This exclusion was made for the analysis to be based on real consumers' preferences.

4.2 Choice experiment

The second part of the survey was comprised of the choice experiment. It started with an information box for the respondent regarding the increase in meat consumption in Sweden in the last decades and meat production's varying impact on climate change, the risk of antibiotic-resistant bacteria, and animal keeping. Furthermore, information on the good of choice, lasagna, was also presented (see box below)[4].

[3] The survey in Swedish can be found in appendix B. A translated version can be provided on request.
[4] Pre-cooked, frozen lasagna has been available in Sweden since at least the 1980's, and often contain both beef and pork.

Lasagna typically contains both meat and dairy products, such as milk and cheese. Since there is no requirement for labeling the country of origin for the ingredients in pre-made meat meals, the origin of the individual ingredients (like meat or cheese) in the lasagna you are to chose from is not known.

Following this came instructions on the choice experiment – to try and answer the choice sets as if they were choices in a real store – and an information table consisting of the attributes with short explanations and their possible levels (see table 3 in the next section). This was to ensure that the respondent had similar knowledge of the attributes and meat production going into the experiment. Sequentially, an example of a possible choice set and explanation regarding the choice was presented. Thereafter, the respondent was asked to make four discrete choices, each with three alternatives of lasagna packages which had varying levels of environmental, ethical, and health-related attributes (restricted antibiotic usage, animal keeping, greenhouse gas emission, and Keyhole labeling) as well as a price attribute. One example (out of 16) can be seen in table 1 below, and the choices were consistently between a standard lasagna that was the cheapest one (but also unimproved in all other attributes) and two alternative lasagnas that had some varying improvements in some or all of the attributes (depending on the choice set) but also cost more. A choice of the standard alternative can here be seen as an opt-out[5].

Table 1. Example of a choice set – main experiment

Choice 1. Which of the three alternatives of a normal-sized portion of pre-cooked lasagna would you choose in a store (physical or online)?

	Alternative 1	Alternative 2	Alternative 3
Antibiotics	No restrictions	No restrictions	Restrictions
Animal keeping	Lacking	Satisfactory	Very satisfactory
Climate effect	High: >11 kg	Low: <7 kg	Medium: 7–11 kg
Keyhole label	No	Yes	Yes
Price	25 kr	35 kr (+10 kr)	55 kr (+30 kr)
I choose			

5 Opt-outs are often used in cases where the respondents might not want to purchase a good or implement a new policy. In the literature for choice experiments regarding food production, there seem to be different opinions if this should be included or not – some do include it (e.g. Jaffry et al., 2004; Grebitus et al., 2015), while others do not (e.g. Lagerkvist et al., 2006). Here it is used, not as the option to not buy the product but rather as the option to keep the status quo of the meat production.

4.3 Alternative experiment

As mentioned above, two versions of this experiment were performed, with the main as described above – plain text to carry the information regarding the attribute levels. Another smaller experiment with an additional 228 respondents was sent with a color-coding to help and possibly affect the respondents to make other choices. One example (out of 16) can be seen in table 2 below. Henceforth, the main analysis will be on the text-only experiment, but comparisons will be made between the results regarding willingness to pay, to see if coloring the information affects the trade-offs respondents make (see *5.4 Alternative experiment*). The hypothesis is that by introducing value-loaded colors such as green and red, the respondents will change their trade-offs to focus more on the green levels and shy away from the red ones.

Table 2. Example of a choice set – alternative experiment

Choice 1. Which of the three alternatives of a normal-sized portion of pre-cooked lasagna would you choose in a store (physical or online)?

	Alternative 1		Alternative 2		Alternative 3	
Antibiotics	No restrictions	🔴	No restrictions	🔴	Restrictions	🟢
Animal keeping	Lacking	🔴	Satisfactory	🟡	Very satisfactory	🟢
Climate effect	High: >11 kg	🔴	Low: <7 kg	🟢	Medium: 7–11 kg	🟡
Keyhole label	No	🔴	Yes	🟢	Yes	🟢
Price	25 kr		35 kr (+10 kr)		55 kr (+30 kr)	
I choose						

4.4 Attributes and levels

The attribute of antibiotic usage has two levels, “Restricted” and “Not restricted”, where the former denotes that antibiotics may not be used in growth-enhancing purposes and a veterinarian must ordinate the medicine for sick animals – like the regulation in Sweden. Likewise, unrestricted usage is the ruling law in several countries Sweden imports beef from. The attribute levels of animal keeping is either “Lacking”, “Satisfactory” or “Very satisfactory”. The first refers to a lacking stable environment (here defined by aspects such as commodiousness, availability to a dry bed, hygiene, noise level, and access to water and foodstuff) and no outdoor stay. “Satisfactory” signifies either a good stable environment or outdoor stay, and “Very satisfactory” refers to both a good stable environment and outdoor stay. The attribute of greenhouse gas emission was following Koistinen et al. (2013) and was based on various beefs’ carbon footprint in kilogram carbon dioxide equivalents (CO_2e) per kilogram meat (Röös, 2014). The levels were “High: >11 kg”, “Medium: 7–11 kg”, and “Low: <7 kg”.

The amount was also related to the carbon footprint of driving an average car to get a reference point. Second to last, the Keyhole symbol is a label issued by the Swedish National Food Agency and identifies healthier options for consumers – it is based on Nordic nutrition recommendation and signifies lower levels of sugar and salt, more wholegrain and fibers, and lower amounts and healthier types of fat. The lasagna could either be labelled Keyhole or not. Finally, price ranged between 25-80 SEK.

Table 3. Attributes and levels

Attribute	**Explanation**	**Possible levels**
Antibiotics usage	States how antibiotics may be used in animal production.	Not restricted: Antibiotics may be used in growth-enhancing purposes and no veterinarian ordinance is needed for sick animals Restricted: Antibiotics may *not* be used in growth-enhancing purposes and veterinarian ordinance is needed for sick animals
Animal keeping	Describes the animal keeping. Stable environment refers to aspects such as commodiousness, availability to a dry bed, hygiene, noise level, and access to water and foodstuff.	Lacking: Lacking stable environment and no outdoor stay Satisfactory: Satisfactory stable environment or outdoor stay Very satisfactory: Very satisfactory stable environment and outdoor stay
Carbon footprint	Describes how large greenhouse gas emissions the meat production causes. Larger emissions cause larger/more harmful effects on the climate. Measured in kg greenhouse gases per portion. (1 kg corresponds to driving a car for approx. 5 km.)	High: More than 11 kg Medium: Between 7 and 11 kg Low: Less than 7 kg
Keyhole label	States if the product is Keyhole-labeled or not. The Keyhole label is based on the Swedish Nation Food Agency's nutritional information and signifies less sugar and salt, more fiber and wholegrain, and healthier or less fat.	No Keyhole label Keyhole label
Price	States the cost of the product.	25, 30, 35, 45, 55, 65, 80 kr

Note: At the time the survey was conducted, 1 Swedish Krona (SEK) ≈ $0.12

4.5 Experimental design

The experimental design has five attributes with two levels for antibiotic usage and Keyhole labeling, three for animal keeping and climate effect, and six for the price (excluding the base level of 25 SEK) – generating potentially 216 combinations of the levels of product attributes. This was reduced using the modified Federov algorithm (based on Cook & Nachtsheim, 1980; Zwerina et al., 1996; Carlsson & Martinsson, 2003) where strictly dominant and too-dominant choice sets can be excluded and reduced the number of choice sets to 16, grouped into four blocks of four choice sets each. From this, each respondent was asked to make choices between three alternatives in four different and independent choices sets[6], in one of the four versions of the survey. Each survey version had between 92-112 respondents in the main experiment and 49-61 in the alternative one.

4.6 Sociodemographic characteristics

The third and last part of the questionnaire contains questions regarding individual characteristics: e.g. the respondent's age, gender, occupation, highest level of achieved education, monthly household income, and household composition. This is partly to check the representation of the sample and partly to be used to test if the valuations of environmental and ethical qualities are correlated to a certain characteristic. Additionally, questions regarding political affiliation, level of trust (generally and specific towards e.g. the government, farmers, and food labels), membership in or sponsorship of environmental organizations, and relation to agricultural sector were included. Here a relation was defined as the respondent either working, having worked, was brought up, live, or have lived on a farm, or have friends and family working as farmers.

From the questions and choices mentioned above, a data set was made with information regarding the respondent's demographics and socio-economic status as well as what choice was made under the specific attribute levels. For a list and description of independent variables, see table 4 below. The dependent variable is *Choice,* which takes the value of one if that specific alternative was chosen in the specific choice set, and zero otherwise.

[6] Too many sets can be detrimental to the quality of data. However, multiple studies use between 4-8 choice sets per respondent. Lagerkvist et al. (2006) and Liljenstolpe (2008) are comparable studies where the former used 6 choice sets with 2 alternatives, and the latter 4 sets with 3 alternatives.

4.7 Interaction terms

As mentioned in the previous section, to search for heterogeneity in marginal willingness to pay for improvements the four non-monetary attributes will be interacted with a number of sociodemographic variables. Since the sample size is not very large, not too many characteristics can be included. The five sociodemographics chosen are age, gender, education level, gross monthly household income, and relation to agricultural sector – for definitions see table 4 below.

Earlier findings have found these characteristics to be correlated to similar attributes for all but the last sociodemographic variable, for which no known studies have included the characteristic. However, it is probable that having a relation to the agricultural sector would affect the willingness to pay for e.g. animal keeping. While age is expected to be negatively correlated with animal keeping and the Keyhole label, income is expected to increase marginal willingness to pay for the same attributes as well as carbon footprint. Being female is expected to decrease marginal willingness to pay for animal keeping somewhat, and education is expected to increase marginal willingness to pay for the Keyhole label.

Table 4. Independent variable descriptions

Variable	**Description**
Choice	Dummy variable equal to 1 if alternative is chosen, 0 otherwise
Price	The price of the good in the alternative, between 25-80 SEK
Restriction	Dummy variable equal to 1 if restriction in antibiotic usage was included in the alternative, 0 otherwise
Satisfactory	Dummy variable equal to 1 if satisfactory level of animal keeping was included in the alternative, 0 otherwise
Very_satisfactory	Dummy variable equal to 1 if very satisfactory level of animal keeping was included in the alternative, 0 otherwise
Medium_climate	Dummy variable equal to 1 if medium level of greenhouse gas emission was included in the alternative, 0 otherwise
Low_climate	Dummy variable equal to 1 if low level of greenhouse gas restriction was included in the alternative, 0 otherwise
Keyhole	Dummy variable equal to 1 if Keyhole label was included in the alternative, 0 otherwise
Age	Age of respondent, in years
Female	Dummy variable equal to 1 if respondent is female, 0 otherwise
Tertiary	Dummy variable equal to 1 if respondent have education equivalent of bachelor or higher, 0 otherwise
Income	Gross household monthly income, in 1,000 SEK
Relation	Dummy variable equal to 1 if respondent have any relation to agricultural sector (i.e. working, having worked, was brought up, live, or have lived on a farm, or have friends and family working as farmers), 0 otherwise.

4.8 Hypothetical bias

One difficulty in this kind of set-up of stated preferences is that there might exist hypothetical bias, i.e. that respondents might not reveal the same preferences when asked as when observed and that people tend to overstate their willingness to pay for e.g. environmental goods and services (e.g. Cummings et al., 1997). This might be due to the situation simply being hypothetical and the respondent do not bear any consequences of choosing expensive but 'good' alternatives. Another difficulty is that stated preference methods are often used in cases where the 'true' willingness to pay is unknown, so it is hard for respondents to accurately answer. List and Gallet (2001) performed a meta-study of 29 experimental studies and found the average ratio of actual and stated willingness to pay was a factor of 3. However, they also found that the ratio is considerably smaller when dealing with private goods. Moreover, Murphy et al. (2005), when doing another meta-study on hypothetical bias in 28 stated preference valuation studies, found that the median of these overestimations was 35 percent higher than their true values, and that "choice-based elicitation mechanism is important in reducing bias". In one meat-related example, Lusk and Schroeder (2004) compared hypothetical and non-hypothetical responses to choice experiment questions and found that hypothetical choices overestimate the total willingness to pay for beef steaks. However, for improvement in steak quality, no statistically significant difference between hypothetical and non-hypothetical marginal willingness to pay was found.

One way of reducing the potential hypothetical bias is to include a cheap-talk script suggested by e.g. Carlsson et al. (2005) before the choice experiment. List et al. (2006), e.g. did not find a statistically significant difference between stated and 'real' willingness to pay when this technique was used. Therefore, the respondents were, before the experimental part of the survey, urged to view these decisions as real purchase choices and regard how this would affect their budget and ability to buy other goods. They were also reminded that there were no right or wrong answers and not to answer based on what they expected the researchers to want – the translated script used can be found in the box below. Since the main interest of this thesis is finding the relative importance of preferences between attributes, this small potential bias is tolerable.

Now follows four difference choice sets. Please observe the three alternatives in each choice set and mark the alternative you would choose if there only where these three alternatives available. Remember that increased costs reduce your possibility to purchase other goods, so think carefully before you make your choice. Also remember that there is no right or wrong answer, we are interested in your choices.

For this study to be as good as possible, it is important that you respond as you truly would choose, and not what you think others regard as good or bad. It is also important that you do not try to respond with what you think we who perform this study regard as good or bad, but rather with the choice you would make in a store.

4.9 Attribute non-attendance

The assumption that respondents have the ability to accurately formulate choices that take into account all attributes in a choice experiment have been challenged by recent studies (Cameron & DeShazo, 2010). Respondents' disregard of one or more attributes in these experiments is in the literature called attribute non-attendance. Not taking it into account could lead to bias in estimated coefficients and willingness to pay for specific attributes, and the subsequent policy and marketing decisions (e.g. Hensher et al., 2005; Hole et al., 2013; Widmar & Ortega, 2014). Moreover, the direction of the effect of accounting for non-attendance are inconsistent across the literature, where some find the estimates to increase while for others they decrease (Caputo et al., 2014).

By not taking this problem into account, the estimated marginal willingness to pay for improvement in our four non-monetary attributes (and perhaps even the order of preferences) could be biased, since marginal rates of substitution between attributes were perhaps not correctly estimated. Therefore, the respondents were asked (directly after the choice sets) which attributes they regarded, and a majority indicated that they did not pay attention to one or more attributes – the proportion of respondents reporting attribute non-attendance is reported in table 5 below.[7] To control for this when estimating the models, a technique of only including the attributes the respondents replied they cared for, in their respective utility functions, was used. This is done by re-coding the non-attendance as "ignored value code", which is omitted from the data (Greene, 2016).

[7] Out of 412 respondents, 25 did not answer one or more of the attribute non-attendance questions, leaving 387 in the main experiment.

Simply demonstrated, if an experiment has three attributes (x_1, x_2, and x_3) and two individuals, where the first reports to ignore the first attribute and the second reports to ignore the last two attributes, their respective utility functions would be modeled as follows:

$$U_1 = \beta_2 x_2 + \beta_3 x_3 + \varepsilon$$

$$U_2 = \beta_1 x_1 + \varepsilon$$

All the estimated results and tables regarding the choice experiment in the next section are replicated without correcting for attribute non-attendance in appendix A. By comparison, when correcting for attribute non-attendance the marginal willingness to pay decreases from very high estimates to more reasonable values. However, one problem with this technique is that the respondents might reply to not have taken some attributes into account when they in truth just attached less weight to said attributes (Carlsson et al., 2010). Balcombe et al. (2011) propose another way of accounting for attribute non-attendance, where the parameter is not reduced to zero, but rather some smaller value inferred from the data. Additionally, Erdem et al. (2015) argue that respondents' non-attendance might vary in attribute level and that it might not be enough to just correct for attribute non-attendance, but an attribute level approach might yield more accurate results. This would be interesting to explore further.

Table 5. Proportion of respondents ignoring a specific attribute

Attribute	**Number of resp.**	**Share of resp. (%)**
Antibiotics	57	14.73
Animal keeping	67	17.31
Carbon footprint	191	49.35
Keyhole labeling	278	71.83
Cost	212	54.78

Note. Total number of respondents in the full sample is 387.

5. Results

5.1 Representativity

In table 6, the demographical and socio-economic statistics of the respondents are presented. Comparing these with the official national statistics show that the sample of the main experiment was slightly overrepresented by males and largely so by respondents with university education. To correct for this, in section 5.2 national averages will be used for age, gender, and level of education to weight the result to yield more representative results.

Table 6. Mean values of respondent characteristics

Variable	**Main experiment**	**Alternative experiment**
Female	.444	.491
Male	.556	.509
Age (over 18)	52.42	54.13
Gross household monthly income (SEK)	45,524	41,132
University education: 3 years or more	40.05	38.16
Relation to agricultural sector	.294	.259
Number of observations	412	228

Note. According to Statistics Sweden (2018), the average age of the Swedish population above 18 years was 49.26 in 2017. There were 50.13% females and 49.87% men, and 22.86% had a university education of 3 years or more.

5.2 Purchase behaviors and production knowledge

Concerning the respondents' purchasing behavior[8] (see table 7 below), a majority (58.6%) replied that they have the full responsibility for the household's purchasing of foodstuff while another 33.3 percent share the responsibility, totaling almost 92 percent of the respondents having at least some say in the decision. Additionally, all respondents but six (99.1%), answered that they themselves eat meat while the rest do not but still purchase for the household. Most buy processed meat on average once a week (63.8%) or less than that (27.7%), while only 8.0% responded they buy it more often. For lasagna, the good of the experiment, a majority on average never buys it (62.2%), while 28.8 percent buys it a few times a year and 8.4 percent a few times a month. Only 0.6 percent consume it weekly. Furthermore, while close to half of the respondents answered that they regularly buy organic and local foodstuff (50.3% and 52.7% respectively), most are not a member or sponsor of any environmental groups (90.2%).

[8] For this section, the whole sample of 640 respondents is used.

Table 7. Respondents' purchasing behavior

Variable	Share of respondents (%)
Who usually buys food in family	
- Respondent	58.59
- Someone else	8.16
- Shared	33.28
Buys and eat meat	
- Yes, and eat	99.06
- Yes, but don't eat	.94
How often buys processed meat	
- Never	27.66
- 1 time a week	63.75
- 2-4 times a week	7.97
- 5-7 times a week	.31
- More than 7 times a week	.31
How often buys lasagna	
- Never	62.19
- A few times a year	28.75
- A few times a month	8.44
- Every week	.63
Regularly buys organic food	50.31
Regularly buys local food	52.66
Member or sponsor of env.org.	9.84

Note. The results in this table uses the full sample of 640 respondents.

Regarding the knowledge of production traits (see table 8 below), the respondents were generally knowledgeable about antibiotic usage. More than 85 percent correctly responded that antibiotic usage in animal production can decrease the efficiency of human treatment with antibiotics in the long run, and that while it is not allowed to use it for growth enhancing purposes in Sweden, it is allowed in countries from where we import meat. However, the knowledge of the label *Antibiotic free meat*, found in countries such as Denmark and the US, was low – only 35 percent thought that the label regarded the upbringing of the animal rather than the level of antibiotics in the meat. Regarding the carbon footprint of the global livestock production, around a quarter (24.1%) correctly assigned the amount of greenhouse gases the sector contributes with – between 15 and 24 percent (actual amount is around 18%). 34.7 percent thought it was lower while 41.2 percent thought it was higher.

Table 8. Respondents' knowledge regarding antibiotics and carbon footprint

Variable	Share of respondents (%)
Antibiotics decreases efficient treatment in humans	85.31
Antibiotics can be used for growth-purposes – Sweden	13.59
Antibiotics can be used for growth-purposes – Imported	92.81
Antibiotic free meat	
- No antibiotics in meat	65.00
- No antibiotics in up-bringing	35.00
Livestock's share of GHG-emission	
- <5%	10.31
- 5-14	24.22
- 15-24	24.06
- 25-34	20.94
- 35-44	10.16
- 45-54	6.41
- >54%	3.91

Note. The results in this table uses the full sample of 640 respondents.

5.3 Results of choice experiment

The main results of this thesis are presented in table 9-11. Table 9 reports the estimates from the choice experiment in three models, all corrected for attribute non-attendance. Model 1 is a simple multinomial logit model without individual preferences among the attributes while model 2 and 3 are both random parameter logit models, the former without sociodemographic variables and the latter with five – age, gender, income, higher education, and relationship to agricultural sector. For the random parameter models, distance of the random parameters in standard deviations (a measure of the variation of preference in the sample around the mean) are also reported to search for unobserved heterogeneity in preference. In table 10 the average marginal willingness to pay for the attribute levels have been calculated using the parameters of table 9. Since the sample was not representative of the Swedish population when it came to gender and level of education, model 3 use the national means as weights for those as well as age (and sample mean for the remaining two), to calculate mean marginal willingness to pay that are more representative for the national sample. In table 11 the marginal willingness to pay for different sociodemographic groups calculated from model 3 are displayed, again using the national means when possible for more representative results.

The utility function to be estimated in the restricted random parameter logit model (model 2) is specified below. In model 3, every non-monetary attribute will be interacted with the five sociodemographic characteristics explained above. As explained earlier, the intercept, α, and price coefficient are fixed across individuals while the non-monetary attributes have random

parameters that are allowed to vary between individuals and choice situations. The non-monetary attributes are also assumed to be normally distributed. For individual n at choice situation t:

$$V_i = \alpha + \beta_1 * Restriction_i + \beta_2 * Satisfactory_i + \beta_3 * Very\_satisfactory_i + \beta_4 * Medium\_climate_i + \beta_5 * Low\_climate_i + \beta_6 * Keyhole_i + \beta_7 * Price_i$$

Table 9. Estimated multinomial and random parameter models

		Model 1: MNL	Model 2: RPL		Model 3: RPL	
Attribute	Level[a]	Coefficient	Coefficient	Coeff. st.dv.	Coefficient	Coeff. st.dv.
Antibiotics	Restriction	1.45956***	2.25484***	1.71074***	1.25544**	1.65088***
		(.08095)	(.20362)	(.21827)	(.58670)	(.21499)
Animal keeping	Satisfactory	1.47595***	2.28459***	1.13847***	.08592	.81249***
		(.10001)	(.20397)	(.25868)	(.57645)	.27901)
	Very satisfactory	1.82277***	2.46565***	1.82127***	.52620	1.67410***
		(.13310)	(.25467)	(.33130)	(.82076)	.32578)
Carbon footprint	Medium	.52044***	.88448***	.82683**	.76583	.78399**
		(.12016)	(.20141)	(.35528)	(.68239)	.36235)
	Low	.69377***	.56326***	1.73563***	.10397	1.42106***
		(.14222)	(.26294)	(.41233)	(.88106)	.38537)
Label	Keyhole	.60727***	.68522***	1.63043***	-.00080	1.42851***
		(.11909)	(.26157)	(.35176)	(1.16636)	(.31156)
Cost		-.05982***	-.07716***		-.07605***	
		(.00402)	(.00626)		(.00620)	
Alpha (opt-out)		.78647***	.70163***		.75473***	
		(.13727)	(.17000)		(.17180)	
Interaction terms						
	Restriction*female				.29063	
					(.29009)	
	Restriction*age				.01513*	
					(.00835)	
	Restriction*income				-.00319	
					(.00585)	
	Restriction*tertiary				.29075	
					(.29966)	
	Restriction*relation				.33634	
					(.32613)	
	Satisfactory*female				.83320***	
					(.28669)	
	Satisfactory*age				.02806***	
					(.00870)	
	Satisfactory*income				.00503	
					(.00594)	
	Satisfactory*tertiary				-.00996	
					(.28821)	
	Satisfactory*relation				.58632*	
					(.30494)	
	Very satisfactory*female				1.28991***	
					(.41104)	
	Very satisfactory*age				.01541	
					(.01204)	
	Very satisfactory*income				.00912	
					(.00834)	
	Very satisfactory*tertiary				-.23891	
					(.41912)	
	Very satisfactory*relation				.92507**	
					(.44582)	
	Medium*female				-.21583	
					(.36774)	
	Medium*age				.01256	
					(.01008)	
	Medium*income				-.00778	
					(.00752)	
	Medium*tertiary				-.36342	
					(.38672)	

Medium*relation			.37700
			(.43855)
Low*female			1.19614**
			(.47809)
Low*age			-.00137
			(.01274)
Low*income			-.01271
			(.00975)
Low*tertiary			.66267
			(.50456)
Low*relation			1.61835***
			(.56826)
Keyhole*female			.13982
			(.52907)
Keyhole*age			.01562
			(.01565)
Keyhole*income			.00064
			(.01050)
Keyhole*tertiary			-.52347
			(.53591)
Keyhole*relation			.89636
			(.60424)
No. of obs.	1556	1556	1548
Log-likelihood	-1078.76291	-1024.9876	-983.2481
McFadden Pseudo R^2	.2656	0.4004	.4211

Standard errors in parenthesizes, *** p<0.01, ** p<0.05, * p<0.1

[a] *Female, age, tertiary (higher education), and relation (to agricultural sector) represent sociodemographic interaction variables.*

In the first two models of table 9 above, all attribute parameters are found to be statistically significant at the 1 percent level. As expected, the cost coefficient is negative, indicating that an increase in price would decrease the probability that a respondent selects the alternative in question. The other attributes have positive coefficient values indicating that improvement in these areas increases the probability of selection[9]. In both random parameter logit models, estimated standard deviations for every attribute level are statistically significant at the 1 percent level (except *Carbon footprint: medium*, which is at the 5% level) – signifying unobserved heterogeneity amongst the respondent concerning preference for every attribute level.

Since all the attribute levels are binary, one could rank them according to coefficient value to evaluate preference strengths – however this is more easily done using average marginal willingness to pay in the next section. Similarly, a more in-depth evaluation of the preference heterogeneity will be in following section.

[9] The first six coefficients in model 3 cannot be used to interpret the change in probability in a similar way since these coefficients are from a model with interaction terms – only yielding result at the intercept of every sociodemographic variable – i.e. a 0-year old man with low education, no income, and no relationship to the agricultural sector.

Table 10. Mean marginal willingness to pay (SEK) per portion

Attribute	Level	Model 1: MNL	Model 2: RPL	Model 3: RPL Weighted
Antibiotic usage	Restriction	24.4011***	29.2244***	28.4899***
		(1.86555)	(2.64050)	(2.75777)
Animal keeping	Satisfactory	24.6751***	29.6099***	30.0420***
		(2.09343)	(2.73015)	(2.84841)
	Very satisfactory	30.4732***	31.9566***	33.7184***
		(2.59400)	(3.31085)	(3.60126)
Carbon footprint	Medium	8.70070***	11.4636***	12.4910***
		(2.00123)	(2.55825)	(2.79928)
	Low	11.5986***	7.30022**	8.99473**
		(2.33224)	(3.41456)	(3.67797)
Label	Keyhole	10.1525***	8.88100***	12.1037***
		(2.04853)	(3.42255)	(4.62428)
Difference in Animal keeping		5.79807***	2.34670	3.67634
		(1.68895)	(2.70079)	(2.88732)
Difference in Carbon footprint		2.89788	-4.16333	-3.49624
		(2.02083)	(3.45466)	(3.68105)

Standard errors in parenthesizes, *** p<0.01, ** p<0.05, * p<0.1

As shown in table 10 above, the average marginal willingness to pay for the attributes are fairly similar across all three models. As explained earlier, the estimates in model 3 are calculated using the national average of age, proportion of females, and proportion of university educated (rather than sample mean) as weights to correct for the unrepresentative sample. Using this weighted random parameter logit model for interpretation, the average marginal willingness to pay for restriction in antibiotic usage is 28.5 SEK. This in relation to the price of 25 SEK for the opt-out alternative that had no improvement for any attribute. Improvements in both levels of animal keeping are valued at 30.0 and 33.7 SEK, respectively. The difference is not statistically significant at the 10 percent level, indicating that there is a willingness to improve animal keeping from non-satisfactory to satisfactory, but not above this level to a very satisfactory state. For reduction in carbon footprint the respondents are on average willing to pay 12.5 SEK to get products with a medium level of emission, and 9.0 SEK for the lowest level. This decline in marginal willingness to pay for more improvement might seem nonsensical but is not statistically significance at the 10 percent significance level – indicating that, similarly to animal keeping, the respondents are willing to pay for a reduction in emission from a high to medium level, but not from a medium to a low level. Finally, the Keyhole label – indicating a healthier option – yield an average marginal willingness to pay of 12.1 SEK. So, when ranking the preferences, one can observe that antibiotic usage restriction and animal keeping are of the most importance, on average, while carbon footprint and Keyhole labeling come in second. This is true even when using the unweighted case of model 2.

This order of preferences is consistent with how the proportion of respondents report non-attendance for attributes, where the absolute majority took into account antibiotic restriction (85%) and animal keeping (83%), while only half (51%) and roughly a quarter (28%) did the same for carbon footprint and Keyhole labeling, respectively.

5.4 Preference heterogeneity

As displayed in table 11 below, one can distinguish heterogeneity in preference in nine cases regarding sociodemographic characteristics, and the most consistent ones are between genders and having a relationship to the agricultural sector or not. Females are on average willing to pay 11.0 SEK and 17.0 SEK more for improving animal keeping to satisfactory and very satisfactory level respectively, compared to men. These results are statistically significant at the 1 percent significance level. They are also willing to pay 15.7 SEK more, on average, to reduce the meat production's carbon footprint from high emission levels to low – statistically significant at the 5 percent level. When including the fact that one cannot see a difference between genders for the medium level of emission, this indicates that the gender difference is skewed towards the most ambitious alternative – until some point men and women have, on average, the same willingness to pay for improvements but beyond that point females are more charitable. This might be driven by male respondents on average not having a willingness to pay for reduction from high to low emission – even though they had one for the reduction from a high to medium level.

Similarly, having some form of relationship to the agricultural sector (e.g. living close to a farm or have friends that are farmers) yields higher willingness to pay for animal keeping, 7.7 SEK for satisfactory care and 12.2 SEK for the highest level of animal keeping, on average compared to those without a relation (statistically significant at the 10% and 5% level, respectively). Additionally, those with a relation are on average willing to pay 21.3 SEK more to decrease the carbon footprint to the lowest level – statistically significant at the 1 percent level. Similarly to the difference between the genders, the latter case indicates that attitudes toward improving emission levels are comparable between those with and without a relation to the sector for the first step of reduction to a medium level, and separate for the largest reduction.

Table 11. Mean marginal willingness to pay for different respondent groups

		Gender		
Attribute	**Level**	Male	Female	Difference
Antibiotic usage	Restriction	26.5740***	30.3957***	3.82173
		(3.09883)	(3.59027)	(3.81860)
Animal keeping	Satisfactory	24.5494***	35.5059***	10.9565***
		(2.98312)	(3.78932)	(3.75379)
	Very satisfactory	25.2150***	42.1773***	16.9624***
		(4.08840)	(4.87800)	(5.40193)
Carbon footprint	Medium	13.9138***	11.0756***	-2.83821
		(3.54013)	(3.85042)	(4.83577)
	Low	1.10951	16.8387***	15.7292**
		(4.82105)	(4.86145)	(6.29643)
Label	Keyhole	12.3793**	14.2180***	1.83866
		(4.94935)	(5.48090)	(6.96273)

		Level of education		
Attribute	**Level**	Low	High	Difference
Antibiotic usage	Restriction	27.6160***	31.4394***	3.82339
		(3.11360)	(3.54137)	(3.94198)
Animal keeping	Satisfactory	30.0720***	29.9409***	-.13103
		(3.20075)	(3.46415)	(3.78994)
	Very satisfactory	34.4364***	31.2948***	-3.14167
		(4.18131)	(4.60027)	(5.51108)
Carbon footprint	Medium	13.5832***	8.80430**	-4.77895
		(3.42645)	(3.82102)	(5.08444)
	Low	7.00302	15.7172***	8.71418
		(4.52032)	(4.90523)	(6.62339)
Label	Keyhole	14.8744***	7.99082	-6.88357
		(4.83896)	(5.05722)	(7.04602)

		Relation to agricultural sector		
Attribute	**Level**	No relation	Relation	Difference
Antibiotic usage	Restriction	27.1909***	31.6138***	4.42292
		(2.94451)	(4.25294)	(4.29727)
Animal keeping	Satisfactory	27.7776***	35.4878***	7.71011*
		(3.01823)	(4.13102)	(4.00829)
	Very satisfactory	30.1457***	42.3104***	12.1647**
		(3.92713)	(5.61956)	(5.89085)
Carbon footprint	Medium	11.0350***	15.9926***	4.95761
		(3.04394)	(5.27479)	(5.75900)
	Low	2.74462	24.0259***	21.2813***
		(4.05370)	(6.77878)	(7.46983)
Label	Keyhole	9.83931**	21.6265***	11.7872
		(4.50325)	(6.92353)	(7.99098)

		Age
Attribute	**Level**	An additional year
Antibiotic usage	Restriction	.19895*
		(.11060)
Animal keeping	Satisfactory	.36894***
		(.11497)
	Very satisfactory	.20263
		(.15864)
Carbon footprint	Medium	.16517
		(.13279)
	Low	-.01803
		(.16746)
Label	Keyhole	.20542
		(.20654)

		Gross household monthly income
Attribute	**Level**	An additional 1000 SEK/month
Antibiotic usage	Restriction	-.04192
		(.07688)
Animal keeping	Satisfactory	.06615
		(.07816)
	Very satisfactory	.11992
		(.10967)
Carbon footprint	Medium	-.10230
		(.09909)
	Low	-.16720
		(.12835)
Label	Keyhole	.00840
		(.13811)

Standard errors in parenthesizes, *** p<0.01, ** p<0.05, * p<0.1

Lastly, one extra year of age increases the mean marginal willingness to pay 0.20 SEK for antibiotic restrictions and 0.37 SEK for satisfactory animal keeping (statistically significant at the 10% and 1% level, respectively). These might be small values but the difference over many years is perhaps not non-significant. However, comparing the latter case to that of genders, being female is equivalent to 30 more years of age. Income and level of education, however, do not control for any differences in taste.[10]

So, while the heterogeneity in animal keeping and carbon footprint are somewhat explained by the chosen characteristics, restriction to antibiotics are less so, and the different tastes for the Keyhole label is not explained by any of these five factors.

5.5 Alternative experiment

An alternative design for the choice set was also tested, where the choices were not only displayed as text but also colorful circles simulating label situations where improvement in some characteristics were marked with either a green or yellow circle (the baseline contained a red circle). Displayed in table 12 below is the average marginal willingness to pay for both the text and color cases, using random parameter models without sociodemographic characteristics (model 2 above), as well as the difference between the two. As can be seen there are only minor, statistically insignificant differences regarding antibiotics restriction and animal keeping. However, whilst there was no statistical difference in marginal willingness to pay between the two levels of improvement in animal keeping in the main experiment, one can be observed in the alternative one with an addition of roughly 7.0 SEK from satisfactory to very satisfactory animal keeping (statistically significant at the 10% level). Regarding carbon footprint, there is an increase in the marginal willingness to pay to decrease the footprint from the highest to the lowest emission level and an increase in confidence level – in the main experiment the marginal willingness to pay was approximately 7.3 SEK at the 5 percent significance level while in the alternative one it was 16.3 SEK and 1 percent significance level, respectively. This increase of 9.0 SEK is statistically significant at the 10 percent level. The difference between the middle and lowest emission level is however, once again, not statistically significant at the 10 percent level. Finally, one dramatical change is concerning the Keyhole label with an increased marginal willingness to pay of 12.6 SEK, statistically significant at the 1 percent level.

[10] When coding higher education as including university education less than bachelor level, the interaction term with satisfactory animal keeping gets statistically significant at the 10 percent level.

Table 12. Comparison experiments: mean marginal willingness to pay (SEK) per portion

Attribute	Level	Main experiment: Text	Alternative experiment: Color	Difference
Antibiotic usage	Restriction	29.2244***	26.2096***	-3.01488
		(2.64050)	(2.66834)	(3.75397)
Animal keeping	Satisfactory	29.6099***	26.3439***	-3.26607
		(2.73015)	(2.94548)	(4.01616)
	Very satisfactory	31.9566***	33.2979***	1.34127
		(3.31085)	(3.50958)	(4.82482)
Carbon footprint	Medium	11.4636***	11.8108***	.34730
		(2.55825)	(2.88603)	(3.85666)
	Low	7.30022**	16.2688***	8.96857*
		(3.41456)	(3.37634)	(4.80197)
Label	Keyhole	8.88100***	21.4336***	12.5526***
		(3.42255)	(3.43313)	(4.84770)
Difference in Animal keeping		2.34670	6.95403**	4.60733
		(2.70079)	(2.84941)	(3.92599)
Difference in Carbon footprint		-4.16333	4.45794	8.62127*
		(3.45466)	(3.04681)	(4.60627)

Standard errors in parenthesizes, *** p<0.01, ** p<0.05, * p<0.1

The result of this alternative experiment indicate that the respondents' relative preferences are fairly stable – antibiotic usage and animal keeping are the two most highly valued attributes in both experiments. While some differences are observed between the experiments, the ranking only shifts for the two least important attributes. Again, this indicates that even with two different ways of representing the attribute levels, two attributes stand out – antibiotic usage and animal keeping. Similarly, the two attribute levels that have a higher marginal willingness to pay (with color circles) are low carbon footprint and the Keyhole label – two attribute levels that had the green circles in the alternative experiment. Additionally, the largest difference is for the attribute with only two levels (red/green) – the Keyhole label. Perhaps these differences are not observed in the antibiotic usage and animal keeping since they already have such high marginal willingness to pay.

6. Discussion

6.1 Order of preference

When respondents had to make trade-offs between attributes in the meat industry that unfortunately are afflicted with conflicts of aim, they preferred to restrict antibiotics usage and improve animal keeping (at least to a satisfactory level) roughly three times as much as reducing the carbon footprint and eating healthier with the Keyhole label. Furthermore, only half of the respondents reported to take carbon footprint into account when choosing lasagna. Comparing this with the result from last year's SOM-Institute study where Swedish respondents were asked to rank how concerned they were for current issues, we see some discrepancies. 62 and 61

percent, respectively, answered that they were "very concerned" regarding climate change and environmental degradation, and slightly fewer (55%) answered the same for increased resistance to antibiotics. This reversed order of importance could be a result of, for example, a value-action gap where the respondents' values and consequently action may not always align. If so, this thesis' type of enquiring consumers' preferences might yield more accurate results since the trade-offs are internal and perhaps simulate the actual behavior of the consumers better. On the other hand, this might not be one area where the respondents see a clear link between action and consequences – they might e.g. think that the largest achievement must happen at the national or international level, and not through consumer power and individual choice. So, responding that climate change is one of the most worrying concerns of this generation might not be incongruent with not caring about reducing the carbon footprint the most in this experiment. More investigation into why this disparity exist would be enlightening.

One potential benefit of these preferred attributes is that the two most important attributes – antibiotic usage and animal keeping – are those that the consumer cannot influence after the point-of-purchase. On the other hand, the carbon footprint and health-related effects (caused by potential harmful overuse of e.g. salt and fat) can be mitigated by consuming less meat or meat products.

6.2 Sensitivity to scope

Another interesting observation is that in both the attributes with multiple levels of improvement – carbon footprint and animal keeping – the two levels of improvement is not statistically significantly different from each other. There seems to be a willingness, on average, to improve from the worst case – but only to the medium or satisfactory one, not to the best one. These results are similar to multiple articles finding that respondents tend to be interested in improvement, but indifferent to the scale of improvement – i.e. insensitivity to scope (see e.g. Desvousges et al., 1992; McFadden & Leonard, 1993). It would be interesting to investigate if the respondents were affected by the number of levels, or if preferences truly are that a very satisfactory animal keeping is not more preferred over a satisfactory one, and that medium carbon emission is perfectly acceptable. If the former were to be true, this could have labeling consequences – such as schemes with multiple levels being less effective than expected.

6.3 Observed heterogeneity in taste

One more interesting finding is that the respondents exhibit unobserved heterogeneity in all attributes and levels, indicating that the respondents have taste differences. Additionally, they differ, on average, in their willingness to pay across some sociodemographics – primarily

gender and relationship with the agricultural sector. Females and those with relationships have higher marginal willingness to pay (compared to men and non-relatives, respectively) in three of the six attribute levels (animal keeping and carbon footprint). Being older is correlated with slightly higher marginal willingness to pay for antibiotics restriction and animal keeping. Surprisingly, higher income and having a university education does not result in higher willingness to pay for any of the attributes – something that earlier findings have linked to e.g. carbon footprint, animal keeping, and health labels. These results concerning gender differences are somewhat congruent with earlier literature where females are found to be somewhat more concerned about climate change (e.g. McCright, 2010) but not that females would be willing to pay for better animal keeping. The fact that one's relation to the agricultural sector is correlated with animal keeping and carbon footprint might be caused by exposure – both to animals in general, and to the risk that climate change can bring to farmers and their livelihood.

That result that one's health, in the form of valuing the Keyhole label, is valued at the same level as carbon footprint reduction but not correlated with any of the five characteristics is also noteworthy. While earlier findings have been found to be correlated to multiple sociodemographics, the proportion of respondents caring for this attribute was very low – perhaps creating a too small subsample to draw results from. It would be interesting to see if these results stand with a larger overall sample. Furthermore, regarding antibiotic usage restriction, which is valued as one of the most important attributes in this experiment, while heterogeneity amongst the respondents is observed, we cannot identify this difference in the five sociodemographic characteristics aside from a small difference when it comes to age.

6.4 Cautions regarding results

One caveat for this thesis should be the fact that this only is a pilot study with limited observations, so the results should be interpreted with some caution and viewed as indications rather than actualities. Additionally, one consistent problem with stated preference methods is that of hypothetical bias – this is an experiment with no actual consequences for the respondents. If one were to add up the average marginal willingness to pay for all the improvements that were statistically significant (antibiotic restriction, satisfactory animal keeping, medium carbon footprint, and Keyhole labeling) with the base cost of 25 SEK, the sum would be 108 SEK – which is perhaps hard to believe someone would pay for pre-cooked lasagna. Additionally, the fact that income does not have a positive effect on any of the attributes might imply that the respondents did not take into account their budget constraints. This is perhaps supported by the fact that over half of the respondents replied to not have taken

the price into account. However, the important result from this study is indeed not the actual level of marginal willingness to pay for each attribute but the order of preferences – to see that animal keeping and restricting antibiotics in animal production are what respondents value most, and thereafter carbon footprint and healthy alternative labeling.

Another odd result is that concerning carbon footprint for both the sub-groups of males and respondents without relation to the agricultural sector. On average, they both have a statistically significant marginal willingness to pay for reducing emissions from high to medium, but not from high to low – not even on par with the smallest reduction. One would expect that the largest reduction would at least have the marginal willingness to pay as that of the smaller reduction, but this is not the case. This might be due to the limited observations described above. If the same results are observed with larger sample sizes, this should be investigated further – could it be that the idea of too large improvements or investments in preventing further climate change estrange large groups in society?

6.5 Comparing main and alternative experiment

The fact that the alternative experiment yields higher results for the most ambitious levels of animal keeping and carbon footprint (even if the latter is not statistically different from medium emissions) as well as for Keyhole labeling, indicates that the respondents were affected by the color scheme and chose the green options more. Additionally, the largest difference is for an attribute that only have two levels and the respondents therefore only have red or green options – indicating that respondents are also more affected when there is no middle option. It is possible that the inclusion of colored circles makes the respondents' choices overly simplified, where the color green overrides the actual trade-offs of the respondents and increase hypothetical bias. On the other hand, it could also be that this is more like the marketplace where advertisement and labeling target consumers with color schemes – hence a more realistic experiment yielding in more reliant results.

6.6 Policy implications

Even though this thesis is only a pilot study for a larger project, with the limitations listed above, some loose policy implications could potentially be drawn. Foremost, the respondents quite robustly favor antibiotic restriction and satisfactory animal keeping over carbon footprint reduction and healthier meals. This would indicate that authorities or other actors that want to change meat production through consumers (e.g. by labeling products) would possibly find it more productive to target the former two attributes. Additionally, if labels are to be used, the inclusion of color schemes could affect the consumers' attitudes towards certain attribute levels

based on color – e.g. increasing the relevance of a low carbon footprint if labeled green. The design of a label would need to be taken under consideration if it is to be implemented. Furthermore, if authorities would want to regulate meat production and importation they would find more acceptance among the Swedish population for antibiotic restrictions and satisfactory animal keeping – two conditions that the Swedish livestock sector need to comply with.

This main result could potentially also have implications for climate policy. As discussed above (regarding the respondents' choices and societal concerns at large), the Swedish population is generally very concerned about climate change, but either has a value-action gap or do not see consumer power and individual choices in the food market as the way to mitigate the issue. If it is the former, helping consumers make the choices congruent with their values would be a possible route. If it is the latter, perhaps other measures could be used – e.g. targeting the production or the amount of meat consumed.

7. Conclusion

In this thesis Swedish consumers' preferences regarding four meat production attributes have been examined using a choice experiment and making respondents trade-off between restriction to antibiotics, animal keeping, carbon footprint, the Swedish Keyhole label, and cost. The results of a random parameter logit model, corrected for attribute non-attendance, show that the willingness to pay for the first two attributes are the highest, roughly three times more than the climate and health attributes, given the specific attribute levels. In fact, roughly half and almost three quarters of the respondents respectively reported to not have taken carbon footprint and the Keyhole label into account when making choices. Secondly, unobserved heterogeneity was found in all attribute parameters, of which some was explained by the five sociodemographic characteristics of age, gender, household income, level of education, and relation to the agricultural sector. Females and those with a relation to the agricultural sector had on average higher willingness to pay for reducing the carbon footprint and improving animal keeping, while age was slightly correlated with restriction of antibiotic usage and carbon footprint.

When comparing the results of the main experiment that carried the information regarding attribute levels with plain text with an alternative version including the green, yellow, and red circles to indicate level of improvement, some differences were shown. The lowest level of greenhouse gas emission and Keyhole label both increased substantially. This could be the result of respondents being affected by the green color – indicating either a simplification of the hypothetical choice or the possibility of affecting consumers with color schemed labels.

Similar to other studies, insensitivity to scope might potentially have been found, in the sense that for the two attributes with multiple levels of improvement, carbon footprint and animal keeping, all levels of improvement are statistically significant but the differences between levels are not. Whether this is a result of insensitivity to scope, actual preferences, or the small sample size remains to be seen.

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Appendix A. Results without correcting for attribute non-attendance

Table A1. Estimated multinomial and random parameter models – without correction for attribute non-attendance

		Model 1: MNL	Model 2: RPL		Model 3: RPL	
Attribute	Level[a]	Coeffient	Coefficient	Coeff. st.dv.	Coefficient	Coeff. st.dv.
Antibiotics	Restriction	1.04011***	2.69356***	2.61200***	.23084	2.48850***
		(.08636)	(.36876)	(.35590)	(.71898)	(.33143)
Animal keeping	Satisfactory	1.04017***	2.63608***	1.71347***	-.32453	1.58696***
		(.09263)	(.36073)	(.30404)	(.72336)	(.32153)
	Very satisfactory	1.20875***	2.81850***	3.35573***	-1.23161	3.09906***
		(.13976)	(.48045)	(.46799)	(1.03782)	(.49738)
Carbon footprint	Medium	.28055***	1.06387***	.95536	-.80114	.87505**
		(.09577)	(.25308)	(.64279)	(.67582)	(.39558)
	Low	.04179	.09425	2.45843***	-1.69636*	2.21296***
		(.13592)	(.30749)	(.51581)	(.91379)	(.43086)
Label	Keyhole	.22144***	.34319	1.96601***	.03184	1.83740***
		(.08235)	(.22641)	(.32888)	(.69199)	(.31881)
Cost			-.05079***		-.05625***	
			(.00806)		(.00867)	
Alpha (opt-out)			-.00975		.29625	
			(.32901)		(.31189)	
Interaction terms						
	Restriction*female				.70746*	
					(.36946)	
	Restriction*age				.03083***	
					(.01077)	
	Restriction*income				.00682	
					(.00738)	
	Restriction*tertiary				.43752	
					(.38843)	
	Restriction*relation				.57874	
					(.40619)	
	Satisfactory*female				.81354**	
					(.35150)	
	Satisfactory*age				.03840***	
					(.01113)	
	Satisfactory*income				.00905	
					(.00727)	
	Satisfactory*tertiary				-.17649	
					(.35908)	
	Satisfactory*relation				.68927*	
					(.38909)	
	Very satisfactory*female				1.40062***	
					(.54035)	
	Very satisfactory*age				.04284***	
					(.01583)	
	Very satisfactory*income				.02176**	
					(.1086)	
	Very satisfactory*tertiary				-.33505	
					(.55711)	
	Very satisfactory*relation				1.76120***	
					(.60648)	
	Medium*female				.49717	
					(.33571)	
	Medium*age				.02771***	
					(.00998)	
	Medium*income				.00523*	
					(.00694)	
	Medium*tertiary				-.23015	
					(.34381)	
	Medium*relation				.28602	
					(.37414)	
	Low*female				2.08363***	
					(.49892)	
	Low*age				.00682	
					(.01307)	
	Low*income				.00859	
					(.00910)	

Low*tertiary			.41058
			(.46979)
Low*relation			.57607
			(.50068)
Keyhole*female			-.21511
			(.35769)
Keyhole*age			.00340
			(.01012)
Keyhole*income			.00126
			(.00717)
Keyhole*tertiary			.50519
			(.38187)
Keyhole*relation			.26000
			(.39151)
No. of obs.	1556	1666	1648
Log-likelihood	-1078.76291	-1232.975	-1161.880
McFadden Pseudo R^2	.2656	0.3263	.3583

Standard errors in parenthesizes, *** p<0.01, ** p<0.05, * p<0.1

[a] *Female, age, tertiary (higher education), and relation (to agricultural sector) represent sociodemographic interaction variables.*

Table A2. Mean marginal willingness to pay (SEK) per portion – without correction for attribute non-attendance

Attribute	Level	Model 1: MNL	Model 2: RPL	Model 3: RPL Weighted
Antibiotic usage	Restriction	55.7078***	53.0368***	47.6067***
		(8.81690)	(6.34300)	(5.40557)
Animal keeping	Satisfactory	55.7112***	51.9050***	45.1688***
		(9.85403)	(6.71654)	(5.68397)
	Very satisfactory	64.7405***	55.4970***	53.1719***
		(0.04605)	(7.86306)	(6.72576)
Carbon footprint	Medium	15.0262***	20.9479***	19.1934***
		(4.34082)	(4.04661)	(3.72277)
	Low	2.23814	1.85586	5.88844
		(7.01972)	(5.94678)	(5.36138)
Label	Keyhole	11.8601***	6.75751	8.15114*
		(3.64508)	(4.11253)	(4.68346)
Difference in Animal keeping		9.02933*	3.59192	8.00314
		(4.66282)	(5.87196)	(5.42478)
Difference in Carbon footprint		-12.7881**	-19.0920***	-13.3049**
		(6.30700)	(6.07099)	(5.34976)

Standard errors in parenthesizes, *** p<0.01, ** p<0.05, * p<0.1

Table A3. Mean marginal willingness to pay for different respondent groups – without correction for attribute non-attendance

		Gender		
Attribute	**Level**	Male	Female	Difference
Antibiotic usage	Restriction	41.3016***	53.8788***	12.5772*
		(5.65605)	(6.95621)	(6.63061)
Animal keeping	Satisfactory	37.9183***	52.3813***	14.4630**
		(5.79052)	(7.16869)	(6.38000)
	Very satisfactory	40.6893***	65.5893***	24.9000**
		(7.24446)	(9.28351)	(9.82676)
Carbon footprint	Medium	14.7625***	23.6011***	8.83857
		(4.35183)	(5.18858)	(6.02708)
	Low	-12.6813*	24.3611***	37.0424***
		(7.26011)	(6.66032)	(8.89479)
Label	Keyhole	7.91857*	4.09437	-3.82420
		(4.59813)	(5.40563)	(6.35706)

		Level of education		
Attribute	**Level**	Low	High	Difference
Antibiotic usage	Restriction	45.8289***	53.6070***	7.77809
		(5.84667)	(7.00732)	(6.89121)
Animal keeping	Satisfactory	45.8859***	42.7483***	-3.13761
		(6.18749)	(6.59451)	(6.37539)
	Very satisfactory	54.5333***	48.5768***	-5.95649
		(7.78504)	(8.34065)	(9.93935)
Carbon footprint	Medium	20.1285***	16.0369***	-4.09161
		(4.32960)	(5.12469)	(6.12028)
	Low	4.22014	11.5193*	7.29915
		(6.25643)	(6.87729)	(8.33935)
Label	Keyhole	3.94873	12.9299**	8.98112
		(4.67170)	(5.32562)	(6.83183)

		Relation to agricultural sector		
Attribute	**Level**	No relation	Relation	Difference
Antibiotic usage	Restriction	44.7085***	54.9972***	10.2887
		(5.56692)	(7.87292)	(7.20390)
Animal keeping	Satisfactory	41.7171***	53.9707***	12.2537*
		(5.74427)	(8.05267)	(6.90974)
	Very satisfactory	44.3521***	75.6624***	31.3103***
		(6.96255)	(1.01078)	(0.83110)
Carbon footprint	Medium	17.7610***	22.8459***	5.08485
		(4.15189)	(6.09522)	(6.66507)
	Low	3.00360	13.2448	10.2412
		(6.04180)	(8.11330)	(8.89758)
Label	Keyhole	4.69941	9.32169	4.62228
		(4.36509)	(6.33632)	(6.99722)

		Age
Attribute	**Level**	An additional year
Antibiotic usage	Restriction	.54810***
		(.19367)
Animal keeping	Satisfactory	.68275***
		(.19922)
	Very satisfactory	.76152***
		(.27608)
Carbon footprint	Medium	.49265***
		(.17944)
	Low	.12122
		(.23138)
Label	Keyhole	.06040
		(.17956)

		Gross household monthly income
Attribute	**Level**	An additional 1000 SEK/month
Antibiotic usage	Restriction	.12130
		(.13143)
Animal keeping	Satisfactory	.16081
		(.12936)
	Very satisfactory	.38691*
		(.19763)
Carbon footprint	Medium	.09314
		(.12320)
	Low	.15270
		(.16236)
Label	Keyhole	.02246
		(.12757)

Standard errors in parenthesizes, *** p<0.01, ** p<0.05, * p<0.1

Table A4. Comparison experiments: mean marginal willingness to pay (SEK) per portion – without correction for attribute non-attendance

Attribute	Level	Main experiment: Text	Alternative experiment: Color	Difference
Antibiotic usage	Restriction	53.0368***	53.4083***	-.37152
		(6.34300)	(7.93294)	(0.15703)
Animal keeping	Satisfactory	51.9050***	44.0963***	7.80869
		(6.71654)	(7.21335)	(9.85619)
	Very satisfactory	55.4970***	52.1534***	3.34352
		(7.86306)	(8.58961)	(1.64514)
Carbon footprint	Medium	20.9479***	23.5876***	-2.63968
		(4.04661)	(4.82323)	(6.29592)
	Low	1.85586	15.0431**	-13.1873
		(5.94678)	(6.49930)	(8.80938)
Label	Keyhole	6.75751	8.64096*	-1.88345
		(4.11253)	(4.91692)	(6.41007)
Difference in Animal keeping		2.34670	8.05710	-4.46517
		(2.70079)	(6.27862)	(8.59657)
Difference in Carbon footprint		-4.16333	-8.54447	-10.5476
		(3.45466)	(6.40713)	(8.82657)

Standard errors in parenthesizes, *** p<0.01, ** p<0.05, * p<0

Appendix B. Survey (main experiment, choice set block 1 of 4)

GÖTEBORGS UNIVERSITET
HANDELSHÖGSKOLAN

En enkät om köttkonsumtion

För att ta reda på vad svenska befolkningen tycker om olika aspekter av köttkonsumtion genomförs nu en undersökning. Undersökningen är riktad till allmänheten och görs av en grupp forskare vid Göteborgs universitet.

Du har tillsammans med ett antal personer från Sverige blivit slumpmässigt utvald för att säga vad du tycker. Det är helt frivilligt att besvara våra frågor, men samtidigt kan du inte ersättas av någon annan. I en vetenskaplig undersökning som denna är det viktigt att människor med olika uppfattningar deltar, oavsett hur väl man känner till hur köttproduktionen går till eller hur intresserad av köttproduktion i Sverige eller utomlands man är.

Dina svar är anonyma. Har du frågor om enkäten så är du välkommen att kontakta Erik Nyberg.

Erik Nyberg	Elina Lampi	Fredrik Carlsson
Student	Docent	Professor
Göteborgs universitet	Göteborgs universitet	Göteborgs universitet
gusnyberd@student.gu.se		

Ett stort tack på förhand. Dina svar är mycket värdefulla för oss!

Del 1. Frågor om konsumtion av kött

Nedan följer ett antal frågor om din konsumtion av kött samt några frågor om olika märkningar av kött.

Fråga 1. Köper du någon gång under året färdiglagade produkter som innehåller kött?

□ Ja, och jag äter kött
□ Ja, men jag äter inte själv kött
□ Nej [Avsluta undersökningen med text: Tack, men du passar inte in i den målgrupp av människor som undersökningen riktar sig till]

Fråga 2. Vem handlar huvudsakligen maten i din familj?

□ Jag
□ Någon annan
□ Delar lika

Fråga 3. I snitt, hur många gånger i *veckan* köper du processade färdiglagade köttprodukter som lasagne, köttbullar, pyttipanna etc. i butik (fysisk eller online)?

□ Aldrig
□ 1 gång i veckan
□ 2–4 gånger i veckan
□ 5–7 gånger i veckan
□ Mer än 7 gånger i veckan

Fråga 4. I snitt, hur ofta köper du färdiglagad köttlasagne i butik (fysisk eller online)?

□ Aldrig
□ Någon gång per år
□ Någon gång per månad
□ Varje vecka

Fråga 5. Vilka av dessa påståenden tror du gäller för ekologiska märkningar såsom KRAV och EU-lövet på köttprodukter? Välj de alternativ som stämmer enligt dig. Det är möjligt att välja flera alternativ.

□ Restriktiv antibiotikaanvändning
□ Stor andel lokal foderproduktion
□ God djurhållning/mycket utomhusvistelse
□ Mer human slakt
□ Producerad i Sverige
□ Använder mindre konstgödsel
□ Fri från kemikalier
□ Mindre klimatpåverkan
□ Hälsosammare kött att äta
□ Paketerad i Sverige
□ Gynnar lokala bönder
□ Inget av ovanstående

Fråga 6. Vilka av dessa påståenden tror du gäller för närproducerat kött? Välj de alternativ som stämmer enligt dig. Det är möjligt att välja flera alternativ.

□ Restriktiv antibiotikaanvändning
□ Stor andel lokal foderproduktion
□ God djurhållning/mycket utomhusvistelse
□ Mer human slakt
□ Producerad i Sverige
□ Använder mindre konstgödsel
□ Fri från kemikalier
□ Mindre klimatpåverkan
□ Hälsosammare kött att äta
□ Paketerad i Sverige
□ Gynnar lokala bönder
□ Inget av ovanstående

Fråga 7. Köper du regelbundet produkter som är KRAV- eller EU-löv märkta?

□ Ja
□ Nej

Fråga 8. Köper du regelbundet produkter som är märkta som närproducerade?

□ Ja
□ Nej

Fråga 9. Hur stor andel av mänskligt orsakade växthusgasutsläpp tror du djurhållningssektorn står för globalt? Med djurhållning menas uppfödning av djur och boskapsskötsel.

□ Mindre än 5%
□ Mellan 5–14%
□ Mellan 15–24%
□ Mellan 25–34%
□ Mellan 35–44%
□ Mellan 45–54%
□ Större än 54%

Fråga 10. Nedan finns ett antal påståenden om antibiotika. Vi vill att du för varje påstående svarar om påståendet är rätt eller fel, enligt vad du tror.

	Rätt	Fel
Antibiotika i djurhållning kan minska möjligheter till effektiv behandling av människor med antibiotika på lång sikt.		
Det är tillåtet i Sverige att använda antibiotika i djurhållning för att djuren ska växa snabbare.		
I flera av de länder som Sverige importerar kött ifrån idag är det tillåtet att använda antibiotika i djurhållning för att djuren ska växa snabbare.		

Fråga 11. I andra länder som USA och Danmark finns en märkning som är ”Antibiotikafritt kött”. Välj det eller de alternativ som du tror märkningen står för.

□ Att djuret är uppfött helt utan antibiotika
□ Att det inte finns någon antibiotika i köttet.

Nästa sida, kan ej gå tillbaka

Information om köttproduktion

I rutan nedan beskrivs några aspekter som påverkas av köttproduktion. Läs informationen innan du går vidare i enkäten.

Kött är för många en viktig näringskälla. I Sverige har konsumtionen av kött ökat med runt 50 procent sedan 1990, varav en stor del genom ökad import. Köttproduktionen påverkar dock både klimatet samt risken för antibiotikaresistens. Djuren tas också olika väl hand om under deras livstid.

Klimat: Globalt orsakar djurhållning nästan en femtedel av klimatutsläppen. Storleken på klimatpåverkan beror till stor del på djursort. Exempelvis ger nötkött större klimatpåverkan än fläsk- eller fågelkött.

Djurvälfärd: Hur väl djuren mår beror bland annat på om de får vistas utomhus eller inte, och hur trång det är inomhus.

Antibiotikaresistens: I Sverige är det förbjudet att använda antibiotika för att djuren ska växa snabbare och det krävs recept för att behandla sjuka djur. I många andra länder är båda dessa saker tillåtna. Att använda antibiotika innebär en risk för att antibiotika-resistenta bakterier sprids globalt och påverkar människor i alla länder. Eftersom djur som fått antibiotika måste vänta ett tag innan de kan slaktas finns det dock ingen risk att få i sig resistenta bakterier från köttet man äter.

Nästa sida

Del 2. Hjälp oss att förstå hur du vill ha det

Vi vill nu att du väljer mellan olika färdiglagade lasagner, precis som om du skulle ställas inför ett sådant val i en butik. Du ska göra fyra olika val. Lasagnerna varierar i djurhållning, påverkan på klimatet, antibiotikaanvändning, nyckelhålsmärkning samt pris.

Lasagne innehåller typiskt både kött och mejeriprodukter, som mjölk och ost. Eftersom det idag inte finns något krav på märkning för vilket land ingredienserna för färdiga kötträtter kommer ifrån, är ursprungen för de enskilda ingredienserna (som kött eller ost) i lasagnerna du ska välja mellan inte kända.

Nästa sida

Här ser du en kort förklaring av aspekterna och de möjliga nivåerna.

Aspekt	Förklaring	Möjliga nivåer
Antibiotika-användning	Anger hur antibiotika får användas i djurproduktionen.	Inga restriktioner: Antibiotika får användas i tillväxtsyfte och ingen veterinärordination krävs för sjuka djur Restriktioner: Antibiotika får *inte* användas i tillväxtsyfte och veterinärordination krävs för sjuka djur
Djurhållning	Beskriver djurhållningen. Med stallmiljö menas aspekter som rymlighet, tillgänglighet till torr liggplats, hygien, ljudnivå samt tillgång till mat och vatten.	Bristande: Bristfällig stallmiljö och inget bete/utevistelse God: God stallmiljö eller bete/utevistelse Mycket god: Mycket god stallmiljö samt bete/utevistelse
Klimatpåverkan	Beskriver hur stora utsläpp av växthusgaser som köttproduktionen ger upphov till. Ju större utsläpp, desto större/skadligare påverkan på klimatet. Utrycks i kg växthusgaser per portion. (1 kg motsvarar att köra bil cirka 5 km).	Hög: Mer än 11 kg Medel: Mellan 7 och 11 kg Låg: Mindre än 7 kg
Nyckelhålsmärkt	Anger om produkten är nyckelhålsmärkt eller inte. Nyckelhålsmärkning bygger på Livsmedelsverkets näringsrekommendationer och innebär mindre socker och salt, mer fullkorn och fiber samt nyttigare eller mindre fett.	Inte nyckelhålsmärkt Nyckelhålsmärkt
Pris	Redogör vad produkten kostar.	25, 30, 35, 45, 55, 65, 80 kr

När du gör dina val kan du se den här sammanställningen genom att klicka på ”Förklaringar”

Nästa sida

Exempel

Nu visar vi dig ett exempel på en valsituation. Tänk dig att du är i en butik (fysisk eller online) och att du har att välja mellan tre olika färdiglagade lasagner, en som finns i butiken idag och två andra. Vi vill att du ser på de tre alternativen och anger det alternativ du skulle välja om det bara fanns dessa tre alternativ.

Vilket av de tre alternativen av en normalstor portion färdiglagad lasagne skulle du välja i butik (fysisk eller online)?

	Alternativ 1	Alternativ 2	Alternativ 3
Antibiotika	Inga restriktioner	Inga restriktioner	Restriktioner
Djurhållning	Bristande	Bristande	God
Klimatpåverkan	Hög: >11 kg	Medel: 7–11 kg	Hög: >11 kg
Nyckelhålsmärkt	Nej	Ja	Nej
Pris	25 kr	55 kr (+30 kr)	35 kr (+10 kr)
Jag väljer			X

I exemplet ovan har personen valt alternativ 3 för att hen tycker det är bäst. Någon annan kan välja alternativ 1 eller alternativ 2.

Alternativ 1 är alltid ett alternativ som finns i butik i idag, utan märkning av antibiotika, bristande djurhållning, hög klimatpåverkan och ingen nyckelhålsmärkning. Det har också alltid det lägsta priset.

Nästa sida

Dina val

Nu följer fyra olika valsituationer. Vänligen titta på de tre alternativen i varje valsituation och markera det alternativ du skulle välja om det bara fanns dessa tre alternativ. Kom ihåg att ökade kostnader minskar dina möjligheter att köpa andra varor, så tänk igenom noggrant innan du gör dina val. Kom också ihåg att det inte finns något rätt eller fel svar, vi är intresserade av dina val.

För att undersökningen skall bli så bra som möjligt är det viktigt att du svarar som du faktiskt skulle välja, och inte vad du tror andra tycker är bra eller dåligt. Det är också viktigt att du inte försöker svara som du tror att vi som gör undersökningen tycker är bra eller dåligt, utan svarar vad du faktiskt skulle fatta för beslut i en butik.

Nästa sida

Val 1. Vilket av de tre alternativen av en normalstor portion färdiglagad lasagne skulle du välja i butik (fysisk eller online)?

	Alternativ 1	Alternativ 2	Alternativ 3
Antibiotika	Inga restriktioner	Inga restriktioner	Restriktioner
Djurhållning	Bristande	God	Bristande
Klimatpåverkan	Hög: >11 kg	Medel: 7–11 kg	Låg: <7 kg
Nyckelhålsmärkt	Nej	Ja	Nej
Pris	25 kr	45 kr (+20 kr)	35 kr (+10 kr)
Jag väljer			

Nästa sida

Val 2. Vilket av de tre alternativen av en normalstor portion färdiglagad lasagne skulle du välja i butik (fysisk eller online)?

	Alternativ 1	Alternativ 2	Alternativ 3
Antibiotika	Inga restriktioner	Restriktioner	Inga restriktioner
Djurhållning	Bristande	Mycket god	Bristande
Klimatpåverkan	Hög: >11 kg	Medel: 7–11 kg	Låg: <7 kg
Nyckelhålsmärkt	Nej	Nej	Ja
Pris	25 kr	35 kr (+10 kr)	30 kr (+5 kr)
Jag väljer			

Nästa sida

Val 3. Vilket av de tre alternativen av en normalstor portion färdiglagad lasagne skulle du välja i butik (fysisk eller online)?

	Alternativ 1	Alternativ 2	Alternativ 3
Antibiotika	Inga restriktioner	Restriktioner	Inga restriktioner
Djurhållning	Bristande	God	Mycket god
Klimatpåverkan	Hög: >11 kg	Medel: 7–11 kg	Hög: >11 kg
Nyckelhålsmärkt	Nej	Ja	Nej
Pris	25 kr	80 kr (+55 kr)	55 kr (+30 kr)
Jag väljer			

Nästa sida

Val 4. Vilket av de tre alternativen av en normalstor portion färdiglagad lasagne skulle du välja i butik (fysisk eller online)?

	Alternativ 1	Alternativ 2	Alternativ 3
Antibiotika	Inga restriktioner	Inga restriktioner	Restriktioner
Djurhållning	Bristande	Mycket god	Bristande
Klimatpåverkan	Hög: >11 kg	Hög: >11 kg	Låg: <7 kg
Nyckelhålsmärkt	Nej	Ja	Nej
Pris	25 kr	55 kr (+30 kr)	65 kr (+40 kr)
Jag väljer			

Nästa sida

Fråga. När du besvarade frågorna om vilken lasagne du skulle välja tog du då hänsyn till alla aspekterna eller var det några som du inte tog hänsyn till?

	Tog hänsyn till	Tog inte hänsyn till
Antibiotika		
Djurhållning		
Klimatpåverkan		
Nyckelhålsmärkt		
Priset		

Nästa sida

Del 3. Frågor om din bakgrund

Frågorna nedan behövs för att kunna se om olika gruppers svar skiljer sig åt. Därför ställer vi några frågor om dig och ditt hushåll.

Fråga 1. Vilket kön är du?

□ Kvinna
□ Man
□ Annat/Vill ej svara

Fråga 2. Vilket år är du född?

……..

Fråga 3. Var bor du?

□ I en storstad (Stockholm, Göteborg eller Malmö)
□ I en större stad (Fler än 50 000 invånare)
□ I en mellanstor stad (Mellan 20 000 och 50 000 invånare)
□ I en småstad eller landsbygd (Färre än 20 000 invånare)

Fråga 4. Vilken är din högsta *avslutade* utbildning?

□ Kortare än 9-årig grundskola
□ 9-årig grundskola
□ Gymnasium eller folkhögskola
□ Högskola (mindre än tre år)
□ Högskola (tre år eller mer)

Fråga 5. Vad är din *huvudsakliga* sysselsättning?

□ Anställd
□ Egen företagare
□ Arbetslös
□ Studerande
□ Pensionär
□ Föräldraledig
□ Har sjuk-/aktivitetsersättning
□ Annat, nämligen……..

Fråga 6. I vilken utsträckning anser du att det går att lita på människor i allmänhet? Markera den siffra som bäst motsvarar din åsikt: 1 betyder att man absolut inte kan lita på människor i allmänhet och 7 betyder att man absolut kan det.

1	2	3	4	5	6	7

Fråga 7 Generellt sett, skulle du säga att man kan lita på följande när det kommer till livsmedel? 1 betyder att man absolut inte kan lita på det och 7 betyder att man absolut kan lita på det.

	Inte lita						Lita
	1	2	3	4	5	6	7
Att myndigheter i Sverige kontrollerar livsmedel							
Att myndigheter inom EU kontrollerar livsmedel							
Att lantbrukare i Sverige håller sig till lagar och regler							
Att lantbrukare inom EU håller sig till lagar och regler							
Att märkningar (ex. KRAV, Bra Miljöval) endast finns på varor som följer deras riktlinjer							
Att köttprodukter med svensk flagga betyder att djuren vuxit upp och slaktats i Sverige							

Fråga 8. Är du medlem i eller sponsrar någon miljöorganisation?

□ Ja
□ Nej

Fråga 9. Har du någon relation till lantbruket? – Det vill säga jobbar/har jobbat som lantbrukare själv, är uppvuxen på lantbruk, bor nära, har bekanta eller släkt som är lantbrukare?

□ Ja
□ Nej

Fråga 10. Hur stor är ditt *hushålls* sammanlagda månadsinkomst *före* skatt inklusive eventuella bidrag? Svara gärna även om du inte är helt säker.

□ 0–3 999
□ 4 000–8 999
□ 9 000–12 999
□ 13 000–15 999
□ 16 000–18 999
□ 19 000–22 999
□ 23 000–25 999
□ 26 000–29 999
□ 30 000–36 999
□ 37 000–44 999
□ 45 000–54 999
□ 55 000–64 999
□ 65 000–74 999
□ 75 000–84 999
□ 85 000–94 999
□ 95 000–104 999
□ 105 000–
□ Vet ej/Vill ej svara

Fråga 11. Hur många medlemmar finns det i ditt hushåll (inklusive dig själv)?

..... medlemmar

Fråga 12. Vilka åldrar har hushållsmedlemmarna? Skriv antalet i varje åldersgrupp. Gäller även barn som bara bor hos dig på deltid. Glöm inte dig själv.

0-10 år,.....stycken
11-17 år,.....stycken
18 år och äldre,.....stycken

Fråga 13. Vilket politiskt parti tycker du **bäst** stämmer överens med dina åsikter idag? Kryssa i ett alternativ.

□ Moderaterna
□ Kristdemokraterna
□ Centerpartiet
□ Liberalerna
□ Sverigedemokraterna
□ Miljöpartiet
□ Socialdemokraterna
□ Vänsterpartiet
□ Feministisk Initiativ
□ Annat parti, nämligen_____
□ Vet ej

Plats för dina egna kommentarer:

……
……
……
……
……
……
……
……
……

Ett varmt tack för att du besvarat frågeformuläret!