Consumer Preferences for Tofu Characteristics in Sweden

A Discrete Choice Experiment

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Abstract

The extensive consumption of meat products is increasingly criticized as it is associated with environmental, ethical, and social dilemmas. This is closely related to production systems and factory farming, which lead to high emissions and strain on planetary boundaries. Based on plant-based ingredients, meat substitutes are a healthy source of protein that offer a number of social, environmental and health benefits compared to meat and therefore play an important role in reducing the consumption of meat products. However, the market shares of plant-based meat substitutes are quite low in many countries and need to increase to reinforce sustainable consumption and production. As a consequence, research needs to investigate where consumers stand in this regard and what their preferences are as the knowledge about these aspects is critical to develop a market that benefits food industry and government policies. The subject of the study is tofu, an important plant-based protein source with a long tradition in Asian cuisine. I used a discrete choice experiment with the product attributes origin (non-EU vs. EU vs. Sweden), production type (organic vs. conventional) and price to get insights into how consumers make choices. Using latent class analysis, five distinct consumer classes have been identified: price-insensitive consumers, eco-conscious consumers, price-conscious consumers, sustainability-conscious consumers, and random clickers. The origin of the tofu and the soy beans used for production as well as organic cultivation have big influence on consumers' preferences. Female consumers and those who do not consume meat regularly are found to have a generally higher willingness to pay for tofu, local production and organic cultivation.

Keywords: sustainable consumption, climate friendly food, plant-based proteins, willingness to pay, legumes, soya bean

Table of contents

List of tables

List of figures

Abbreviations

BIC	Bayesian Information Criterion
CLM	Conditional Logit Model
DCE	Discrete choice experiment
GDP	Gross domestic product
GHG	Greenhouse gases
LCA	Latent Class Analysis
MWTP	Marginal willingness to pay
PBMA	Plant-based meat alternatives
SLU	Swedish University of Agricultural Sciences
RUM	Random Utility Model
UU	Uppsala University
WTP	Willingness to pay

1. Introduction

1.1 Background

Food systems are a main driver of climate change and global environmental change (Tziva et al. 2020), with agriculture emitting substantial shares of global greenhouse gases (GHG) (Foley et al. 2005), accounting for approximately 70 percent of global freshwater withdrawals (Unesco 2015), and occupying around 40 percent of the Earth's surface (Campbell et al. 2017). The sector is responsible for more than 25 percent of worldwide GHG (Tso et al. 2020). Livestock takes up a substantial volume of these emissions being responsible for 23 percent of the total warming in 2010, being the major contributor to climate change within the agricultural sector (Reisinger & Clark 2018). Thus, a crucial step in fulfilling the Paris Agreement and limiting global warming to 1.5 degrees compared to pre-industrial levels is a reduction in livestock (Campbell et al. 2016). In addition, the projected population growth of 10 billion people until 2050 could lead to a shortage of food resources, and animal proteins in particular are unlikely to be available in today's per capita quantities (Henchion et al. 2017).

In line with the necessary decline in livestock and an increase in awareness of sustainable consumption, the number of vegetarians and vegans has increased in recent years (cf. Leahy et al. 2010; de-Magistris & Gracia 2016), leading to annual growth of 5-10 % for plant-based products in Sweden (Changing Markets Foundation 2018; Bohrer 2019). Diseases such as the ongoing COVID-19 pandemic or the African swine flu have driven sales of plant-based meat alternatives (PBMA), as consumers consider the association between meat products and pandemics (Attwood & Hajat 2020), leading to a doubling of demand for these products in the USA in 2020 compared to the previous year (Gaan 2020). By ensuring consumers' protein intake for a healthy diet (Willett et al. 2019), meat alternatives based on legumes have a much lower impact on the environment (cf. de Vries et al. 2011; Erisman et al. 2011; Profeta & Hamm 2019; Xue et al. 2019) with meat from ruminants such as beef and lamb generating about 250 times more CO_2 equivalents compared to legumes (Tilman & Clark 2014).

1.2 Problem Statement and Research Gap

Besides the motivation to decrease individual carbon footprints, consumers are driven by health concerns and animal welfare when purchasing PBMA (cf. Sinha et al. 2009; Bernstein et al. 2010; Bashi et al. 2019; Fresán & Sabaté 2019; Hopwood et al. 2020). A plant-based diet brings health benefits, as it has been shown to reduce the risk of type 2 diabetes, heart disease and stroke (Godfray et al. 2018; Fehér et al. 2020). In addition, the increasing demand for these products can be linked to the need for nutrients and proteins that normally come from animal products in an omnivorous diet and can be replaced with PBMA (Henchion et al. 2017). However, while the growth in the market for meat alternatives is well documented, these substitutional products are still holding a relatively low market share when compared to meat (Zhao et al. 2022) and it remains unclear if and how consumers trade off plant-based proteins against animal proteins and – more importantly – characteristics of PBMA with each other.

With the growing interest in PBMA and the rising recognition of the environmental impact of individual diets, the literature about these phenomena has become relatively broad (Slade 2018; Tso et al. 2020; Van Loo et al. 2020; Profeta et al. 2021a; Rondoni et al. 2021). Several researchers analyze and evaluate the impact of vegan and vegetarian nutrition on the environment as well as on human health (Nilsson 2015; Bashi et al. 2019; He et al. 2020). Further, practitioners attain information about the motivators, drivers, and barriers behind decision-making towards such products (cf. Hoek et al. 2004, 2011). However, many of these studies do not take the context of the purchase decision and the connected consumers' preferences into account. These studies are also often specific to national contexts, highlighting the need to replicate and extend the research to different countries.

This study applies a focus on Swedish consumers where especially their choices regarding tofu are analyzed. Understanding what drives consumers to buy tofu and explaining their willingness to pay (WTP) is of interest, which enhances policy introduction and marketing decisions.

Concerning the existing body of literature, several studies in the field of WTP have addressed consumer acceptance and preferences towards meat alternatives that try to imitate the taste and consistency of meat. In their meta-analysis about WTP toward sustainable food products, Li and Kallas' (2021) show that on average, consumers value sustainability attributes positively. However, to my knowledge, only two studies were performed in Sweden, and further, only one study looks at meat substitutes. A focus on tofu is rarely conducted but is of interest as it differentiates from meat substitutes as it has a long tradition in Asian countries and is comparably popular and well-known (Shurtleff & Aoyagi 2013). Based on panel data from Swedish consumers and their preferences towards tofu, this thesis offers novel insights into WTP that can be applied to the broader society in Sweden. A

focus on Sweden is made because consumers are increasingly becoming aware of problems regarding development, poverty, and climate issues (Broberg 2007).

1.3 Objectives and research questions

This study aims to understand the motivators behind purchasing decisions and to find out how much Swedish consumers are willing to pay for plant-based proteins and their sustainability-related characteristics. Accordingly, I will estimate consumer preferences for these characteristics and how they affect the WTP. I will also explore how preferences differ among consumer characteristics. The research further examines how information about health or environmental impacts or the versatility of cooking affects decision-making. As a tool to achieve this goal, I used data from a discrete choice experiment (DCE) on consumer preferences for tofu characteristics.

I will answer the following research questions:

- *What is the willingness to pay for sustainability-related characteristics of tofu and how does consumers' willingness to pay differ?*
- *How does information on tofu affect the willingness to pay for tofu?*

1.4 Delimitations

1.4.1 Theoretical delimitations

A DCE is conducted in a context where respondents choose between hypothetical choice sets. Compared to non-hypothetical approaches, this method is more likely to lead participants to overstate their WTP and often leads to the so-called hypothetical bias with higher estimates (Carlsson et al. 2005; Alfnes et al. 2006; Hensher 2010).

1.4.2 Empirical delimitations

Empirically, this study focuses on the results from an online panel with approximately 1,500 Swedish consumers. Besides the figures from the literature review, the paper does not contribute findings from other countries nor does it draw comparisons between different countries.

1.5 Outline

The rest of this paper is organized as follows. *Chapter 2* gives an overview of the current literature about consumer preferences and the theoretical background. The methodology and data used for this research are elaborated in *chapter 3*, followed by the results and analysis in *chapter 4*. *Chapter 5* discusses the results and the limitations of this study and *chapter 6* follows with the conclusion.

2. Literature Review and Theoretical Framework

This chapter introduces the literature and theoretical framework of the thesis. An overview of the existing body of research about consumer preferences and WTP is given to motivate the usage of different information treatments in the survey. In line with the objectives of this study, emphasis is placed on sustainability and health aspects. Followed by the literature on meat substitutes and consumer choices, this chapter aims to give an overview of WTP towards products with certain positively attributed characteristics. Because this area of research is widely recognized and has been researched in a variety of settings and with several products, I will focus on summarizing the main findings from European studies that have looked at non-meat and non-dairy products. Finally, an overview of Lancaster's new consumer theory (1966) is given which provides the theoretical framework for DCE which is explained in the method section.

2.1 Literature on Consumer Preferences

What consumers are willing to pay for products with certain characteristics can provide important insights into their buying behavior and help identify potential market demand (Li & Meshkova 2013). The WTP is the stated maximum amount a consumer may be prone to pay for a specific product under certain circumstances before choosing another product. It represents the demand curve for a product and thus plays an important role in price and quantity formation. The estimation of the WTP provides information on whether it is justifiable and worthwhile to produce a particular product as it represents the consumer's perceived value of consuming or using it (Shor & Oliver 2006). By knowing consumer preferences and behavior, market development can be analyzed and marketing decisions about a particular product can be made (Skreli et al. 2017).

2.1.1 Consumer Preferences for Sustainability Attributes

No uniform definition of the term "*sustainability*" can be found in the literature and different terms describe the same phenomenon. "*Ecological*", "*green*" or "*environmentally friendly*" are just some of the synonyms used to define sustainable

products (cf. Kucher et al. 2019). Moreover, as the triple bottom line suggests, not only environmental aspects but also social equity and economic prosperity should be included when considering sustainability (Henriques & Richardson 2004). Research testing for consumer preferences and their WTP towards sustainable products has focused mainly on products with organic and/or local characteristics (cf. Schollenberg 2010; van Doorn & Verhoef 2011; Vanhonacker et al. 2013; de-Magistris & Gracia 2016; Li & Kallas 2021). A few surveys and experiments also investigate the impact of social aspects such as fair working conditions on consumption decisions and the self-image of consumers (cf. Drichoutis et al. 2017; Friedrichsen & Engelmann 2018).

Products with attributes such as organically or locally grown are known to come with a positive environmental impact: the production cycles lead to significantly lower creation of GHG (cf. Brugarolas Mollá-Bauzá et al. 2005; Hallström et al. 2015) and thus looking at WTP for products with those attributes can give indications about consumer preferences towards sustainability. These products often bring a price premium of between 10 % and 200 % compared to commercial products, as they incur higher production costs (Brugarolas Mollá-Bauzá et al. 2005). In addition, the authors found that consumers buy these products because they consider them to be of higher quality, healthier, and more environmentally friendly. However, organic production is associated with lower yields, which leads to an expansion of cultivated areas.

On average, consumers value sustainability attributes in products and are willing to pay a price premium for products produced organically or by local producers (Li & Kallas 2021). In their meta-analysis, Li and Kallas (2021) summarize the evidence for the WTP for attributes identified as sustainable, with ecological and local characteristics being represented in the majority of studies. Overall, the authors found a positive WTP of 27.5 % on average for sustainability attributes. In addition, consumers appear to report a higher WTP in hypothetical study situations than in non-hypothetical ones, and results differ across continents.

Numerous studies show that there are major differences in consumer behavior toward sustainable products in different regions. One of the few Swedish-based studies of consumer behavior toward sustainable products examines the WTP for fair trade coffee (Schollenberg 2010). Sweden can be identified as a country with a comparably high number of political consumers who value fair and ethical conditions while caring about the well-being of workers and the political surroundings when purchasing products (Stolle et al. 2003). Political consumers are typically well-educated, with a high income and resourcefulness. Due to the growing number of these consumers in Sweden, there is a trend toward high awareness of climate and sustainability as well as development issues (Broberg 2007). In relation to this, Schollenberg (2010) finds a positive attitude and WTP of Swedes towards organically-labeled coffee packages. However, the study focuses

highly on the effects of Fair Trade and organic labels which are not examined in this research.

In contrast to Swedish consumers, several studies have shown that in other European countries there is a lower consciousness and knowledge about sustainability and the effects of, for example, organic farming (cf. Skreli et al. 2017; Kucher et al. 2019). Compared to other European consumers, Ukrainians have a comparatively low WTP, which could be related to their lower awareness of the benefits of sustainable products (Kucher et al. 2019) but could also be connected to the substantially lower GDP which is not discussed by Kucher et al. (2019). This is consistent with the findings of Schollenberg (2010) who finds a higher WTP in Sweden as compared to studies in Italy and the UK, which he explains by the high sustainability awareness of Swedish consumers.

De-Magistris and Gracia (2016) conducted a study with Spanish consumers on their WTP for organic labels and proximity to production sites as an indicator of local attributes. The results show that consumers are willing to pay an additional price premium for almonds that generate lower GHG emissions because of organic (0.79€/100g) or local (0.85€/100g) characteristics[1]. However, the authors find that results vary widely for different consumer segments which motivates a clustering into the classes "conventional consumers", "short distance consumers", and "sustainable consumers". Segmentation of consumers into classes can be helpful to understand the market better. Determining WTP for specific product attributes by combining a Latent Class Analysis (LCA) with a discrete or conjoint choice experiment is a widely used method in the literature (cf. Vanhonacker et al. 2013; de-Magistris & Gracia 2016; Skreli et al. 2017).

As the meta-analysis is quite recent (2021), it offers a good overview of the current body of literature on WTP for sustainability characteristics. The main focus in the literature on WTP about sustainability is on the product categories of coffee, dairy, meat and seafood, fruits and vegetables, wine, and beer (cf. Li & Kallas 2021), while the relationship between PBMA and these characteristics is examined in only one paper (Vanhonacker et al. 2013). The content and results of that paper are discussed in *chapter 2.1.3*.

2.1.2 Consumer Preferences for Healthy Food

As with sustainable food attributes, there is a large body of literature on how consumers make decisions when purchasing products in terms of health attributes. Diet has a major impact on human health, and an unhealthy diet significantly increases the risk of developing a chronic disease (Godfray et al. 2018; Fehér et al. 2020). Such noncommunicable diseases account for about 26 % of premature

[1] However, almonds are an example of a plant-based product where a very high water consumption leads to a negative environmental impact, but this is not a criterion for organic certification. Therefore, the organic label should be treated with caution.

deaths worldwide (World Health Organization 2021). Moon et al. (2005) mention the importance of consumers recognizing the health benefits that are connected to soy products as that leads to a more frequent and probable consumption. In this context, Siró et al. (2008) found that the health benefits of foods have a substantial impact on consumers' decisions to purchase a particular food.

Since products with increased health benefits typically come with higher production costs, it is helpful to validate the value that consumers place on these healthier products (Siró et al. 2008). By looking at the WTP, most of the studies in this field find a positive price premium towards health attributes which goes in line with the higher value of these products (cf. Dolgopolova & Teuber 2018). In addition, a direct relationship was found between income and WTP estimates of health benefits (cf. Tra et al. 2011). However, results vary widely depending on the methods used, the product, the specific health benefit, and the place of the study (Dolgopolova & Teuber 2018). As with studies of sustainability attributes, non-hypothetical surveys yield a significantly lower WTP than hypothetical surveys (ibid.).

One study is particularly interesting regarding this research as it investigates the marginal willingness to pay (MWTP) for soy attributes concerning health claims (Chang et al. 2012). In addition to tofu, the authors analyzed several other soy-based products because soy has been shown to lower cholesterol and thus reduce the risk of coronary heart disease (cf. Anderson et al. 1995) as well as osteoporosis and cancer (Messina & Barnes 1991). The results of the study by Chang et al. (2012) show that consumers are willing to pay an additional price premium of between $1.23 and $1.54 for tofu with health claims compared to tofu without claims. However, consumers value taste more, with MWTP significantly higher for good (compared to poor) taste than for health information.

Contradicting the findings of Chang et al. (2012), Corrin and Papadopoulos (2017) mention a perceived health barrier to vegetarian and vegan diets among consumers, associating these diets with imbalanced nutrient intake. This inconsistency could be because novel products such as PBMA have low legitimacy and credibility or a lack of knowledge about their health benefits. Combined with concerns about taste or naturalness, this can lead to market failures and more critical consumer perceptions (Onwezen & Bartels 2011).

Most studies that focus on consumer preferences for healthy foods exclude consumers' subjective positions that might affect purchase decisions. In response, Papparlado and Lusk (2016) analyze subjective beliefs and the values consumers place on certain attributes related to functional foods. To obtain information about subjective opinions, they test before and after tasting functional and conventional snacks. Consistent with most studies, they find that WTP increases for a higher value of healthiness, with taste and safety being slightly more important than health

attributes. The authors observe a change in subjective beliefs after tasting, implying that beliefs have an important influence on WTP.

2.1.3 Consumer Preferences for Plant-based Meat Alternatives

As mentioned earlier, reasons for purchasing PBMA range from animal welfare to environmental protection to personal health. Further, consumers are motivated by weight loss whereas the taste is found to be a hindrance (Hoek et al. 2011). One reason Hoek et al. (2011) state is food neophobia, the fear of new, unknown food (Pliner & Hobden 1992). Another obstacle in pushing the purchases of environmentally friendly products has been the attitude-behavioral intention gap (Matsdotter et al. 2014). Matsdotter et al. (2014) found that how consumers claim to act and what they declare to purchase differ from their actual behavior. Additionally, a study has found that few people are fully informed about the intertwined relationship between the meat and dairy industry and underestimate the negative effects on the environment with only 36 % of the participating individuals connecting sustainability issues with meat consumption (Pohjolainen et al. 2016). This phenomenon is described in several other studies (cf. Tobler et al. 2011; Latvala et al. 2012; de Boer et al. 2013).

Despite the widely acknowledged benefits of a plant-based diet, a complete switch is met with strong opposition from the majority of consumers (Slade 2018). This could be explained by the fact that plant-based protein products have only recently begun to target meat eaters by imitating meat in taste and texture. Further, He et al. (2020) summarize several studies showing that the pleasure of eating meat is a major barrier for most consumers, with consumers also believing that a meat-free diet is low in nutrients and therefore unhealthy (Pohjolainen et al. 2015; Corrin & Papadopoulos 2017). Additionally, a lack of education, personal income, or knowledge about how to prepare non-meat dishes can hinder a transition (Lea et al. 2006; Pohjolainen et al. 2015; He et al. 2020). Older consumers in particular are found to be resistant to changing their ingrained habits because they believe that their diet is healthy (Pohjolainen et al. 2015). The social environment can further complicate dietary changes, as friends or family members who consume meat can make an accepting environment more difficult (Lea et al. 2006).

In the literature review for this study, only a few studies were found that directly link WTP to PBMA (cf. Li & Kallas 2021). One study conducted by Vanhonacker et al. (2013) finds that only about one-third of consumers tend to eat less meat or more organic meat, while respondents generally underestimate the environmental footprint of meat consumption, despite being concerned about rising emissions and climate change. The authors compare respondents' WTP and willingness to consume for PBMA where the latter is higher than the former. A segmentation of respondents into “*conscious*”, “*active*”, “*unwilling*”, “*ignorant*”, and “*uncertain*” achieved a better understanding of consumer decisions with WTP varying from

1.81 to 3.10 (with 1 – strongly disagree and 5 – strongly agree). The WTP was not quantified in percentage or currency. As the majority of research suggests, Vanhonacker et al. (2013) also found an effect of age and education on the WTP.

Profeta et al. (2021b) investigated consumer preferences towards meat hybrids, i.e. products where only part of the meat product (20% to 50%) is replaced by plant proteins. By applying a DCE, the authors found that consumers who substitute meat at least sometimes are willing to pay more for such meat hybrids than for vegetarian or vegan alternatives. This suggests that such meat hybrids may be a solution to a healthier and more sustainable diet for meat-eaters.

A recently published study conducted by Carlsson et al. (2022) results in very similar findings. The authors use a Swedish consumer panel to analyze the willingness to switch from meat burgers to meat burger substitutes. Their stated preference survey with 1,096 respondents finds that the price of a plant-based burger patty has to be around two-thirds of the meat patty for the average consumer to switch. To understand whether familiarity with PBMA leads to higher WTP, Carlsson et al. (2022) examined whether respondents had previously tried vegan patties. As in most studies, age, higher education level, and environmental concern are found to be associated with a higher likelihood that a person has ever tried a plant-based patty and that their WTP for such products is higher. This leads to the same results as Hoek et al. (2013) who concluded that consumers find PBMA more acceptable and are willing to pay more once they tasted the product.

By also comparing beef and soy burger patties, Castellari et al. (2019) look into consumers' WTP in a lab context using multiple-price lists and chosen quantities of the two products. As it is conducted in the present study, the authors use health and environmental information about beef and soy before the participants make their choices. However, the information treatments are found to have a weak impact on WTP, while having a stronger impact on the quantities chosen.

A relatively new plant-based ingredient in the production of meat alternatives is micro-algae. Products made from micro-algae come with several advantages as they can be grown on non-arable land and yield high harvest rates per square meter (Weinrich & Elshiewy 2019). They are also considered very healthy, as they contain a high proportion of high-quality dietary protein and many omega-3 fatty acids, which are beneficial compared to animal fatty acids (Becker 2007). As a result of their analysis, Weinrich and Elshiewy (2019) found that consumers prefer organic and local characteristics when purchasing microalgae-based meat substitutes. When investigating the preferred second ingredient (besides microalgae), the authors found that egg is the most popular, followed by peas. However, eggs are considered less desirable because, as an animal product, they have more negative environmental impacts compared to plant products (ibid.).

The findings of studies that look at PBMA suggest that consumers are not willing to pay a price premium for those products compared to the meat products and rather

would purchase such products if prices are lower. However, as discussed in *chapters 2.1.1* and *2.1.2*, consumers are willing to pay higher prices for products with sustainability or health claims. As PBMA come with both health and sustainability benefits, these contradicting findings might explain the unawareness of consumers about the connection between those characteristics which is also discussed in the literature. Analyzing how information about sustainability and health attributes can affect consumers' decision-making might give more information about this phenomenon.

2.2 Theoretical Framework

Lancaster's new consumer theory (1966) assumes that the utility consumers attach to a product is determined by the totality of its attributes rather than the product itself. By assuming that goods are inputs and their collective characteristics are outputs, the consumption of a single good is based on its multiple attributes. In the basic version of the model, the relationship between the good and a consumer's preference is the same for all consumers. This leads to the fact that a consumer's personal decision depends only on the selection of the collective attributes. For example, a coffee's usefulness to consumers may depend on its taste or smell, which in turn depends on the coffee beans used and the roasting process. But other relevant characteristics may also be credence attributes such as production or labor standards used when growing the coffee beans. In other words, the idea of Lancaster (1966) is that consumers decompose goods into attributes that they evaluate. In a marketing context, this approach allows us to predict how preferences change as we adjust the options or baskets of goods offered to consumers. This is achieved by examining how changes in the attributes that make up the product affect consumer preferences.

Based on Lancaster's new consumer theory, DCEs reveal preferences explained as choice models (*chapter 3.4*), empirically supported by McFadden's (1974) Random Utility Model (RUM). RUM is a well-established economic theory that derives parameter estimates from the data using properties of error components (Skreli et al. 2017). In RUM, observed attributes in the utility function are represented by explanatory variables, while unobserved attributes are represented as random variables (Horowitz et al. 1994). Because the utility is unobserved and thus a random variable, the model cannot be used to predict consumer choices with certainty. Rather, the model yields probabilities for the various alternatives to be chosen. Thurstone (1927) first introduced random utility functions, after which the effects of various product characteristics on choice and their probabilities were formalized by Manski (1977). The first DCE following McFadden's model was conducted by Louviere and Woodworth (1983). In this model, the consumer seeks the highest utility.

A basic assumption in these models is that an individual's preferences for different alternatives are described by a utility function, which is usually considered additive. This means that the utility of a purchase is the sum of the utility of its features. The utility for a consumer i of choosing the alternative j can then be described by the formula (cf. Chang et al. 2012; Melo Guerrero et al. 2020):

$$U_{ij} = V_{ij}(Z_{ij}S_iM_j)$$

with

U_{ij}: utility of consumer i for alternative j

V_{ij}: component for each alternative j

Z_{ij}: attributes

S_i: socioeconomic characteristics of the consumer

M_j: income.

The underlying logic of the consumer theory can be understood with utility graphs and the more general characteristic demand theory (see Figure 1). Consider two firms that both sell a product with the same attributes and are in perfect competition. However, they have different quantities of these attributes. The horizontal axis shows the amount of attribute a_1 offered by the firms, while the vertical axis shows the amount of attribute a_2. The amount of the attributes characterizes the distinction of the goods of different firms. $Firm_1$ is represented with the blue line and $firm_2$ with the green line. These lines illustrate that the more a consumer buys from a particular firm, the more of these qualities they get. The further up the line we move, the more of that firm a consumer buys, and the more of those qualities they get to enjoy.

As shown in Figure 1, $firm_1$ is closer to the vertical axis and $firm_2$ is closer to the horizontal axis. This means that the same quantity of goods will have more of attribute a_1 if we choose $firm_2$ and more of attribute a_2 if we choose $firm_1$. Individuals will choose the firm that maximizes their total consumption and reach the highest utility curve, meaning that they will decide on the cheaper firm. A consumer can choose between buying $firm_1$ (point B) and $firm_2$ (point A) with a given amount of money. Since point A offers an indifference curve with higher utility, the consumer will decide for purchasing $firm_2$. In a scenario where $firm_1$ lowers its price, the utility curve at point C results in a higher utility compared to point B. However, as point A is still on a higher curve, the consumer will decide for consuming point A.

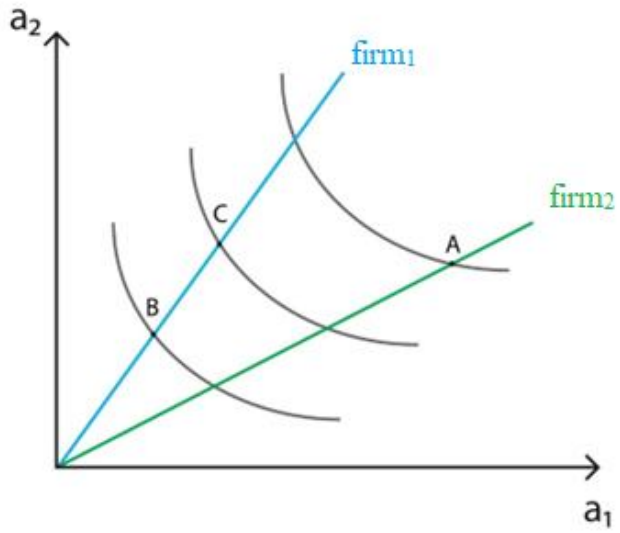

Figure 1: Characteristic demand theory (Policonomics 2014)

Returning to Lancaster demand, Figure 2 shows the utility function based on the attributes each basket contains, rather than the quantity of each type of good. In this model, it is no longer a question of "all or nothing", convex combinations of different attributes can be taken into account that reflect preferences for variety in consumption represented by point C. Unlike the previous scenario, the results are changed as soon as the price of a brand falls and consumers can select point D.

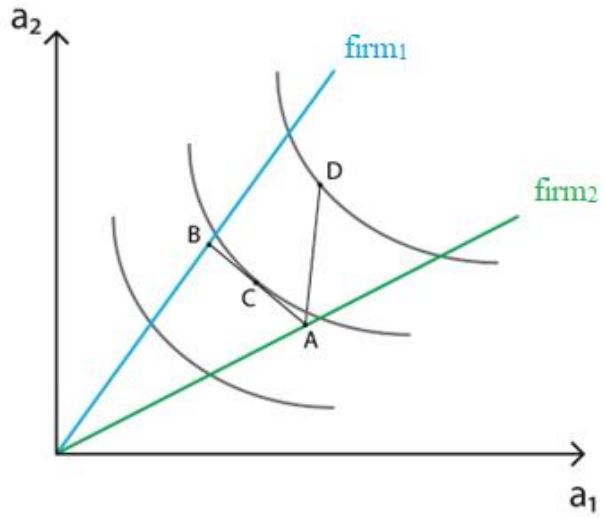

Figure 2: Lancaster's new consumer theory (Policonomics 2014)

3. Methodology and Data

3.1 Research Philosophy

A researcher's assumptions and beliefs influence the development of knowledge, which is referred to as research philosophy (Saunders et al. 2019). Such assumptions are based on ontological and epistemological views that determine the methodology for a study (Guba & Lincoln 1994). In this context, ontology refers to the nature of reality (Slevitch 2011). As this study is based on quantitative data collected online from Swedish consumers, the ontological perspective of this study is entrenched on the objectivist approach (Bell et al. 2022). Here, objectivism describes the relationship between social phenomena and social actors as independent, meaning that the researcher can observe without interfering as an observer (ibid.).

In symbiosis with ontology, epistemology is concerned with views of truth and legitimate knowledge, with ontology serving as the logical foundation for epistemology (Slevitch 2011). This means that a preferred ontological position predetermines the epistemological position (Bell et al. 2022). When choosing an epistemological approach, researchers can use natural sciences procedures or choose not to (ibid.). In this study, the positivist approach is applied, in which the methods of natural sciences are used. This serves the purpose of answering the research questions in the best possible way. In this positivist epistemological approach, social phenomena can be both directly observed and measured through a survey, as applied in this thesis. Moreover, this study is based on methodological individualism, which means that people's preferences and subsequent choices are viewed as decisive for social and economic phenomena (see for example Giddens (1979) for a sociological or Hodgson (1996) for an economic approach based on alternative ontologies that also unclude social structures).

3.2 Research Design

There are two overarching groups of methods for academic studies from which researchers can choose, qualitative and quantitative approaches (Saunders et al. 2019). The methodological assumptions of the study are based on the choice between these two possibilities (Bell et al. 2022). This study aims to estimate the WTP of Swedish consumers for tofu with distinct characteristics. The research area of consumer preferences toward PBMA is a widely researched area of interest in which quantitative data with a descriptive design is the primary choice for empirical analysis (Edmondson & Mcmanus 2007). Therefore, the study follows a quantitative approach and relies on a comprehensive statistical basis that allows to

measure various phenomena and derive generalizable observations and results from the selected case (Bell et al. 2022).

An additional motivation for the choice of a quantitative study is the possibility to depict the results in other contexts which further leads to high quality and reliability characteristics (Bell et al. 2022). It uses numerical evidence that is quantifiable and thus is of objective quality (Golafshani 2015; Bell et al. 2022). Based on statistical concepts, a quantitative research method offers tests and evaluations of the results to observe the given phenomena in an unbiased way (Bell et al. 2022). By analyzing data from a Swedish consumer panel with statistical models, this study explains the observed behavior. Tofu with different attributes is compared to understand consumers' preferences and decision-making.

Since this study does not aim to create a new theory but to review the existing literature using empirical data, it follows a deductive approach (Bell et al. 2022). Often in deductive studies, a hypothesis test is conducted, but theories can also be used that determine the direction for data collection. Following Lancaster's new consumer theory as a formulated direction, this study applies the deductive approach by answering two research questions.

This study takes a quantitative approach aiming at observing specific phenomena in a relatively large sample of individuals, which is why a survey is appropriate (Kelley et al. 2003). The purpose of a sample survey is to generalize the population as a whole to provide a picture of certain factors at a particular point in time while acknowledging the uncertainty resulting from sampling error. Such surveys can be conducted using either open-ended or closed-ended questions, with the former used to obtain qualitative and the latter to acquire quantitative data (Schuman & Presser 1979). In this study, closed questions were used because they are more appropriate for large samples with multiple factors involved.

Quantitative research aims to generalize findings to a larger population (Bell et al. 2022). However, in order to generalize the results of a sample, it must be representative of the population under study. To obtain a representative picture of a population, it does not necessarily have to be studied as a whole, and the observed characteristics do not apply to every individual in the population (Fricker 2012). Rather, the data obtained from the sample provide very similar insights to those that would have resulted from the entire population. When collecting a sample, researchers can decide between two comprehensive types, probability-based sampling and non-probability-based sampling, depending on the situation. In the former method, participants are selected using probabilistic methods, knowing the probability with which each member of the population could be included in the sample while in the latter method, the sample is not selected randomly but according to the researcher's judgment. Respondents were randomly chosen from an online panel representing the population by the variables age, gender, and income and then were contacted by email. In addition, filter questions were applied

to exclude individuals who never do groceries or who would not consider purchasing meat alternatives.

3.3 Literature Review

In order to formulate accurate and insightful questions about the topic under study, it is essential to review the literature, previous work, and what is already known and written about the area of interest before beginning the study (Yin 1994; Robson & McCartan 2016). A systematic review has the added advantage of designing a study framework based on describing relevant patterns, defining concepts, commonly used jargon and research methods, and identifying gaps in knowledge or areas of uncertainty (Robson & McCartan 2016).

Following the advice from Yin (1994) and Robson and McCartan (2016), this research project started with a literature review to understand the current state of the research area and to get an overview of the definitions used. A comparison of distinct perspectives and approaches was used to identify knowledge gaps. Subsequently, a review of relevant empirical studies was conducted to establish undiscovered areas. To ensure the trustworthiness and quality of the literature search, I mainly used secondary data from peer-reviewed journals. The review is based on search results from the SLU library database Primo, the UU library database, and Google Scholar. To find the most relevant literature that aligns with the purpose of the study, the following keywords and their combinations were used for the literature search: “willingness to pay”, “tofu”, “plant-based”, “plant-based meat alternatives”, “consumer preferences”, “discrete choice experiment”, and “latent class analysis”. To avoid limitations, no time frame was set for the search. Nevertheless, emphasis has been placed on recent research, particularly concerning consumer preferences toward PBMA and empirical studies examining the relationships among them, as this topic is very new.

3.4 Quality Criteria

3.4.1 Reliability

The concept of reliability determines if the results of the study are consistent, stable, and repeatable (Bell et al. 2022). For a study to meet the quality criteria of reliability, the results must be consistent over time and are expected to be the same when another person assesses the study under different conditions, on different occasions, and with different instruments measuring the same phenomena (Drost 2011; Golafshani 2015). If these quality criteria are met it can be rejected that the results are based on random chance (Bell et al. 2022).

However, as with all research studies, quality measures need to be discussed, addressed, and sought in this study, as there are issues here as well. In order to increase reliability as much as possible, the questions in the survey were worded clearly and understandably. To ensure clarity of the questions, the survey was pilot tested with 310 members of various Facebook groups as part of a master's thesis (Slinn 2021) and with a pre-test for the survey engine with 100 participants. Another aspect of survey reliability is whether the questions are relevant to what they are intended to measure. By following the literature on DCE, this study addresses this problem since these experiments are well known and frequently used to estimate WTP.

3.4.2 Validity

Validity is another important quality criteria for quantitative studies which discusses if the results and conclusions are scientifically accurate, meaning if the used instruments determine the data as it is supposed to (Bell et al. 2022). The use of authentic and correct measurement methods is closely related to the aim of the study and its research question, which means that the study must measure what it is intended to investigate.

The purpose of this study is to quantify consumers' WTP for tofu with different attributes and to determine how information about health, environment, and preparation possibilities influence consumer preferences. To measure WTP, a DCE is performed in combination with an LCA, a combination commonly used in research to study consumer decisions (cf. Skreli et al. 2017). Since it is a well-proven method, it increases the scientific validity of this study.

Further, the validity of a study should be discovered in several different aspects, internal validity being one of them (Bell et al. 2022). The concept explains the importance of finding relations or causalities between the variables used in the study. Internal validity addresses the question of causality between two or more variables and whether this relationship exists. This paper has addressed this problem by following the scientifically well-tested DCE model. Thus, the literature on DCE has been reviewed and recognized to measure the relationship between products or services and customer satisfaction.

Another aspect of validity is external validity. The issue here is whether the results of the study can be generalized to contexts that do not fall under the research question. Participants must be relevant to the study so that the sample is representative of the target population. This study used a Swedish online panel which offers a very good sample of the Swedish population as a whole. However, the first part of the survey included questions that filtered out only respondents who at least occasionally purchase for their household and consider buying meat alternatives. Consequently, the results are only representative of individuals that align with those prerequisites. A major source of uncertainty in quantitative

research is sampling error. The larger the sample, the smaller the sampling error. The survey used the pre-test to estimate confidence bounds for the main attributes and concluded that with a sample of 1,500 respondents, all effects can be estimated with more than 90% power (i.e., there is a very high chance (greater than 90 %) of finding the effect seen in the pre-test given these are true effect sizes).

3.5 Discrete Choice Experiments

DCEs are a recognized tool to estimate WTP and product preferences of consumers. Such experiments are conducted by asking respondents repeatedly to indicate their preferred alternative from a choice set (see Figure 3). Choice sets present different products which differ in their attributes and each combination of attributes results in a different option. These alternatives are combined in an experimental design to estimate choice models that can inform the researcher of the trade-offs between the attributes. Typically, an opt-out option (not choosing any of the alternatives), as well as a price attribute are included.

There are different ways to create such experimental designs. Here, an orthogonal design (ensuring uncorrelated attributes) has been chosen, resulting in a total of 27 different choice sets with four attributes (see Table 1 in chapter 3.4.1). After the data are collected, one can estimate the relative contribution of an attribute to utility and the effect or value of each product attribute on the decisions made by the respondents. Trading off attributes with the cost attribute also allows the researcher to estimate WTP for a change in attributes.

	Option 1	**Option 2**	**Option 3**
Country of Tofu manufacturing	Sweden	Another EU country	
Country of origin of the used soybean	Another EU country	A non-EU country	
Cultivation of soybean	Organic soybean cultivation	Conventional soybean cultivation	
Price	25 SEK	30 SEK	
Which would you choose?	○ Option 1	○ Option 2	○ Not interested

Figure 3: Sample choice set (own illustration)

Since DCEs are based on the RUM, they are considered more appropriate for analyzing consumer preferences than traditional conjoint analysis (Skreli et al. 2017). Traditional conjoint analysis is a method where the error components are predominantly provisional and do not allow for clear interpretations. In addition, the use of DCEs allows for a better understanding of people's decision-making. This facilitates practitioners' understanding of how people make decisions and helps

them learn how to conduct such empirical decision studies in marketing and other applied fields (Louviere et al. 2010).

By including price or cost as an attribute, the researcher can calculate the trade-off between a change in the utility of money and the utility of one of the attributes by taking the total derivative of the utility function, setting dU to zero and solving for cost or price. Assuming a linear utility function (which I do throughout this thesis), the WTP then can be calculated as $-\beta_{attribute}/\beta_{price}$ where the two betas are the estimated coefficients for an attribute and the price in the model, respectively. WTP estimates are the maximum amount a current or potential consumer is willing to pay for a product or good (Tully & Winer 2014). Maximum WTP is estimated by calculating the marginal rate (measured in monetary units) at which a consumer substitutes for a product based on attribute levels. Here, WTP for specific product attributes is derived from the price difference required to make a person indifferent in choosing between two alternative products. The exact calculation of the WTP can be found in Hensher et al. (2005). Within the choice experiment, consumers are given choices between organic and non-organic products and between Swedish, EU, and non-EU products, with respondents receiving different information treatments.

3.5.1 Experimental Design and Data Collection

The data were collected in March 2021 through a Swedish consumer panel in collaboration with a German market research company, preceded by a pilot survey with 100 respondents. Respondents were sampled to be representative of age, gender, and income categories of the general population of Sweden. Potential respondents were randomly selected from the panel and invited via email. A total of 7,129 respondents opened the survey. 2,915 participants were screened out because they either were not responsible for grocery shopping in their household or did not consider buying meat alternatives. Another 2,755 of the respondents did not complete the survey and thus were rejected which leaves me with 1,459 completed responses for analysis.

To test the design, a Monte Carlo simulation with a varying number of sample sizes was carried out. The simulation indicated that a sample size of 200 was enough to get a power above 90 % when the alpha level was set at 0.05. The study was preregistered at the open science framework. The pre-registration, simulation, data, code, questionnaires, and other relevant material are available here: *Tofu experiment*.

The survey was programmed with the SurveyEngine online tool with three sections (Figure 4 below gives an overview, see Appendices A – G for the whole survey). The first part informed respondents about the content of the survey, included a consent form and covered questions about sociodemographic data, shopping, and eating habits. The second section provided background information

on tofu by explaining what tofu is, how it is used, and how it is made (see *Appendix C*). Each respondent was then randomly assigned to one of four experimental conditions (health, environmental, recipe, and control which are described in more detail in *chapter 3.4.2*) using the random number generator built into the survey software. The treatments comprised one page (see *Appendix D*). Before the choice experiment started, the choice situation was described, followed by a concise explanation of the attributes and an indication that all other attributes (taste, nutrients, packaging) were the same between the products. Then, the DCE started with an explanation of the tofu properties and the choice scenario, followed by randomly selected nine choice sets (out of a total of 27) (see *Appendix E*) and finally some follow-up questions to understand heterogeneity among consumers when choosing and adjusting the data for comprehension and different motivations in the choice tasks (see *Appendix F*). The third and final part included several attitude questions and an item asking respondents to provide their estimate of the actual price of 400 g of tofu (see *Appendix G*).

In the choice experiment itself, there were three non-price attributes and one price attribute (see Table 1). The first two attributes referred to the country of origin of the product. Firstly, the country in which the tofu was produced, and secondly, the country in which the soybeans used for production were grown. Both these attributes had the options "Sweden", "another EU country", and "non-EU country". The third attribute was binary and related to whether the tofu was conventionally or organically grown. Ultimately, the attribute price was defined with eight values between 15 SEK and 60 SEK.

Table 1: Attributes and coding of the survey

Attributes	**Description**	**Levels**	**Coding**
Country of origin of the soybean	Country where the soybeans used to produce the tofu are cultivated	Sweden Another EU Country Non-EU Country	Dummy coded
Country of tofu manufacturing	Country where the tofu is produced	Sweden Another EU Country Non-EU Country	Dummy coded
Cultivation of soybean	Type of cultivation used for the soybean	Organic soybean cultivation Conventional soybean cultivation	Dummy coded
Price	Price for 400 g piece of natural tofu	15 SEK 20 SEK 25 SEK 30 SEK 35 SEK 40 SEK 50 SEK 60 SEK	Effect coded (linear)

The description of the context for the choice scenario was intentionally kept short, as most people are familiar with such selection situations and with the properties.

> Consider the following scenario: You are in a store, and you want to buy a 400 g piece of natural tofu. Two alternative variants of 400 g of tofu are available in the store. They are similar in taste, nutrients, and packaging but differ in the following characteristics. The tofu may be produced in different countries, the soybean may be cultivated in different countries, the soybeans may have been grown under organic or conventional conditions, and the price may differ. In the following, you see two variants of a 400 g piece of natural tofu. Please choose which of the variants you would buy. If you would not buy any of the variants, select the third option "I would not buy any of the variants".

3.5.2 Between-Subject Information Treatments

To examine the effects of different priming topics and the role of information on choice behavior and WTP, the survey was divided into four treatment versions that differed only in the content of the page before the DCE. This was motivated by the findings from the literature review to test for sustainability and health effects. Thus, the first treatment's focus was set on the environmental benefits of tofu (environment) and the second included information about health benefits (health). As a control, the third treatment included a recipe for a tofu schnitzel to show the versatility of preparation (recipe) and the fourth treatment was the baseline without any additional information (control). This information aimed to show the positive characteristics of tofu: lower environmental impact compared to animal products, healthier than dairy or meat products, and its versatility in the kitchen. All four treatments included a description of the topic at hand, followed by an easy multiple-choice knowledge question about the content. Once the participants had read the text, the correct answer was straightforward. These treatments aim to test whether it is possible to observe significant differences in WTP for tofu traits when the treated samples are compared to the control samples.

Participants randomly selected for the environment treatment received information on the sustainability of tofu compared to other animal protein sources. In particular, they received information on CO_2 emissions in kg per 100 g of protein according to Poore and Nemecek (2018). The text provided gives information that tofu leads to significantly lower CO_2 emissions per 100 g of protein compared to animal protein sources. To check whether participants had read the information, a question was asked about the product with the lowest emissions with tofu being the correct answer.

The health treatment group received information on the nutrient content of tofu and its effects on human health according to Bouchenak and Lamri-Senhadji (2013), Jayagopal et al. (2002), and Lee et al. (2005). Along with a picture of tofu, it was explained that the product is a very nutritious and healthy food with numerous positive effects. It was also informed that tofu can help prevent diseases

such as diabetes and high blood cholesterol. The control question asked about the truth of the statements, and the statement that tofu contains mainly unsaturated fats was correct.

For the third group with treatment (recipe), information has described the properties of tofu in cooking, how versatile it is and how easily it can absorb the taste of spices. Then a recipe for a tofu schnitzel was described with the control question of how to prepare tofu. The answer that stated it had to be fried was correct. An overview of the experimental design is provided in Figure 4.

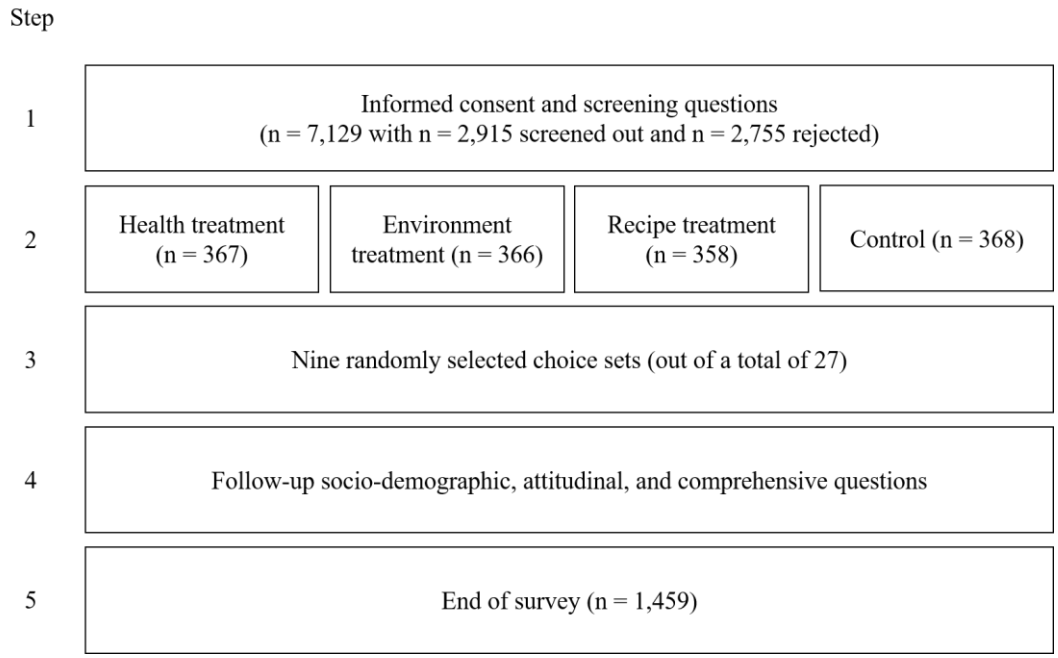

Figure 4: Overview of experimental design (own illustration)

3.6 Conditional Logit Model

To estimate consumers' WTP, a conditional logit model (CLM) was applied. CLMs provide a representation of the choices made by individuals when exposed to a set of alternatives. This is achieved by estimating the probability of observing a given choice as a function of the characteristics of the alternatives available. These characteristics can also interact with individual characteristics, illustrating how choice decisions and characteristics depend on the characteristics of both individuals and the alternatives. The CLM is under the assumption that all consumers from the sample are homogeneous or that heterogeneity is homogeneously affected by the socio-economic characteristics that can be observed and interacted. In other words, respondents would in principle always choose the same alternative. This means that the model is under the assumption that all have the same basic WTP, which is represented here as the average WTP of all

participants. In this study, based on the CLM, I calculate each participant's WTP for tofu and the additional WTP for the attributes listed in Table 1.

The WTP values are estimated by dividing the attribute coefficient and the price coefficient. The calculated value reflects the amount of money participants are willing to pay for attributes that are considered more sustainable, such as the country of origin of the tofu (where the improvement in sustainability is from non-EU – EU – Sweden) or the soy bean cultivation (from conventional to organic).

3.7 Latent Class Analysis

This paper conducts a DCE in combination with an LCA. This analysis method is widely used to estimate WTP for specific groups of consumers. The approach is to divide the whole sample into *n* segments that have different utility preferences (Vermunt & Magidson 2004), which goes back to the more traditional aggregate model analysis. LCA offers insights into the heterogeneity of preferences compared to the traditional one-class model (Skreli et al. 2017).

The analysis method of latent classes is based on the idea that some of the parameters of a postulated statistical model differ in unobserved subgroups (Vermunt & Magidson 2004). Based on these subgroups, categories of a categorical latent variable are formed. Choice data is used to segment the respondents and estimate their utility based on their attributes and levels. This leads to the estimation of the probability of belonging to each of the segments for each participant, based on the choices that have been made in the DCE. Accordingly, participants are not unambiguously assigned to a particular segment. The applications of this method are diverse and include, for example, clustering, scaling, density estimation, and random effects modeling.

In order to make this model more understandable, let us consider the example of studying respondents' shopping behavior. Here, shopping behavior is not presented as a continuous variable, but in the form of different categories or typologies. Since it is difficult to directly measure which respondent falls into which class, shopping behavior is a latent variable. Using the LCA, the respondents can be divided into, for example, three groups: sustainable consumers, price-sensitive consumers, and quality-seeking consumers. The model provides information about the respondents' probabilities of belonging to one of these three groups.

In this paper, LCA was used to assess how respondents make their choices. This was done by capturing observable and unobservable attributes that are accounted for by the heterogeneity of individuals. That is, respondents were divided into different classes based on their choices in answering the DCE questions. The likelihood of making a particular choice in a choice task is based on both the respondents' perceived value of product attributes and their socio-demographic

characteristics (McFadden 1974). The probability P_{ni} that individual *n* chooses profile *i* can be represented by the following equation:

$$P_{ni} = \frac{\exp(\mu X_{ni})}{\sum_{j=1}^{n} \exp(\mu X_{nh})}$$

where μ denotes a scale parameter that is usually normalized to 1.0. X_{ni} stands for explanatory variables. In practice, when deciding on the number of classes, measures of statistical fit are typically combined with a pragmatic interpretation of the classes, i.e. the LCA model should both provide a good statistical fit and add to the interpretation of the results.

3.8 Ethical Considerations

Considering ethical requirements when conducting a research study is of high importance (Bell et al. 2022). Especially when interacting with individuals, as is the case with surveys, confidentiality and informed consent become important. (Kelley et al. 2003). The survey was emailed to respondents and included an informational text stating the purpose of the study, its content, and how the responses were used to achieve the study's aim. Because the survey is anonymous and respondents volunteered to participate in the survey, there are no confidentiality issues. All participants gave their consent, and no deception was used.

4. Results and Analysis

4.1 Descriptive Statistics

The online questionnaire, sent to Swedish consumers in March 2021, resulted in 1,459 responses out of 7,129, after screening out 2,915 undesired responses, such as those from consumers who never shop or do not consider buying a meat alternative, and 2,755 responses that were rejected due to incomplete answers. Of those 1,459 respondents, 367 received the environmental treatment (25.15 %), 366 the health treatment (25.09 %), 358 participants the recipe treatment (24.54 %), and 368 were in the control group (25.22 %). As Table 2 indicates, the distribution of the socio-economic characteristics is very similar across the four treatments as in the entire sample.

Participants were 49 years old on average, with a standard deviation of about 16.7 years. 851 of the respondents were female (58.3 %) and 601 were male (41.2 %) with almost 52 % of the respondents having a university degree. 47 % of the respondents eat meat regularly, 38.2 % are flexitarians who eat meat occasionally, while all the others are either vegetarians, vegans or of another type. To keep the questionnaire short, no other sociodemographic characteristics were asked.

Table 2: Descriptive Statistics overall and by information treatment

	Overall (N = 1459)	**Environment (N = 367)**	**Health (N = 366)**	**Recipe (N = 358)**	**Control (N = 368)**
Age					
Mean ± SD	49.4 ± 16.7	50.7 ± 16.6	49.5 ± 17.0	48.7 ± 16.3	48.9 ±17.0
Median	50.0	52.0	50.5	49.0	49.0
[Min, Max]	[18.0, 90.0]	[18.0, 85.0]	[18.0, 83.0]	[18.0, 84.0]	[18.0, 90.0]
Missing	15 (1.0%)	6 (1.6%)	4 (1.1%)	3 (0.8%)	2 (0.5%)
Gender					
Male	601 (41.2%)	156 (42.5%)	146 (39.9%)	150 (41.9%)	149 (40.5%)
Female	851 (58.3%)	211 (57.5%)	215 (58.7%)	206 (57.5%)	219 (59.5%)
Missing	7 (0.5%)	0 (0%)	5 (1.4%)	2 (0.6%)	0 (0%)
Diet					
Regular meat eater	686 (47.0%)	178 (48.5%)	160 (43.7%)	175 (48.9%)	173 (47.0%)
Flexitarian	558 (38.2%)	129 (35.1%)	152 (41.5%)	135 (37.7%)	142 (38.6%)
Vegetarian	142 (9.7%)	39 (10.6%)	35 (9.6%)	33 (9.2%)	35 (9.5%)
Vegan	37 (2.5%)	8 (2.2%)	11 (3.0%)	8 (2.2%)	10 (2.7%)
Other	28 (1.9%)	9 (2.5%)	7 (1.9%)	6 (1.7%)	6 (1.6%)
Prefer not to say	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Missing	8 (0.5%)	4 (1.1%)	1 (0.3%)	1 (0.3%)	2 (0.5%)
Education					
Lower than primary school	7 (0.5%)	1 (0.3%)	3 (0.8%)	3 (0.8%)	0 (0%)
Primary school	101 (6.9%)	23 (6.3%)	28 (7.7%)	25 (7.0%)	25 (6.8%)
High School	581 (39.8%)	142 (38.7%)	146 (39.9%)	139 (38.8%)	154 (41.8%)
University	756 (51.8%)	196 (53.4%)	187 (51.1%)	189 (52.8%)	184 (50.0%)
Prefer not to say	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Missing	14 (1.0%)	5 (1.4%)	2 (0.5%)	2 (0.6%)	5 (1.4%)

4.2 Results Conditional Logit Model

Table 3 displays estimated WTP values in SEK[2] and their 95% confidence intervals with respective upper and lower bounds. It is important to note that larger confidence intervals represent a more uncertain estimate. All values are statistically significant estimates (*** implies statistical significance at the 1% level) that show that consumers value certain characteristics of tofu that are associated with sustainability. For tofu made with non-organic soybeans grown outside the EU and produced in a non-EU country (reference tofu), the average consumer is willing to pay SEK 17.43. Participants place a high value on local production and cultivation and are willing to pay a premium of SEK 48.52 for tofu made with Swedish soybeans and from Swedish production. For the "best available" tofu that also is produced organically, participants are willing to pay a price of SEK 95.2, which is around 546 % higher than the price for the reference tofu.

Table 3: Average WTP (in SEK) for all samples

	All samples	**95 % confidence interval**
Reference tofu[3]	17.43 ***	[13.00; 21.86]
Manufactured in the EU (manufEU)	8.68 ***	[6.68; 10.67]
Manufactured in Sweden (manufSE)	26.50 ***	[23.21; 29.79]
Soybean cultivated in the EU (cultEU)	8.96 ***	[6.94; 10.98]
Soybean cultivated in Sweden (cultSE)	22.02 ***	[19.03; 25.01]
Organic cultivation (Eco)	29.25 ***	[25.75; 32.76]

When analyzing the results by the treatment samples with health, environmental, and recipe information, the WTP looks slightly different. The first seven rows of Table 4 represent the WTP for the control group of the sample that did not receive any treatment. All of the values are significant, again indicated by the ***. The WTP of the treatment groups is given for tofu with the respective attributes, where manufEU*Environment, for example, is the average WTP for tofu produced in the EU and for participants assigned to the environment treatment. As most results are not significant, this implies that the different treatments do not have effects on the WTP towards tofu and its different attributes. Results that are statistically significant do not seem to show a reasonable or relevant association, as they imply, for example, for the participants with the health treatment, that their WTP is higher for tofu produced in Sweden. In part, this may be explained by the smaller sample sizes for each of the treatments, which makes the estimates more uncertain. Hence, one should interpret the results with more care. Summing up, one can see that the

[2] The WTP will be given in SEK throughout the paper.

[3] Reference tofu describes a non-organic product which is manufactured outside of the EU with soybeans grown outside of the EU.

attributes have a strong effect on WTP, whereas the (newly) provided information has not.

Table 4: WTP for information treatment groups

	WTP	**95 % confidence interval**
Reference tofu	18.25 ***	[13.21; 23.30]
Manufactured in the EU	6.07 ***	[3.90; 8.23]
Manufactured in Sweden	22.66 ***	[19.17; 26.16]
Soybean cultivated in the EU	9.25 ***	[5.80; 12.70]
Soybean cultivated in Sweden	20.72 ***	[17.31; 24.12]
Organic cultivation	27.03 ***	[22.89; 31.18]
Reference*Environment	-9.16	[-22.21; 3.88]
cost*Environment	0.14	[-0.14; 0.43]
manufEU*Environment	2.73	[-0.23; 5.69]
manufSE*Environment	4.62	[-1.42; 10.66]
cultEU*Environment	0.57	[-0.70; 1.85]
cultSE*Environment	1.17	[-4.66; 7.00]
Eco*Environment	2.40	[-1.96; 6.76]
Reference*Health	-0.48	[-2.78; 1.83]
cost*Health	0.03	[-0.03; 0.10]
manufEU*Health	3.3	[-0.03; 6.64]
manufSE*Health	3.88 **	[1.52; 6.24]
cultEU*Health	-1.64	[-4.11; 0.83]
cultSE*Health	1.50	[-0.96; 3.97]
Eco*Health	0.20	[-1.09; 1.49]
Reference*Recipe	1.59	[-0.60; 3.79]
cost *Recipe	0.09	[-0.07; 0.26]
manufEU*Recipe	1.98 *	[0.45; 3.52]
manufSE*Recipe	-0.38	[-1.69; 0.94]
cultEU*Recipe	-2.53	[-9.14; 4.07]
cultSE*Recipe	-3.46	[-7.02; 0.10]
Eco*Recipe	-1.66	[-4.85; 1.53]

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

4.3 Heterogeneity in Preferences

4.3.1 Heterogeneity with Interaction Terms in the Conditional Logit model

Table 5 shows the WTP of the participants, with their socio-economic characteristics analyzed within the model. In addition to the WTP for the tofu attributes, these attributes interact with the characteristics of gender, age, diet, and education level of the participants (* stands for the interaction between tofu attributes and participants' characteristics). The WTP reference value compared to the other values is the amount the benchmark – a flexitarian, vegetarian or vegan, non-female, non-graduate person who is 49.4 years old – would pay for the specified tofu properties.

Since the baseline is given for non-female participants, the WTP shows us how much more a female person is willing to pay compared to a person that did not indicate female as their gender when we consider the interaction of a tofu attribute with the characteristic *female*. If we look at the *age* characteristic, it indicates how much the WTP increases with an age increase of ten years, i.e. if the WTP for the interaction of the reference tofu and age is -0.74, a person that is 59.4 years old – ten years older than the benchmark person – is willing to pay SEK 0.74 less (however, this value is not significant here). Since the baseline person is flexitarian, vegetarian, or vegan, we can see how much more a regular meat-eater is willing to pay when we look at the interaction with *meat*. To understand this further, consider the WTP value for manufEU*Meat, SEK 0.85 (again not significant). The value shows that a person who eats meat regularly would be willing to pay SEK 0.85 more for tofu that has been manufactured in the EU compared to a person who follows a vegan, vegetarian, or flexitarian diet. Looking at education, we can see how much more someone with a *university* degree is willing to pay compared to participants without. For example, the WTP value for cultSE*University (SEK -1.10 but not statistically significant) would indicate that the WTP of a person with a university degree for tofu with soy cultivated in Sweden is SEK 1.10 lower than that of a person without a university degree.

Table 5: Socio-economic interactions model: WTP for all samples

	All samples	**95 % confidence interval**
Reference tofu	26.94 ***	[17.09; 36.79]
Manufactured in the EU	5.74 ***	[1.16; 10.31]
Manufactured in Sweden	21.81 ***	[16.12; 27.49]
Soybean cultivated in the EU	2.80	[-0.99; 6.59]
Soybean cultivated in Sweden	16.81 ***	[12.97; 20.64]
Organic cultivation	29.40 ***	[23.62; 35.17]
Reference*Female	-6.01	[-13.93; 1.91]
Reference*Age	-0.74	[-2.10; 0.63]
Reference*Meat	-11.84 ***	[-19.50; -4.18]
Reference*University	4.89	[-2.53; 12.31]
manufEU*Female	4.78 ***	[1.09; 8.47]
manufEU*Age	-0.01	[-0.14; 0.11]
manufEU*Meat	0.85	[-5.52; 7.21]
manufEU*University	1.15	[-47.05; 49.35]
manufSE*Female	8.59 ***	[4.29; 12.89]
manufSE*Age	-0.51	[-1.24; 0.23]
manufSE*Meat	-0.37	[-4.66; 3.92]
manufSE*University	1.15	[-47.09; 49.40]
cultEU*Female	5.82 ***	[2.09; 9.54]
cultEU*Age	0.65 ***	[0.04; 1.26]
cultEU*Meat	1.76	[-1.50; 5.03]
cultEU*University	1.86	[-1.63; 5.35]
cultSE*Female	7.01 ***	[2.98; 11.03]
cultSE*Age	-0.01	[-0.60; 0.57]
cultSE*Meat	0.85	[-4.48; 6.17]
cultSE*University	-1.10	[-4.68; 2.47]
Eco*Female	2.37	[-1.63; 6.37]
Eco*Age	0.05	[-0.68; 0.77]
Eco*Meat	-10.01 ***	[-14.11; -5.91]
Eco*University	5.15 ***	[1.21; 9.09]

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

As can be seen in the table, this model estimates a different WTP for the benchmark person (not female, no university degree, meatless diet) compared to the average participant. The benchmark person is willing to pay SEK 26.94 for tofu with basic characteristics, SEK 9.51 more than the average participant. Again, the WTP for sustainability-related attributes is higher. Apart from the attribute of being grown in the EU, all values are statistically significant (i.e., larger than zero) for the average person with basic attributes.

Looking at the interaction values of meat-eaters and tofu compared to participants who do not consume meat, people with a meat-inclusive diet are willing to pay SEK 11.84 less for the reference tofu with conventional cultivation and soybeans from non-EU countries. Meat eaters also do not value organic farming as much as non-meat eaters, as they are only willing to pay SEK 19.39 for organic tofu, while flexitarians, vegetarians, and vegans would pay SEK 29.40. In contrast to people with a habit of eating meat, a university degree has a positive impact of SEK 5.15 on the WTP for organic tofu.

Overall, the results suggest that people who identify as female are willing to pay more for tofu with local sustainability attributes. In line with the increasing improvement in environmental sustainability for example due to shorter supply chains or other benefits of local production that consumers may value, products produced in Sweden and soybeans from Sweden achieve a higher WTP than products from the EU. For both attributes, the WTP is higher than for products where both the soybeans and the production originate from a country outside the EU. This can shed light on gender differences in awareness of sustainability issues. In addition to gender, age also seems to have an influence on the WTP for tofu made from soy grown in the EU, with a ten-year increase in age leading to a higher WTP of SEK 0.65.

4.3.2 Heterogeneity with Latent Class Analysis

Contrary to the simple conditional logit model, the analysis of latent classes resolves the assumption that all participants have the same preferences and assumes that groups have different WTP and thus are heterogeneous. After estimating the Latent Class Models with 1, 2, 3, 4, 5, and 6 classes, the 5-class model has shown to be the best fit as the Bayesian Information Criterion (BIC) has the lowest value for this model (see *Appendix H*). This technical approach to choosing the number of classes represents a compromise between the parsimony of the model and its explanatory power. In other words, BIC is a tool to trade-off a simple model and a model with good fit. Additionally, when looking at the results, this model offered an intuitive interpretation of the estimated class probabilities. The actual class membership is unknown for each individual and is only determined based on the response patterns to the indicator variables.

In the 5-class choice model, Class 1 represented 11.9 % of the respondents; Class 2, 20.2 %; Class 3, 23.7 %; Class 4, 9.4 % and Class 5 34.8 % of the respondents on average (Table 6). The table gives an overview of the estimated parameters and their statistical significance. These characteristics guide the classification of participants, but it is important to clarify that this model does not represent an unambiguous classification of participants, but merely estimates the likelihood of each of them belonging to one of these classes. In what follows, I interpret the classes.

—*Price-conscious consumers* (Class 1): for respondents in the sample, the probability to belong to this class is 11.9 % on average. These consumers have a quite high basic WTP of SEK 52.12 for the reference tofu. However, they ignore the tofu attributes and only pay attention to the price when comparing different choices of tofu. In other words, this group is generally interested in tofu, but very insensitive to the specific investigated quality attributes.
—*Sustainability-conscious consumers* (Class 2): class 2 consumers who on average make up 20.2 % of the sample attach great importance to regionality and organic production and are not willing to buy tofu if it does not meet these characteristics. Their WTP for the reference tofu is very low but increases for tofu and soybeans that originate in Sweden and are organic. They would not buy reference tofu but would pay SEK 53.32 for organic tofu with all Swedish characteristics (WTP for a product is calculated by the sum of the WTP for each characteristic).
—*Eco-conscious consumers* (Class 3): the attributes of local and organic cultivation are also very important for class 3 consumers (23.7 % on average), but they are more open to purchasing the reference tofu as well. Especially organically produced tofu has a high value for these consumers as they are willing to pay a price premium of SEK 56.57 only for this attribute. For the "perfect" tofu which has been cultivated and manufactured in Sweden and is organic, this group would pay SEK 128.77.
—*Random clickers* (Class 4): the smallest class (9.4 % on average) appears to be that of participants who simply click through the survey without indicating their actual preferences. This is an artifact of the method since it is conducted in a hypothetical context. No significant results can be estimated, and the results displayed capture such behavior.
—*Price-insensitive consumers* (Class 5): on average, about one third of the surveyed consumers falls into class 5. These consumers do not pay attention to the price of the tofu, but only to its attributes (in sharp contrast to class 1). The WTP is very high; they are willing to pay SEK 120.79 for the reference tofu. However, it can be seen that these participants pay attention to the attributes the tofu has. One assumption could be that these consumers have a lot of money and therefore do not care about the price, or they ignore it because they do not have to pay anything in the context of the survey (see discussion "hypothetical bias" below).

The delta values in the lowest five rows indicate the probability of the participants' socioeconomic characteristics belonging to the classes. Since most of the values are not statistically significant and small, we can assume that there are no strong observed drivers of class membership for most of the variables. However, there is a significant negative probability that respondents who regularly eat meat belong to the *eco-conscious* class 3. This is consistent with the literature, which suggests that meat-eaters are not as environmentally conscious as vegetarians or

vegans. The likelihood that female participants are among the *price-conscious* consumers appears to be slightly negative as well.

Table 6: WTP values of latent class analysis with 5 classes and socio-economic delta (BIC = 16501.63)

	Class 1 (11.9 %)	**Class 2 (20.2%)**	**Class 3 (23.7%)**	**Class 4 (9.4%)**	**Class 5 (34.8%)**
Reference tofu	52.12 (1.30) ***	2.06 (14.74)	35.15 (6.08) ***	1354.66 (12101.54)	120.79 (19.18) ***
Manufactured in the EU	0.28 (1.09)	5.97 (6.01)	3.88 (5.36)	-344.16 (2590.91)	28.16 (4.10) ***
Manufactured in Sweden	1.13 (0.85)	19.67 (9.51) *	20.96 (5.63) ***	-588.71 (5053.42)	69.38 (6.77) ***
Cultivated in the EU	0.83 (0.83)	5.47 (3.84)	5.69 (2.86) *	-44.20 (331.32)	22.99 (3.55) ***
Cultivated in Sweden	0.52 (1.62)	16.44 (5.78) **	16.09 (5.87) **	-127.77 (910.78)	64.28 (6.64) ***
Organic cultivation	0.80 (0.60)	15.15 (4.91) **	56.57 (7.60) ***	-164.08 (1831.38)	24.33 (4.18) ***
delta	0.00	0.54 (0.26) *	0.65 (0.21) **	-0.40 (0.18) *	1.09 (0.19) ***
delta_Female	-0.14 (0.08) *	0.18 (1.92)	0.01 (0.14)	-0.14 (0.55)	0.09 (0.49)
delta_Age	-0.14 (0.09)	-0.06 (0.07)	0.07 (0.28)	0.19 (0.30)	-0.07 (0.12)
delta_Meat	0.00 (0.06)	-0.00 (0.00)	-0.66 (0.19) ***	0.71 (0.48)	-0.05 (0.22)
delta_University	-0.02 (0.15)	-0.08 (0.08)	0.29 (0.35)	-0.32 (1.61)	0.12 (0.63)

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

4.4 Analysis of Follow-up Questions

As the results of the conditional logit model show, the different treatment groups do not seem to have a large impact on consumers' WTP and thus on their preferences for tofu. However, there are some differences between the groups when looking at the follow-up questions of the survey (see Appendix I). When participants were asked about their knowledge of tofu before and after the survey, all treatment groups reported a slightly higher percentage than the control group of strongly agreeing to be better informed than before the survey (9.5 %, 11.5 % *, 8.9 %, 6.5 % for environment, health, recipe, control respectively), but overall, these differences cannot be considered substantial. In other words, the information provided in the treatments did not generate substantial new knowledge according to respondents' self-assessment.

A stronger differentiation can be seen in the agreement with the statement "Tofu is an environmentally friendly alternative to meat": 33.5% *** of the respondents from the environmental group strongly agree with this statement, 26% *** of the respondents from the health group, 20.9% of the respondents from the recipe group strongly agree and only 16.6% of the respondents from the control group (where treatment with the recipe is not statistically significantly different from the control group). Similar results are highlighted in the statements about the health benefits of tofu compared to meat: 28.4% *** of participants in the health group strongly agreed, 26.2% ** in the environmental group, 21.5% in the recipe group, whereas only 18.2% in the control group would fully agree. If we ask about the same parameters for organic food compared to conventional food, the results go in a similar direction but do not differ that much.

5. Discussion

5.1 Theoretical Contributions

This paper provides insights into consumer preferences regarding the sustainability attributes of tofu. To this end, a review of the literature on consumer preferences toward foods with sustainability criteria and healthy foods was first presented, and then the literature on consumer attitudes toward PBMA was highlighted. Based on Lancaster's new consumer theory (1966), the results of a DCE were analyzed to gain insight into Swedish consumers' preferences toward tofu based on their WTP. This involved examining how different information affects consumers' WTP and estimating consumers' membership in segments/classes.

The results indicate that consumers generally are willing to pay a price premium for sustainability attributes such as local production or organic cultivation. This goes in line with the findings from the meta-analysis about consumers' WTP for sustainable food products conducted by Li and Kallas (2021). Compiling results from various studies in this area, the authors found a positive additional WTP of 27.5% on average. Compared to their results, this study shows a much higher price premium: participants were willing to pay an average of 182.06 increase in percentage (calculation see *Appendix J*) more if the tofu had exactly one of the three characteristics of production in Sweden, Swedish-grown soybeans, or organic farming, and an average price premium of 129.48 percentage points (*Appendix J*) if production and cultivation in EU countries were included. This could be due to the openness and higher awareness of Swedish citizens as political consumers noted by Broberg (2007) or Schollenberg (2010).

When considering the different treatments that provide information on the benefits of tofu, the results regarding the WTP for sustainability attributes lead to the same findings as Castellari et al. (2019), namely that different information does not affect consumers' WTP. However, this is not consistent with the literature on consumer preferences for healthy and sustainable foods. The literature suggests that a major barrier to switching to a plant-based diet is the lack of knowledge about the negative impacts of livestock on the environment, but also on human health (cf. Dolgopolova & Teuber 2018) and for those who make the shift away from a meat-based diet, health and environmental reasons are the main reasons (Siró et al. 2008; Schollenberg 2010; Chang et al. 2012; de-Magistris & Gracia 2016; Dolgopolova & Teuber 2018; Li & Kallas 2021). Corrin and Papadopoulos (2017), on the other hand, discuss the perceived health barrier of vegetarian and vegan diets as they are associated with imbalanced nutrient intake. Informing participants about these issues through different treatment groups, the results show no significant difference

in WTPs which could be due to the fact that the information consumers need must be more detailed and salient than what a researcher can provide in a survey.

Despite not finding significant changes in WTP, respondents from the treatment groups (especially health and environment) indicated that their knowledge about tofu has somewhat increased and that they believe tofu is more environmentally friendly and healthier compared to meat. However, this may also be related to an overestimation of their behavior. The fact that no significant results were found for the information treatments in this study may be because the opposing effects reported in the literature cancel each other out. Another possible explanation could be that consumers have preferences related to their strongly held individual beliefs and therefore do not change their beliefs due to merely brief information about health benefits, preparation variety, or environmental factors. Those consumers who are aware of the negative environmental and health impacts of a meat-based diet may have already known the information given, and those who are not aware may not be interested or may not care. In addition, many consumers would possibly need more detailed information to make a real-world decision.

When analyzing the results for consumer preferences and their WTP, it is important to keep in mind that participants are heterogeneous individuals, each with a different WTP. One way to account for the heterogeneity of consumers is to look at their socioeconomic characteristics. The results of the conditional logit model in this study show that respondents who do not eat meat regularly are willing to pay more for tofu. Since tofu is identified as a PBMA, these consumers would choose tofu instead of meat, even though meat is often cheaper due to subsidies. In addition, the model provides significant results for people who identify as female having higher WTP toward the sustainability attributes of tofu. As noted in numerous papers (cf. Li & Kallas 2021), females have a higher awareness of sustainability issues and are therefore willing to pay more for products that have less negative impacts; this paper finds the same results. Similar results are found for participants who have a university degree, they are willing to pay higher prices for the tofu attributes. This goes in line with most studies, as higher education levels are found to lead to higher WTP for plant-based products (cf. Vanhonacker et al. 2013). An explanation could be that a university degree often leads to more disposable income. In contrast to the results of previous studies (cf. Carlsson et al. 2022), this study found a positive WTP for EU-produced tofu with an increase in consumer age. The assumption for a higher WTP for younger generations is that their awareness and concerns about sustainability issues are higher and therefore they are willing to invest more in sustainable products (ibid.). Thus, the positive WTP found in this study could be explained by higher income rather than higher sustainability awareness.

The LCA offers an additional interpretation that accounts for heterogeneity between respondents. Latent classes that have been identified within this study are *price-conscious*, *sustainability-conscious*, *eco-conscious*, and *price-insensitive* consumers, and *random clickers*. For example, Skreli et al. (2017) established very similar clusters in their 4-class LCA, "*Bio-ready consumers*", "*price sensitive consumers*", "*variety seeking consumers*", and "*quality seeking consumers*". In this study, however, only a 5-class model was described; other models with, for example, 3, 4, or 6 classes were not analyzed. As a result, heterogeneity is not fully exploited and future work could shift its focus to comparing different numbers of classes.

5.2 Implications

The results of this study provide some important implications for the food industry, marketers, and policymakers. The economic analysis shows that consumers value characteristics of tofu, such as organic or regionally produced, more highly than conventional characteristics and associate them with higher benefits. Therefore, they are willing to pay a significantly higher price for such products.

These findings should motivate a rethinking in the food industry towards a stronger focus on these variables. Furthermore, the present results can be used for the formulation of marketing strategies that focus on the sustainability and health benefits of products. As human health and sustainability issues are major policy concerns, governments can use the results to implement and design the right policies. The promotion of sustainable food consumption should be taken into account and, based on this, education and information campaigns can be created that promote sustainable dietary patterns. In addition, food labeling legislation should be better defined in terms of health and environmental factors.

Although there was no significant positive WTP found for respondents with information treatment on the health or environmental benefits of tofu, the literature review (cf. Tobler et al. 2011; Latvala et al. 2012; de Boer et al. 2013; Pohjolainen et al. 2016) leads to some implications for public health agencies as well as the soy food industry. It is a challenge to disseminate the health benefits of soy protein to the general population, but this may lead to the positive outcome that consumers will rank the value of soy foods as higher once they are informed about their health benefits.

The LCA results in a class that includes more flexitarians, vegetarians, and vegans as compared to the other classes (*sustainability-conscious*). These consumers would highly appreciate tofu containing soy grown in Sweden, which should be a motivation for agriculture to grow soy plants in Sweden and for Swedish tofu producers to manufacture with Swedish soy. To date, there is no tofu on the market that is made in Sweden from Swedish soybeans. This class accounts

for 23.7% of the sample in this survey. As Shor and Oliver (2006) point out that a positive WTP provides information about the justification for producing a particular product, and this group is large enough to create a niche market.

5.3 Limitations and Future Research

The present paper is connected to some limitations. As a choice experiment is conducted in a hypothetical setting, it is not clear how respondents would make decisions in a real-life situation when purchasing tofu. As mentioned before, compared to non-hypothetical approaches, a model with discrete choices where participants answer hypothetical choice sets may cause participants to overstate their WTP (Carlsson et al. 2005; Alfnes et al. 2006; Hensher 2010). However, in comparison to other hypothetical surveys, the DCE has been shown to produce very similar results to actual WTP as it gets close to a purchase situation in the supermarket (cf. Lusk & Schroeder 2004). Despite its advantages in methodology, choice experiments still can result in overestimated WTP compared to the true WTP (Dolgopolova & Teuber 2018). Contrary to the findings of Dolgopolova & Teuber (2018), Aoki and Akai (2022) found no evidence of hypothetical bias among all treatment combinations when they tested non-hypothetical and hypothetical settings. Their results suggest that the likelihood of hypothetical bias is lower for foods with environmental attributes compared to other goods. This would imply that the results of this study can be interpreted as if the WTP was not overstated. To gain further insight, in addition to a DCE, experimental auctions, scanner data, or real purchase data could be conducted to test the hypothetical bias associated with tofu (see for instance Canavari et al. 2019 on experimental auctions).

As Hartmann and Siegrist (2017) discuss in their paper, research on meat substitutes often ignores the sensory aspect. Furthermore, Hoek et al. (2013) point out the need to provide participants with a meal context and to repeatedly expose them to unfamiliar products. This suggests that being unfamiliar with PBMA may lead to aversion, also known as food neophobia, which was not considered in this study. Offering respondents a meal with tofu or having them prepare the product at home over a longer period could provide more insights into how unfamiliarity affects WTP.

Although this study provides a good understanding of the WTP for tofu among Swedish consumers who would consider purchasing meat alternatives when doing groceries, the results should be viewed with caution when interpreting the WTP for PBMA in general. This work only examines one product that falls under the PBMA definition, namely tofu. Tofu differs from other meat substitutes in that it does not attempt to imitate the taste and texture of meat and is more established due to its long tradition in Asian cuisine. However, such products may have greater potential to appeal to meat-eaters as they do not feel they are giving up anything. Conducting

a similar study with more than one product could provide deeper insights into the WTP for plant-based meat products.

Papparlado and Lusk (2016) discuss in their work that subjective beliefs can have certain effects on consumer decision-making. This research ignores the effects that these beliefs have on WTP. Furthermore, tofu is still associated with negative perceptions and prejudices related to its taste, but also to the fact that it is a product made from soy. A common argument against eating tofu is that the rainforest is cut down to grow soy. The fact that this soy is largely used as cattle feed is often ignored. These aspects are not considered in this study.

In the context of the subjective perspective, personal behavior is an important aspect influencing consumers' decisions. To gain more insights into this topic, a deeper analysis of socio-demographic characteristics could be helpful. Furthermore, a longitudinal study could shed light on how different circumstances and changes in socio-demographics affect sustainable food choices and consumption behavior.

This study examines the impact of information on environmental and health benefits, cooking versatility, and product characteristics of organically and/or regionally produced products. However, other information treatments or effects of other methods are not used but could offer important insights into consumer decision-making and their preferences. The impact of labeling strategies, additional information on animal welfare, the influence of close friends and relatives, or information from reliable scientific sources could be focal points of future studies.

Despite the aforementioned limitations of this study, this paper provides further insights into the research that aims at the determinants that affect PBMA consumption behavior. This is achieved through a new methodological approach that has not been applied in previous studies of PBMA consumption. The use of a panel of around 1,500 Swedish consumers makes the results applicable to the Swedish subpopulation of people who would consider buying PBMA when shopping.

6. Conclusion

Decisions regarding dietary choices are now one of the most important global influences on public health and environmental sustainability and therefore have a major impact on the achievement of the UN Sustainable Development Goals and the Paris Climate Agreement. Finding solutions to the closely interlinked problems of food supply, climate crisis, and public health, and promoting sustainable consumption to develop a greener society have become problems that strongly influence the world politically, economically, and sociologically. To achieve the goal of more sustainable and healthier food systems, consumers are increasingly turning to alternative diets and choosing more environmentally friendly protein sources. An important aspect of moving towards a more sustainable diet is the development of more climate-friendly substitutes for animal protein sources that are accepted and adopted by consumers. However, this is a difficult obstacle, which is why it requires studies by researchers who assess and define consumer preferences. Consumers themselves are increasingly stating that they want to consume more alternative protein products out of concern for health and the environment. However, studies show that only a small proportion of consumers include health and environmental factors in their purchasing decisions.

This study was motivated by the need to understand how consumers are driven toward climate-friendly products in their purchasing decisions and to identify WTP estimates for various product attributes such as environmental and health characteristics, using the product tofu as a plant-based and sustainable example. In detail, the subject was to find out consumers' WTP for sustainability-related attributes for tofu and how information may affect decision-making in the context of WTP. To reach this purpose, a choice experiment with around 1,500 Swedish consumers was conducted to illustrate consumer preferences for different attributes such as organically or locally produced. Participants were exposed to various environmental, taste, and health treatments to test the effects of information.

The results of this paper reveal that Swedish consumers who are open to purchasing meat substitutes are willing to pay significantly higher prices for tofu that is manufactured in Sweden, from Swedish soybeans, or cultivated organically. Manufacturing and soybean agriculture within the EU is also preferred but consumers are not willing to pay as much as for Swedish characteristics. Organic production is considered more important than regionality. Thus, the work contributes to consumer research on protein-rich foods from legumes such as tofu and, in particular, on the potential of (organic) soy production in Sweden. Results differ for participants who regularly eat meat in that their WTP is lower while female consumers show to value the sustainability-related characteristics of tofu higher. Consumers with a university degree have a higher WTP for environmentally

friendly properties of tofu, while age also has a positive influence on WTP for EU-manufactured tofu. Participants further can be split into five classes with distinct preferences which offer implications for policymakers and marketing strategists.

There is no evidence that information regarding the health and environmental benefits of tofu and its cooking versatility have effects on consumers' preferences and their WTP. However, the analysis of the follow-up questions suggests a potential small increase in knowledge about tofu's positive characteristics for the treatment groups regarding health and environment. This highlights the knowledge gaps among consumers discussed in the literature who do not appear to be fully aware of the health and environmental benefits of increased consumption of legumes or legume-based products, such as tofu.

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Popular science summary

Today's world is disrupted by crises such as the Russian war in Ukraine, the Covid-19 pandemic, or the climate crisis. Particularly in light of recent crises that are initially perceived as more dramatic, the major challenge of keeping climate change below 1.5° C sometimes seems to slip under the radar. However, it is crucial to work together on climate action so that humanity can survive on this planet.

One aspect in our society that is highly connected to the creation of Greenhouse Gases, is the products we consume. Especially our diet can have significant impacts on the climate. In this context, the extensive consumption of meat products is increasingly criticized as it is associated with environmental, ethical, and social dilemmas. This is closely related to production systems and factory farming, which lead to high emissions and strain on planetary boundaries. Based on plant-based ingredients, meat substitutes are a healthy source of protein that offer a number of social, environmental and health benefits compared to meat and therefore play an important role in reducing the consumption of meat products.

However, the market shares of plant-based meat substitutes are quite low in many countries and need to increase to reinforce sustainable consumption and production. As a consequence, research needs to investigate where consumers stand in this regard and what their preferences are as the knowledge about these aspects is critical to develop a market that benefits food industry and government policies. The subject of the study is tofu, an important plant-based protein source with a long tradition in Asian cuisine.

In this thesis, a discrete choice experiment with the product attributes origin, production type and price is applied to get insights into how consumers make choices. Five distinct consumer classes have been identified: price-insensitive consumers, eco-conscious consumers, price-conscious consumers, sustainability-conscious consumers, and random clickers. The origin of the tofu and the soy beans used for production as well as organic cultivation have big influence on consumers' preferences. Female consumers and those who do not consume meat regularly are found to have a generally higher willingness to pay for tofu, local production and organic cultivation.

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Appendix

Appendix A

Introduction and informed consent

Thank you for participating in this survey

The survey is part of a research project on food consumption behaviour of the Swedish population and carried out by the Swedish University of Agricultural Sciences. The results of the survey will be scientifically analysed and all findings will be compiled in a publicly available report. However, all data that we collect is anonymized and aggregated and treated confidentially. It is not possible to derive any information on individuals.
Please answer all questions honestly. There are no wrong or correct answers, we are interested in your personal opinion.

Data and confidentiality
We will use the data for scientific purposes in anonymous form. We will not be able to identify you or any other participant.

Duration
It should take approximately 10 minutes to complete the survey.

Risks
There are no known risks from participation.

Contact information
Contact Jens Rommel (jens.rommel@slu.se) if you have any questions.

Consent to participate
I herewith confirm that I have read and understood the above information. I am at least 18 years old and give my consent to participate in this research.

Select only one answer

- ○ I have read and understood the information presented. I am at least 18 years old, and I agree to participate in the study.
- ○ I do not agree, or I do not want to participate.

Appendix B

Filter questions

What is your gender?

Select only one answer

- Diverse
- Female
- Male
- Prefer not to say

What is your age (in years)?

Select only one answer

- years old
- Prefer not to say

How often do you shop food for yourself or for your household?

Select only one answer

- Never
- Once a month or less frequently
- Two to three times a month
- Once a week or more frequently

Which of the following food products would you generally consider buying in a grocery store or market for your own consumption?

Select all that apply

- Bread/Bakery – sandwich loaves, dinner rolls, tortillas, bagels
- Meat – lunch meat, poultry, beef, pork
- Meat alternatives – tofu, soya chunks, tempeh, seitan/wheat protein
- Canned/Jarred Goods – vegetables, spaghetti sauce, ketchup
- Dry/Baking Goods – cereals, flour, sugar, pasta, mixes
- Dairy – cheeses, eggs, milk, yogurt, butter

Appendix C

Introduction to tofu

What is tofu?

Tofu is a common food in many countries in Asia and has become popular in the European food market as a substitute to meat. It is rich in proteins and contains vitamins and minerals. Tofu is produced from condensed soy milk and -- in its most common form -- pressed into white quarters. The process of making tofu is similar to cheesemaking. The pictures below show some typical kinds of tofu.

Appendix D

Environment Treatment

In the following you will be asked to choose between different options of tofu. Did you know that tofu has different environmental impacts than meat?

- Beef production leads to emissions of 49.89 kg CO_2 equivalent per 100 g of protein on average.
- Pork production leads to emissions of 7.61 kg CO_2 equivalent per 100 g of protein on average.
- Poultry production leads to emissions of 5.7 kg CO_2 equivalent per 100 g of protein on average.
- Tofu production leads to emissions of 1.98 kg CO_2 equivalent per 100 g of protein on average.

According to the text, which of the following statements is true?

- Beef has the lowest emissions per 100g of protein.
- Pork has the lowest emissions per 100g of protein.
- Tofu has the lowest emissions per 100g of protein.
- Poultry has the lowest emissions per 100g of protein.
- Don't know.

Health Treatment

Per 100 g, a typical piece of tofu may contain a total of:

- 14.2 g of protein
- 5.9 g fat
- 2.1 g carbohydrate
- 118 kilocalories

The fat is mainly unsaturated, and tofu contains several important micronutrients that can help to decrease cholesterol. It also contains antioxidants and may have a possible positive effect on diabetes.

According to the text, which of the following statements is true?

- Tofu contains animal fat.
- Tofu is rich in saturated fat.
- Tofu contains a lot of Vitamin C.
- Tofu contains mostly unsaturated fats.
- Don't know.

Recipe Treatment

Did you know that tofu can easily pick up tastes from spices and is very versatile? For instance, it can be used to prepare tofu schnitzels using the following ingredients:

- 1⁄3 cup sweet chili sauce
- 1⁄2 cup dry breadcrumbs
- 2 tablespoons sesame seeds
- 1 teaspoon ground cumin and ground coriander and 1⁄2 teaspoon paprika
- 2 x 300g packets firm tofu, drained

Combine breadcrumbs, seeds and spices on a second plate. Cut each tofu block into four thick slices: pat dry on paper towels. Coat in chili sauce, then cover in crumb mixture. Heat one tablespoon oil in a large non-stick frying pan over moderate heat. Cook tofu, in batches, for 1-2 minutes each side until golden, adding more oil if needed. Drain on paper towels.

The control question, which is found below the information provided, was:

According to the text, which of the following statements is true?

- The tofu should be boiled.
- The tofu should be baked.
- The tofu should be fried.
- The tofu should be grilled.
- Don't know.

Appendix E

Choice sets

Consider the following scenario: You are in a store, and you want to buy a 400 g piece of natural tofu.

Two alternative variants of 400 g of tofu are available in the store. They are similar in taste, nutrients, packaging but differ in the following characteristics. The tofu may be produced in different countries, the soybean may be cultivated in different countries, the soybeans may have been grown under organic or conventional conditions, and the price may differ.

In the following you see two variants of a 400 g piece of natural tofu. Please choose which of the variants you would buy. If you would not buy any of the variants, select the third option "I would not buy any of the variants"

	Variant 1 of 400 g tofu	Variant 2 of 400 g tofu	I would not buy any of the variants
Country of tofu manufacturing	Sweden	Another EU country	
Country of origin of the used soybean	A non-EU country	Sweden	
Cultivation of soybean	Conventional soybean cultivation	Organic soybean cultivation	
Price per 400g in SEK	20 SEK	25 SEK	
Which would you choose?	○	○	○

Please also take the price into account and consider a real purchase. Only select a variant if you would really buy it in a store.

Appendix F

Follow-up questions

How much do you agree or disagree with the following statements?

Select one response from each row

	1 strongly disagree	2	3	4 neither agree or disagree	5	6	7 strongly agree
I was certain in my choices.	○	○	○	○	○	○	○
I mainly chose randomly because I have no interest in the characteristics.	○	○	○	○	○	○	○
The choice situations presented here mimic the choice situation in a supermarket.	○	○	○	○	○	○	○
Please answer this question with "strongly agree".	○	○	○	○	○	○	○
The choice situations presented here are realistic.	○	○	○	○	○	○	○
The characteristics describing the tofu are strong determinants of my purchasing behavior.	○	○	○	○	○	○	○

How much do you agree or disagree with the following statements?

Select one response from each row

	1 strongly disagree	2	3	4 neither agree or disagree	5	6	7 strongly agree
Before participating in this survey, my knowledge about tofu has been good.	○	○	○	○	○	○	○
After participating in this survey, my knowledge about tofu has increased.	○	○	○	○	○	○	○
Tofu has a good taste.	○	○	○	○	○	○	○
Tofu is an environmentally friendly alternative to meat.	○	○	○	○	○	○	○
Tofu is a healthy alternative to meat.	○	○	○	○	○	○	○
Organic food is an environmentally friendly alternative to conventional food.	○	○	○	○	○	○	○
Organic food is a healthy alternative to conventional food.	○	○	○	○	○	○	○

Appendix G

Basic survey questions

Vilken är din högsta avslutade utbildningsnivå?

Select only one answer

- Universitet, högskola eller motsvarande
- Grundskola, realskola, folkskola eller motsvarande
- Gymnasium, folkhögskola eller motsvarande
- Mindre än grundskolenivå
- Prefer not to say

How much do you think would the cheapest 400 g piece of natural tofu cost in a supermarket near your home?

Select only one answer

-
- Prefer not to say

Where do you typically buy food?

Select only one answer

- Upper segment supermarket (t.ex. ICA, Coop)
- Discount supermarket (t.ex. Willys, Lidl)
- Farmers' market or other markets (t.ex. REKO ring)
- Other
- Prefer not to say

How would you describe your diet?

Select only one answer

- I eat meat occasionally (Flexitarian).
- I never eat meat (Vegetarian).
- I never eat a product from animals (Vegan).
- I eat meat regularly.
- Other
- Prefer not to say

Appendix H

WTP values of latent class model with 2 classes (BIC = 18641.41)

	Class 1 (77.4%)	**Class 2 (22.6%)**
Reference tofu	61.91 (4.67) ***	-35.23 (12.47) **
Manufactured in the EU	7.52 (0.91) ***	9.45 (3.11) **
Manufactured in Sweden	22.12 (1.76) ***	27.80 (6.09) ***
Soybean cultivated in the EU	7.30 (1.02) ***	5.50 (2.27) *
Soybean cultivated in Sweden	17.98 (1.59) ***	21.21 (4.27) ***
Organic cultivation	24.16 (1.82) ***	17.68 (3.14) ***
delta	0.00	-1.23 (0.10) ***

*** p < 0.001; ** p < 0.01; * p < 0.05

WTP values of latent class model with 3 classes (BIC = 17896.48)

	Class 1 (22.3%)	**Class 2 (27.2%)**	**Class 3 (50.6%)**
Reference tofu	-36.18 (12.21) **	30.58 (5.45) ***	66.90 (6.63) ***
Manufactured in the EU	9.38 (3.84) *	4.25 (2.45)	10.59 (1.87) ***
Manufactured in Sweden	28.16 (6.12) ***	12.82 (3.92) **	27.83 (4.02) ***
Soybean cultivated in the EU	5.97 (2.33) *	3.33 (2.95)	10.59 (1.68) ***
Soybean cultivated in Sweden	21.59 (4.27) ***	6.93 (4.88)	24.34 (3.84) ***
Organic cultivation	17.32 (3.33) ***	41.36 (7.33) ***	11.12 (1.91) ***
delta	0.00	0.20 (0.14)	0.82 (0.10) ***

*** p < 0.001; ** p < 0.01; * p < 0.05

WTP values of latent class model with 4 classes (BIC = 17385.04)

	Class 1 (14.4%)	**Class 2 (10.8%)**	**Class 3 (65.8%)**	**Class 4 (8.9%)**
Reference tofu	-67.84 (32.41) *	33.11 (2.41) ***	100.48 (7.45) ***	-1535.50 (2303.27)
Manufactured in the EU	22.01 (9.91) *	0.39 (0.35)	9.19 (1.36) ***	941.73 (1228.84)
Manufactured in Sweden	67.71 (24.83) **	2.17 (0.62) ***	27.11 (2.93) ***	1063.94 (1443.44)

Soybean cultivated in the EU	19.62 (8.93) *	-0.03 (0.75)	9.11 (1.60) ***	41.84 (65.95)
Soybean cultivated in Sweden	55.04 (20.77) **	1.52 (0.83)	22.24 (2.63) ***	63.85 (105.78)
Organic cultivation	42.09 (10.30) ***	2.95 (1.38) *	30.55 (3.46) ***	141.33 (313.82)
delta	0.00	-0.29 (0.20)	1.52 (0.12) ***	-0.48 (0.12) ***

*** p < 0.001; ** p < 0.01; * p < 0.05

WTP values of latent class model with 5 classes (BIC = 16691.25)

	Class 1 (43%)	**Class 2 (9.7%)**	**Class 3 (24.4%)**	**Class 4 (8.9%)**	**Class 5 (14%)**
Reference tofu	105.41 (10.09) ***	33.73 (2.32) ***	37.01 (5.69) ***	-1997.27 (1997.11)	-64.19 (27.65) *
Manufactured in the EU	13.38 (2.70) ***	0.32 (0.64)	3.93 (2.03)	1303.50 (1427.17)	20.69 (7.87) **
Manufactured in Sweden	33.95 (5.62) ***	1.95 (0.57) ***	16.24 (3.38) ***	1445.39 (1531.01)	63.85 (20.45) **
Soybean cultivated in the EU	12.53 (2.13) ***	0.11 (0.19)	5.89 (2.25) **	44.27 (49.12)	17.90 (6.64) **
Soybean cultivated in Sweden	29.73 (5.31) ***	1.48 (0.44) ***	8.75 (3.93) *	69.14 (58.27)	51.98 (16.16) **
Organic cultivation	13.92 (2.34) ***	2.13 (0.73) **	47.79 (6.76) ***	164.49 (174.28)	39.55 (10.39) ***
delta	0.00	-1.49 (0.16) ***	-0.57 (0.14) ***	-1.57 (0.11) ***	-1.12 (0.14) ***

*** p < 0.001; ** p < 0.01; * p < 0.05

WTP values of latent class model with 6 classes (BIC = 16075.16)

	Class 1 (11.9%)	**Class 2 (35.5%)**	**Class 3 (8.9%)**	**Class 4 (11.1 %)**	**Class 5 (8.55%)**	**Class 6 (24.1%)**
Reference tofu	-109.67 (89.00)	120.05 (17.47) ***	-9123.13 (40062.35)	52.42 (0.91) ***	27.70 (3.88) ***	32.41 (4.60) ***
Manufactured in Sweden	31.93 (27.44)	25.94 (4.51) ***	8535.37 (38121.77)	0.25 (0.61)	0.46 (1.39)	4.17 (3.23)
Soybean cultivated in Sweden	97.61 (67.56)	63.94 (8.97) ***	8654.52 (38504.39)	1.23 (0.54) *	2.64 (1.50)	18.55 (4.49) ***
Reference tofu	25.37 (17.38)	21.67 (3.48) ***	37.69 (170.88)	0.82 (0.73)	0.47 (0.94)	6.18 (2.89) *
Manufactured in Sweden	78.60 (53.27)	59.27 (8.22) ***	57.70 (167.30)	0.53 (0.69)	1.92 (0.99)	13.89 (4.52) **

	Class 1 (11.9%)	**Class 2 (35.5%)**	**Class 3 (8.9%)**	**Class 4 (11.1 %)**	**Class 5 (8.55%)**	**Class 6 (24.1%)**
Soybean cultivated in Sweden	54.23 (29.91)	23.42 (4.32) ***	143.42 (577.23)	0.77 (0.54)	3.80 (2.07)	53.93 (6.53) ***
delta	0.00	1.09 (0.12) ***	-0.29 (0.14) *	-0.07 (0.19)	-0.34 (0.30)	0.71 (0.11) ***

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Appendix I

	Environment (N=367)	Health (N=366)	Recipe (N=358)	Control (N=368)	Overall (N=1459)
Before participating in this survey, my knowledge about tofu has been good.					
1 strongly disagree	51 (13.9%)	53 (14.5%)	52 (14.5%)	33 (9.0%)	189 (13.0%)
2	41 (11.2%)	38 (10.4%)	52 (14.5%)	43 (11.7%)	174 (11.9%)
3	37 (10.1%)	27 (7.4%)	26 (7.3%)	44 (12.0%)	134 (9.2%)
4 neither agree or disagree	71 (19.3%)	72 (19.7%)	79 (22.1%)	78 (21.2%)	300 (20.6%)
5	70 (19.1%)	76 (20.8%)	69 (19.3%)	77 (20.9%)	292 (20.0%)
6	50 (13.6%)	56 (15.3%)	38 (10.6%)	44 (12.0%)	188 (12.9%)
7 strongly agree	47 (12.8%)	44 (12.0%)	42 (11.7%)	49 (13.3%)	182 (12.5%)
After participating in this survey, my knowledge about tofu has increased.					
1 strongly disagree	33 (9.0%)	34 (9.3%)	32 (8.9%)	40 (10.9%)	139 (9.5%)
2	19 (5.2%)	32 (8.7%)	27 (7.5%)	35 (9.5%)	113 (7.7%)
3	26 (7.1%)	37 (10.1%)	25 (7.0%)	42 (11.4%)	130 (8.9%)
4 neither agree or disagree	92 (25.1%)	91 (24.9%)	96 (26.8%)	124 (33.7%)	403 (27.6%)
5	102 (27.8%)	81 (22.1%)	92 (25.7%)	71 (19.3%)	346 (23.7%)
6	60 (16.3%)	49 (13.4%)	54 (15.1%)	32 (8.7%)	195 (13.4%)
7 strongly agree	35 (9.5%)	42 (11.5%)	32 (8.9%)	24 (6.5%)	133 (9.1%)
Tofu has a good taste.					
1 strongly disagree	28 (7.6%)	26 (7.1%)	25 (7.0%)	33 (9.0%)	112 (7.7%)
2	24 (6.5%)	31 (8.5%)	22 (6.1%)	21 (5.7%)	98 (6.7%)
3	30 (8.2%)	30 (8.2%)	32 (8.9%)	39 (10.6%)	131 (9.0%)
4 neither agree or disagree	127 (34.6%)	125 (34.2%)	124 (34.6%)	116 (31.5%)	492 (33.7%)

5	77 (21.0%)	66 (18.0%)	68 (19.0%)	82 (22.3%)	293 (20.1%)
6	49 (13.4%)	46 (12.6%)	51 (14.2%)	40 (10.9%)	186 (12.7%)
7 strongly agree	32 (8.7%)	42 (11.5%)	36 (10.1%)	37 (10.1%)	147 (10.1%)
Tofu is an environmentally friendly alternative to meat.					
1 strongly disagree	11 (3.0%)	10 (2.7%)	13 (3.6%)	13 (3.5%)	47 (3.2%)
2	6 (1.6%)	14 (3.8%)	13 (3.6%)	13 (3.5%)	46 (3.2%)
3	12 (3.3%)	8 (2.2%)	13 (3.6%)	22 (6.0%)	55 (3.8%)
4 neither agree or disagree	53 (14.4%)	74 (20.2%)	73 (20.4%)	78 (21.2%)	278 (19.1%)
5	70 (19.1%)	77 (21.0%)	86 (24.0%)	113 (30.7%)	346 (23.7%)
6	92 (25.1%)	88 (24.0%)	85 (23.7%)	68 (18.5%)	333 (22.8%)
7 strongly agree	123 (33.5%)	95 (26.0%)	75 (20.9%)	61 (16.6%)	354 (24.3%)
Tofu is a healthy alternative to meat.					
1 strongly disagree	10 (2.7%)	9 (2.5%)	11 (3.1%)	13 (3.5%)	43 (2.9%)
2	5 (1.4%)	7 (1.9%)	12 (3.4%)	9 (2.4%)	33 (2.3%)
3	12 (3.3%)	16 (4.4%)	10 (2.8%)	16 (4.3%)	54 (3.7%)
4 neither agree or disagree	74 (20.2%)	64 (17.5%)	80 (22.3%)	90 (24.5%)	308 (21.1%)
5	71 (19.3%)	80 (21.9%)	87 (24.3%)	99 (26.9%)	337 (23.1%)
6	99 (27.0%)	86 (23.5%)	81 (22.6%)	74 (20.1%)	340 (23.3%)
7 strongly agree	96 (26.2%)	104 (28.4%)	77 (21.5%)	67 (18.2%)	344 (23.6%)
Organic food is an environmentally friendly alternative to conventional food.					
1 strongly disagree	10 (2.7%)	7 (1.9%)	12 (3.4%)	8 (2.2%)	37 (2.5%)
2	7 (1.9%)	12 (3.3%)	10 (2.8%)	9 (2.4%)	38 (2.6%)
3	14 (3.8%)	11 (3.0%)	12 (3.4%)	25 (6.8%)	62 (4.2%)

4 neither agree or disagree	53 (14.4%)	62 (16.9%)	71 (19.8%)	58 (15.8%)	244 (16.7%)
5	63 (17.2%)	70 (19.1%)	78 (21.8%)	67 (18.2%)	278 (19.1%)
6	84 (22.9%)	80 (21.9%)	79 (22.1%)	86 (23.4%)	329 (22.5%)
7 strongly agree	136 (37.1%)	124 (33.9%)	96 (26.8%)	115 (31.3%)	471 (32.3%)
Organic food is a healthy alternative to conventional food.					
1 strongly disagree	12 (3.3%)	8 (2.2%)	11 (3.1%)	9 (2.4%)	40 (2.7%)
2	4 (1.1%)	10 (2.7%)	9 (2.5%)	10 (2.7%)	33 (2.3%)
3	18 (4.9%)	10 (2.7%)	18 (5.0%)	21 (5.7%)	67 (4.6%)
4 neither agree or disagree	46 (12.5%)	70 (19.1%)	67 (18.7%)	52 (14.1%)	235 (16.1%)
5	74 (20.2%)	64 (17.5%)	73 (20.4%)	71 (19.3%)	282 (19.3%)
6	80 (21.8%)	81 (22.1%)	87 (24.3%)	84 (22.8%)	332 (22.8%)
7 strongly agree	133 (36.2%)	123 (33.6%)	93 (26.0%)	121 (32.9%)	470 (32.2%)

Appendix J

Difference between WTP für Swedish and organic characteristics compared to reference tofu:

$$\frac{(WTP\ reference + WTP\ manufSE + WTP\ cultSE + WTP\ Eco)/3}{WTP\ reference\ Tofu} * 100 - 100$$
$$= \frac{(17.43 + 43.93 + 39.45 + 46.68)/3}{17.43} * 100 - 100 = 182.06$$

Difference between WTP für all characteristics compared to reference tofu:

$$\frac{(WTP\ reference + WTP\ manufEU + WTP\ manufSE + WTP\ cultEU + WTP\ cultSE + WTP\ Eco)/5}{WTP\ reference\ Tofu} * 100 - 100$$
$$= \frac{(17.43 + 26.11 + 43.93 + 26.39 + 39.45 + 46.68)/5}{17.43} * 100 - 100 = 129.48$$

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