Do I care: How does the provision of information about the environmental benefits of grain legume cultivation in Sweden influence consumers.

Kalle Nils Valentin Köster

Degree project/Independent project • 30 credits
Swedish University of Agricultural Sciences, SLU
Faculty of Landscape Architecture, Horticulture and Crop Production Science
Programme Master of Agroecology
Alnarp, 2022

Do I care: How does the provision of information about the environmental benefits of grain legume cultivation in Sweden influence consumers?

Kalle Nils Valentin Köster

Supervisor:	**Raj Chongtham, Swedish University of Agricultural Sciences, Department of Biosystems and Technology**
Assistant supervisor:	Jens Rommel, Swedish University of Agricultural Sciences, Department of Economics
Examiner:	Erik Hunter, Swedish University of Agricultural Sciences, Department of Work Science, Business Economics and Environmental Psychology

Credits:	30 ECTS
Level:	Master of Science, A2E
Course title:	Independent Project in Agricultural Science
Course code:	EX0848
Programme/education:	Agroecology
Course coordinating dept:	Department of Biosystems and Technology
Place of publication:	Alnarp, Sweden
Year of publication:	2022
Copyright:	All featured images are used with permission from the copyright owner.
Keywords:	Biospheric Values, Diversity, Grain Legumes, Willingness-to-pay

Swedish University of Agricultural Sciences
Faculty of Landscape Architecture, Horticulture and Crop Production Science
Department of Biosystems and Technology

Abstract

Grain legume cultivation is promoted to be beneficial for Swedish agriculture due to grain legumes´ ability to engage in biological nitrogen fixation, function as break-crops in cereal-based cropping systems and a general increase in biodiversity. Furthermore, grain legumes are an important pillar of more sustainable diets. Yet, cultivation remains relatively low and consumption levels are below suggested thresholds for achieving sustainable diets: the current daily consumption is 12 grams per person while research suggests that it should reach 50 grams. To achieve this increase means tackling barriers that hinder Swedish farmers from growing more grain legumes and consumers to consume more grain legumes.

This study aims to explore how providing information on environmental benefits from grain legume consumption influences consumers' Willingness-to-pay for Swedish produced yellow peas. In this, individual differences are measured through the Environmental Schwartz Values Survey. It is further accounted for differences in products by including conventional, organic and small-scale organic resellers of Swedish yellow peas. In this, descriptions of operations and goals of the companies were provided to participants. An online survey with 329 participants showed that providing information on environmental benefits did not affect participants' Willingness-to-pay. This result was independent of participants' endorsement of biospheric values as well as the product type. However, participants were willing to pay a significantly higher price for small-scale organic yellow peas compared to conventional or organic yellow peas. Still, this increased Willingness-to-pay was limited and showed that participants were not willing to pay the real shelf price of the product. Furthermore, endorsement of biospheric values only correlated weakly with participants' Willingness-to-pay. One of the most mentioned barriers to increasing the consumption of grain legumes was the lack of recipes. The results of the study suggest that providing information about environmental benefits resulting from the cultivation of grain legumes does not influence participants´ WTP. Future research could focus on the relation between information provision about environmental benefits and intentions to consume grain legumes in the future. Furthermore, it has not been controlled for the effect of the information provided on the operations and goals of the different companies which could have influenced participants´ indication of WTP.

Keywords: Biospheric Values, Diversity, Grain Legumes, Willingness-to-pay

Table of contents

List of figures

Abbreviations

CAP	Common Agricultural Policy
E-SVS	Environmental Schwartz Value Survey
GAEC	Good Agricultural and Environmental Conditions
LOHAS	Abbreviation for Lifestyles of Health and Sustainability: used to refer to people who are interested in healthy living and social and environmental issues
SD	Standard deviation
SVS	Schwartz Value Survey
WTP	Willingness-to-Pay

1. Introduction

Diversifying cropping systems is often advocated as a desirable practice that can have multifunctional benefits such as improving biodiversity, reducing inputs, contributing to adaptation and mitigation of climate change. This is because an increase in diversity strengthens the resilience of cropping systems and decreases the need for external inputs such as agrochemicals (Smith et al., 2008) via ecological mechanisms, e.g., biological Nitrogen fixation by legumes, reducing weed and pest pressure offered by plant-plant interactions and more. However, to address the climate crisis, a monotonic focus on changing cropping systems will be insufficient. Larger changes are needed which include all food system actors (Foley et al., 2011). One of the most important stakeholders are end consumers. Current dietary choices which are marked by a high intake of calories, processed food and red meats are proven to have aversive effects on the environment as well as on human health (Garnett, 2016; Willett et al., 2019). Simultaneously, farmers are experiencing barriers to diversifying their cropping systems due to a lack of financial returns and diversification knowledge (Id *et al.*, 2020).

Furthermore, dietary choices which are marked by a high intake of animal-based products are exacerbating the emissions from food systems. The production of animal products is connected to large losses and inefficiencies of converting energy into protein, reaching a loss rate of 82% (Alexander *et al.*, 2017). Moreover, fodder production and grazing land for animal products occupy 77% of the agricultural land while only contributing 17% to the caloric intake of the world (Alvarez-Kalverkamp *et al.*, 2014). Thus, large areas and large amounts of energy are needed to produce a small fraction of resource-consuming food. To enhance the environmental and resource efficiency of our food systems means a shift to more plant-based diets (Sabaté and Soret, 2014). Plant-based diets are further advocated as being beneficial for human health as well as for the environment and thus are an important pillar for a sustainable diet (Willett et al., 2019). Still, the composition of a healthy and sustainable plant-based diet is challenging. In this context, grain legumes can be a good substitute for animal products to fulfil nutritional needs (Röös *et al.*, 2020). The cultivation of grain legumes is further associated with multiple environmental benefits: (1) Ability to engage in biological nitrogen fixation and thus decreases in the need for external nitrogen fertilizer; (2) Positive effects as a pre-crop due to residual nitrogen and break-crop effects (Angus *et al.*,

2015; Preissel *et al.*, 2015); (3) Increases in biodiversity and crop diversification (Köpke and Nemecek, 2010).

Despite the health benefits derived from the consumption of grain legumes and the positive environmental benefits associated with its cultivation, grain legumes are only grown on 1.6% of the arable land in Sweden (Swedish Board of Agriculture, 2020) and only represent 1% of the Swedish protein consumption (Röös *et al.*, 2020). On average, a Swedish person consumes 12 grams of grain legumes per day (Swedish Food Agency, 2012) whereas 50 grams per day are recommended as part of a healthy and sustainable diet (Willet *et al*, 2019). Still, only 50% of Swedish women and 44% of Swedish men include grain legumes in their diets, this means that the average daily consumption is higher than 12 grams for people that consume grain legumes (Swedish Food Agency, 2012). Yellow pea (Pisum Sativum L) is one of the main grain legumes cultivated in Sweden. They have been traditionally used as the main ingredient for "Thursday soup", thus it is a well-known, important and traditional grain legume in Sweden. Therefore, this study includes yellow peas as grain legumes which human consumption could be promoted in Sweden.

One approach to promoting sustainable food is to provide information on its environmental impact (Graham and Abrahamse, 2017; Abrahamse, 2020). Yet, a large body of literature suggests that the provision of information is a non-effective strategy to promote behavioural change (Abrahamse *et al.*, 2005; Schultz and Kaiser, 2012). This is further in line with research about the effect of information provision on sustainable food choices (Bernstad, 2014). Still, the effectiveness of information provision is dependent on multiple factors, such as the mode of communication, the framing of the message and individual differences of the receiver. In this, a moderation effect of consumers´ personal values could explain whether information provision influences consumer decision-making or not (Abrahamse, 2020). Thereby, personal values are argued to influence how relevant the information is for the consumer in the context of the decision-making process to consume a product. Thus, people who value the goal of safeguarding the environment will perceive information about environmental benefits as more relevant and consequently, the information will influence their decision-making process to a greater extent. However, literature on the moderation effect of personal values on the effect of information provision is scarce. Therefore, this study includes a measure of participants' values to shed light on the question of whether individual differences could explain contradicting results regarding the effectiveness of providing information on the environmental benefits of consumer behaviour.

A recent study in France has looked at the effect of information provision about the environmental benefits of cultivating grain legumes on participants' Willingness-to-pay (WTP) for French lentils (Marette, 2021). It was found that the

general effect of the information provided on participants´ WTP was small. Still, the effect of the information provided on participants' WTP for French lentils was influenced by multiple factors. Here, the effect of the information provided was stronger for organic and organic & local lentils in comparison to conventional lentils implying that the type of product influences the effect of the information provided on participants´ WTP. Building upon this result, three different resellers of Swedish produced grain legumes have been included to understand whether a potential effect of the information provision interacts with the type of product participants were presented with. In this, it is argued that the information provided has a greater effect when it matches the goals and operations of the reseller of the presented yellow peas. Overall, this paper aims to shed light on the relationship between providing information about environmental benefits, individual differences of the receiver as well as the interaction with the operations and goals of different Swedish resellers of yellow peas.

2. Research objectives.

This study aims to look at whether the consumption of Swedish grain legumes can be promoted by providing information about environmental benefits resulting from the cultivation of grain legumes in Sweden. In this, it is accounted for the personal values of participants as well as different resellers of Swedish yellow peas (conventional, organic, small-scale organic).

The specific objectives of the study are:

- Evaluate whether information provision about the environmental benefits of cultivating yellow peas in Sweden influences participants´ Willingness-to-pay.
- Explore how and/or whether the effect of providing information about environmental benefits of cultivating yellow peas differs between different resellers of Swedish yellow peas.
- To understand whether personal values moderate the effect of providing information on the environmental benefits of cultivating yellow peas.
- Obtain an initial insight into the frequency, perceived hinders and motivators to consume grain legumes.

This study attempts to understand whether the construct of personal values has a moderating effect on the relation between participants WTP and the provision of information about environmental benefits from the cultivation of grain legumes. Hereby, it is further controlled for different resellers of Swedish produced yellow peas (Conventional, Organic, Small-scale Organic). It is suggested that the message provision has the strongest effect for small-scale organic yellow peas for people that affiliate themselves with nature. Because firstly, the information seems most relevant for participants who value the outcome of safeguarding the environment and secondly, the information about environmental benefits matches to the greatest extent with the goals and operations of the small-scale organic company. This information can be useful to understand how grain legume consumption can be promoted most effectively.

The above objectives are based on the following three hypotheses:

I. The provision of information about the environmental benefits of integrating grain legumes in the Swedish agricultural landscape increases consumers' Willingness-to-pay for Swedish produced yellow peas.

II. The extent of the increase in Willingness-to-pay is influenced by the goals and operations of the reseller, hereby, the increase will be the greatest for the small-scale organic reseller (*Nordisk Råvara*).

III. An increase in Willingness-to-pay correlates positively with consumers´ endorsement of biospheric values (Consumers who affiliate themselves with the environment increase their WTP by a greater extent than participants that do not).

This study only includes a measure of participants´ WTP without any financial or external consequences. Thus, it is questionable whether the indication of the WTP has any external value.

According to FAO (2018), food systems are: *"Systems that encompass the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry or fisheries, and parts of the broader economic, societal and natural environments in which they are embedded."*

Thus, food systems are complex in their nature and include many stakeholders. Consequently, this paper takes an interdisciplinary approach in which different facets to sustainable food choices are integrated. In the subsequent sections, relevant facets to the consumption of grain legumes in Sweden are presented. This is done by acknowledging the complexity of the study topic "Consumption of grain legumes in the Swedish context". The information described in the subsequent sections focuses on larger systems as agricultural politics as well as smaller systems as the individual consumer.

3. Background Information

The Background information includes how agricultural policies influence the agricultural landscape followed by a presentation of current research within the field of environmental psychology that is associated with sustainable food consumption. Afterwards, the agricultural production within Sweden as well as agronomical properties of grain legumes are presented.

3.1. Agricultural Policies

Problems arising from modern agricultural systems cannot be understood in a political vacuum within the European Union due to the large influence subsidies have on the agricultural sector. The implementation of policies that target consumer behaviour bears the potential to decrease European CO2 emissions by 25% with food choices being one of the most influential factors (Moran *et al.*, 2020). One important facet to strengthen the ability of consumers to make more sustainable food choices is to increase the accessibility to diverse local farming products (Willett *et al.*, 2019). Therefore, it is important to understand what encourages and hinders farmers to grow more diverse food. Consequently, barriers should be lifted for farmers to integrate more diversified cropping systems and financial incentives should be placed to encourage the implementation and thereby increase the accessibility to sustainable food for consumers (Balazs *et al.*, 2021).

One important tool to encourage farmers to integrate more diversified cropping systems are policies. The most influential policy package in the European context is the Common Agricultural Policy (CAP) which had a total budget of 57.98 Billion Euros in 2019 (European Commission, 2021). In 2020 a new reform CAP has been suggested. One of the main drivers for the new reform is to tackle the issue of insufficient environmental protection in the agricultural sector. Hereby, three basic agricultural practices are formulated, namely crop diversification, maintenance of permanent grassland and maintenance of “ecological focus areas”. To implement these methods the CAP 2020 reform takes a less prescriptive approach towards the individual contribution of its member states in comparison to its previous versions. Therefore, each country is asked to develop eco-schemes that function as strategical plans to achieve the European environmental objectives (European Commission, 2020). These eco-schemes are connected to the first pillar of the CAP which deals

with the direct payment budget of the member states. Thus, countries will have the chance to steer their agricultural sector by formulating conditionalities that farmers need to follow to receive subsidies.

To assure that the payments are facilitating the necessary change certain conditionalities are prescribed. Hereby, 'Good Agricultural and Environmental Conditions (GAEC) and 'Statutory Management Requirements' are defined and used as standards to mitigate and adapt to climate change; address water challenges; soil protection and quality; land management; and protection and quality of biodiversity. The resulting GAEC are summarized in 10 conditionalities that are linked to farmers' income support. On top of these the European Union plans to give freedom to countries to define eco-schemes to encourage farmers to go beyond mandatory and baseline requirements of the conditionalities. The resulting eco-schemes vary across countries to increase national efforts to address more local and context-dependent climate change issues. Hereby, the participation of farmers is voluntary and can be based on 1-year commitments, which is understood to be an advantage over previous multi-annual commitments (European Commission, 2021).

The resulting regulations vary across countries in the European Union. In Germany, one of the suggested conditionalities is that farmers need to integrate crop rotations with at least 5 different crops of which at least 10 % must be grain legumes (Federal Ministry of Food and Agriculture, 2021). Whereas in the Swedish proposal the eco-schemes are less prescriptive and rather abstract. They focus on the integration of flower strips, inclusion of cover crops, catch crops and soil preparation in spring and organic production systems. It is further mentioned that the introduction of subsidies for the cultivation of protein crops in Sweden is not recommended, due to concerns about limitations to cultivate protein crops and a lack of demand. Therefore, it is suggested that the area dedicated to the cultivation of protein crops will not increase even if subsidies were implemented. At the current state, the financial difference between cultivating protein crops as grain legumes and cultivating cereals is approximated to 900 SEK (1 Euro ~ 10 SEK) per hectare. To ensure that protein crops have a similar financial return would mean that they should be subsidized with 900 SEK per hectare (The Swedish Board of Agriculture, 2021). The eco-scheme conditions are linked to 20% of the total CAP budget and would be implemented in the period between 2023 and 2027. Changes in the payments schemes of subsidies will result in shifts in production systems and thus change the food that is available on our shelves. To ensure that the environmental targets can be met through the implementation of these eco-schemes means to look at the whole situation in which farmers are confronted with a market that is steered by the demand. And thus, it is most crucial that effective policies target production systems as well as the consumer side to circumvent that farmers disobey countries´ recommendations due to a lack of consumer demand and thus a lack of financial

returns. Hereby, it is of interest to look at how demand can be introduced or supported for products that comply with the suggestions of the new policy package to prevent that a lack of demand develops into a stuck point for innovating cropping systems and to cultivate food in more diversified cropping systems.

3.1 Agricultural policies and consumer behaviour

It is important to change consumer behaviour to assure that sustainably produced food (e.g., food from more diversified cropping systems) has a demand. The need to change food choices is further stressed by the insufficiency of technological advancements to satisfy consumer demand without harming the environment (Bajželj *et al.*, 2014). The underlying driver is the high demand for animal products which are connected to large inefficiencies. A further worsening of the situation is likely to occur when future economic growth is still associated with a shift from staple food diets to more meat-based diets (FAO, 2020). Overall, a positive correlation between the level of income per household and carbon footprint is observed in the European context (Ivanova and Wood, 2020). Economic growth is not only linked to an increase in meat consumption but rather to an overall increase in carbon emissions. To decrease the environmental impact of food systems implies stopping this trend and to showcase how economic growth can be decoupled from an increase in meat consumption. Thus, changes in human behaviour are needed to ensure that environmental targets can be met.

3.2 The influence of values on environmental behaviour

Schwartz theory of basic values seem most relevant for understanding people's engagement in pro-environmental behaviour. Previous research has shown that the affiliation with more universal values is associated with organic food choices (Vermeir and Verbeke, 2008) and vegetarianism (Hayley, Zinkiewicz and Hardiman, 2015; Graham and Abrahamse, 2017). Universal values are associated with the self-transcendence dimension of values and reflect how important caring for the environment is to a person. Values are the motivational bases for behaviour and attitudes and function as guiding principles for our life. According to Schwartz, values are defined as: "Desirable transsituational goals, varying in importance, that serve as guiding principles in the life of a person or other social entities." (Schwartz, 1994). This implies that individual behaviour is influenced by underlying goals which build the motivational bases for behaviours and attitudes. Ten basic values have been identified across different cultures and are regarded as relatively stable over time and are shared within cultural groups in Figure 1 (Stern, 2000). The

values are defined by the broad goals it expresses. The ten identified values are: Self-Direction, Stimulation, Hedonism, Achievement, Power, Security, Conformity, Tradition, Benevolence and Universalism (Schwartz, 2012). These values and their underlying motivational goals can be in conflict or congruent. Therefore, the values are organized along two bipolar dimensions, namely ´openness to change to conservation´ and `self-enhancement to self-transcendence´. To further express the relations between the values a circular structure has been suggested by Schwartz (1994). The circle represents the motivational continuum in which the distance between the values represents their relation. Values that are closely related are placed adjacent and antagonistic values are placed in distance to each other. However, it is suggested that all ten values relate to any other variable (behaviour, attitude, age, etc.) in an integrated manner. The prioritization of values differs between individuals and situations. The personal importance of different values determines their influence on individuals' decision-making processes, meaning that people make decisions based on what is most important in their life in the given situation.

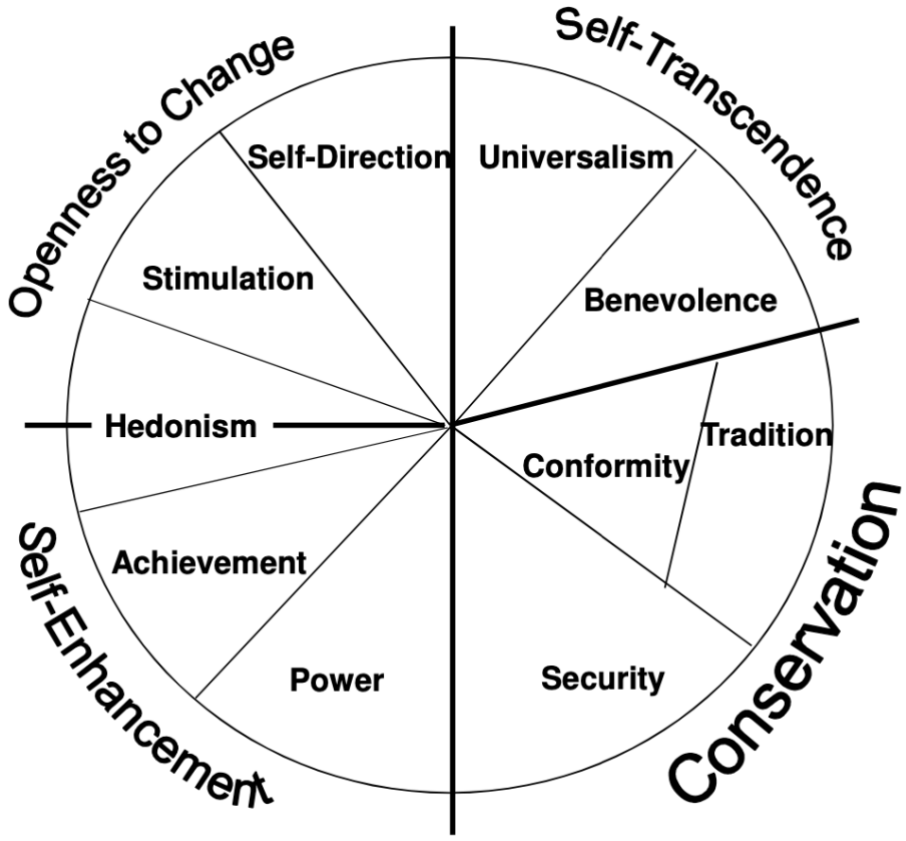

Figure 1. Visualizes the theoretical framework of relations between the ten different values (graphic taken from Schwartz, 2012)

Each value, in turn, can be associated with a palette of behaviours that are associated with one's life goals. When one behaviour stays in conflict with different values the importance of the value determines its effect on the decision-making process. Imagine one person goes to a grocery shop, this person enjoys the pleasure of food (hedonic) but still thinks that environmental (universal) aspects are important. When this person is confronted with a piece of cheese that is tasty but bad for the environment, the person will most likely act following the value that is most important in this context. Thus, values influence what importance is ascribed to anticipated outcomes of behaviours, how a situation is perceived, and which alternative behaviours are considered (Steg *et al.*, 2014). Building up on the model of Schwartz four values have been identified to be most relevant in the context of pro-environmental behaviour. These values are: egoistic (i.e., concern for personal resources), hedonic (i.e., concern for pleasure and comfort), altruistic (i.e., concern for others) and biospheric values (i.e., concern for the environment) (Bouman, Steg and Kiers, 2018).

The potential influence of personal values on decision-making processes makes it possible to develop interventions. These interventions can aim to increase the importance of values or make them salient in situations to increase the likelihood of people engaging in desired behaviours (Vermeir *et al.*, 2020). This can be done by stressing how one's behaviour contributes to achieving one's goals. In this, it is argued that people are motivated to perform behaviours by their positive valuation of the outcome (Moors, Boddez and De Houwer, 2017). In this context, it was found that providing information on the climate impact of meat consumption had a greater impact on future intentions to consume meat for people that have high self-transcendence values (Graham and Abrahamse, 2017). This means that people who affiliate themselves with more universal values that include others, as well as the environment, were more affected by the information about the environmental impact of meat consumption. Therefore, it can beneficial to underline how certain food choices relate to larger goals such as safeguarding the environment to promote its consumption.

3.3 Important personal values in the context of sustainable food choices.

It is important to assure that consumers know about the impact of their food choices to assure that they can make choices that are in line with their goals (Gifford and Nilsson, 2014). In the context of sustainable food choices, it means that the likelihood of choosing sustainable products is increased when people value the outcome of safeguarding the environment and when they are aware of the impact of their choices (Vermeir *et al.*, 2020). Current research tends to focus mostly on

the provision of information about the negative impact of one's food choices, such as carbon labels. Studies focusing on the communication of environmental benefits resulting from one's food choices and the interaction with participants´ values are relatively rare (Abrahamse, 2020). There is a knowledge gap on whether communicating environmental benefits can affect consumers´ decision-making processes and what role personal values play in this process. In this, it can be argued that personal values highlight the importance of the information and thus lead to a higher likelihood to engage in behaviour that is in line with one's life goals (Köster *et al.*, 2021). This implies that environmental values lead to more sustainable food choices (Vermeir and Verbeke, 2008). Thus, it is purposeful to advocate how food choices relate to environmental values to increase the demand for sustainable food products and to assure that consumers can make the most educated choices.
However, this approach may only function for people that value the environment and thus perceive the information as most relevant in the decision-making process of buying food. Whereas it could potentially decrease the likelihood of consumers that perceive other goals as most relevant in the decision-making to buy the product.

Moreover, changing food choices appears to be an especially difficult process due to its central role in people´s lifestyles (Sonestedt *et al.*, 2005) and cultural influences (Tiu Wright, Nancarrow and Kwok, 2001) as people do not exclusively act upon their values while engaging in sustainable food choices. Different motivators and facets to sustainable food are in place and lead to engagement in the behaviour, such as price and health factors (Mullee *et al.*, 2017). Furthermore, knowledge is an important factor influencing consumers´ intention to buy local or organic products (Zepeda and Deal, 2009). The process underlying the role of knowledge is the activation of personal norms (Vermeir *et al.*, 2020). Personal norms are guiding principles that people deploy to themselves which are rooted in one's values. Thus, highlighting how behaviour can contribute to achieving one's goals can make them more salient and thus increase engagement. Therefore, it is suggested that stressing the relation between food choices and environmental consequences can influence consumers´ behaviour. The underlying mechanism leading to behavioural change is to make the relation between personal values and food choices more salient. Subsequently, the likelihood of consumers who value the environment and perceive it as being most relevant in the context of the decision-making process to purchase a product would increase through the provision of information about environmental benefits.

3.4 Information about environmental impacts and consumers´ choices.

In general, it seems that most people are aware of climate change but lack the knowledge to evaluate the environmental impact of their behaviour (Mbow, C. *et al.,* 2019). This inability to assess one's behaviour seems to be independent of the level of motivation to engage in pro-environmental behaviour (Wynes, Zhao and Donner, 2020). This means that people who value the environment are still lacking the necessary information to make climate-accurate choices. This gap between motivation and action is further enhanced through the cultural embeddedness of unsustainable food choices and the perceived effort to change food habits. One potential solution to decrease this gap is hoped to be found in information provision. An important tool to enhance the availability of information for the consumer and to increase the transparency of the supply chain is digitalization (WBGU, 2020). Hereby, it is assumed that an increase in information availability will translate into behavioural changes. Thus, a moderation effect of information between motivation and actual behaviour is suggested. This would mean that motivation is more likely translated into action when information is readily available (Grunert, Hieke and Wills, 2014). Therefore, it seems crucial to educate consumers about the environmental impacts of their choices.

3.5 Swedish Food systems' impact on the environment.

In order to identify products that promote more sustainable and diversified cropping systems, it is important to gain an understanding of the current agricultural system that consumers´ decisions are placed in. The Swedish food system in its current state appears to be non-sustainable on multiple levels. It harms the environment through its large emissions of greenhouse gases during cultivation, transportation and production (Moberg *et al.,* 2020). The levels of emissions are to a large extent associated with the relatively high consumption of meat and dairy products (Martin and Brandão, 2017). Currently, the Swedish agricultural landscape is dominated by cereal cultivation. Its cultivation occupies approximately 40% of the agricultural land (The Swedish Board of Agriculture, 2009). Hereby, the yields vary across the country from least productive in the north to most productive in the south. Such a mere focus on the cultivation of cereals is often accompanied by great use of inorganic fertilizer and agrochemicals, which harm the environment. In contrast, building on more diversified cropping systems can increase ecosystem services and thus increase stability and decreases the necessity of external inputs (Gliessman, 2015). The diversification of the cropping system further enables consumers to

choose from a larger palette of different products to compose a healthy diet (Willett *et al.*, 2019). This suggests that implementing more diversified cropping systems in Sweden can lead to a multitude of positive effects as increasing the accessibility to healthy diets, supporting local biodiversity and strengthening the resilience of cropping systems. One way to promote more diversification of Swedish cropping systems is to increase the cultivation of grain legumes (Köpke and Nemecek, 2010). Hereby, consumers can play an important role by creating a demand for locally grown grain legumes and thus supporting the diversification of Swedish cropping systems.

3.6 The role of grain legumes.

One potential contribution to achieving more diversified cropping systems in Sweden is to increase grain legume cultivation and to shift the consumption from red meat to grain legumes (Röös *et al.*, 2020). Grain legumes are defined as arable crops belonging to the Leguminosae family and the sub-family of Fabaceae. Important grain legumes cultivated in Sweden are fava beans (Vicia faba), yellow peas (Pisum sativum), grey peas (P. sativumvararvense), common beans (Phaseolus vulgaris) and lentils (Lens culinaris). They are primarily cultivated for their grains which are mostly used for human or animal consumption (Nemecek *et al.*, 2008). Grain legumes are beneficial on multiple levels, as they benefit soil fertility, prevent the spread of diseases in cereal-based cropping systems as break crops and serve as an alternative source to animal-based proteins.

The underlying mechanism of increasing soil fertility is a symbiotic relationship with Rhizobia bacteria which can fix Nitrogen from the atmosphere and make it accessible to biotic organisms in the soil (Jensen *et al.*, 2012). The available nitrogen can either be utilized by subsequent or accompanying crops. The integration of grain legumes in cropping systems can decrease nitrogen fertilization by 23–31 kg ha^{-1} for subsequent crops and can increase the yields by 0.5–1.6 Mg ha^{-1} in comparison to cereals as a pre-crop (Preissel *et al.*, 2015). Grain legumes are furthermore highly efficient in converting nitrogen into protein. This leads to low investments costs of only 1-2 kg of new nitrogen for producing 1.0 kg of protein, whereas 1.0 kg of beef protein demands 15-20 kg of new nitrogen (Leip *et al.*, 2014). Thus, grain legumes can strongly reduce the demand for additional nitrogen in the farming system while at the same time producing protein for food and feed. Furthermore, grain legumes can mitigate climate change by reducing the use of mineral fertilizers which are associated with considerable Greenhouse Gas emissions (Jensen *et al.*, 2012).

Grain legumes further function as important break crops in cereal-based cropping systems as they decrease the risk of built-up diseases and pests, help with weed management and benefit the soil structure (Watson *et al.*, 2017). This results

in lower demands for agrochemicals in crop sequences that include grain legumes due to an increase in diversity (Jensen *et al.*, 2012). Overall, multiple environmental benefits are associated with the cultivation of grain legumes. However, the consumption and cultivation of grain legumes are relatively low in Sweden. Therefore, it is of interest to research how grain legume cultivation can be promoted in Sweden. One way to make the cultivation of grain legumes more attractive to farmers is to ensure a stable demand. Here, consumers can create a demand which subsequently will influence the crop choices of farmers.

3.7 Drawbacks of Cultivating Grain Legumes.

Besides the positive aspects of cultivating grain legumes, it is also associated with risks such as nitrogen leakage, soil-borne diseases, pathogens, pests and logging. Therefore, the integration of grain legumes into crop rotations must be well planned. Grain legumes should not be planted too frequently on the same land to prevent the spread of soil-borne legume diseases, pests and pathogens (Watson *et al.*, 2017). The nitrogen which is made available from the cultivation of grain legumes must be taken up by subsequent crops to prevent leakage. Therefore, it is advised to utilize catch crops that have a high nitrogen demand. Intercropping grain legumes with cereals has multiple positive aspects, as it prevents the spread of diseases, decreases the risk of logging and creates a synergy of supplying the cereal with nitrogen (Jensen *et al.*, 2020). Overall, the cultivation of grain legumes should be planned carefully to assure that those drawbacks are held at a minimal level and to ensure that they can express their full potential to benefit the environment, so the environmental benefits communicated to consumers are holding true.

3.8 The role of grain legumes - For human health.

An increase in the consumption and cultivation of grain legumes in Sweden could lead to a win-win situation in which the environment and human health would benefit. The EAT-LANCET report has composed a diet in which human health and environmental health are balanced (Willett *et al.*, 2019). The resulting Planet Health Diet includes a great increase in fruit, vegetable, and grain legume consumption in comparison to the current Swedish diet, which is heavily based on meat products. It further implies that the consumption of animal products should be decreased to a great extent, with red meat consumption being as low as 14 grams per day (Willett *et al.*, 2019). It is important to pay close attention to the composition of more plant-based diets to prevent health risks from nutritional deficiency (Millward and Garnett, 2010). Here, it is suggested that grain legumes can play a key role in composing more plant-based diets to ensure a healthy diet in the Swedish context

(Röös *et al.*, 2020). Thereby, grain legumes are connected to multiple health benefits and are vital in the prevention of cardiovascular disease and type 2 diabetes (Clemente and Olias, 2017). Moreover, grain legumes are an important source of proteins, carbohydrates, minerals and vitamins micronutrients. However, grain legumes are often associated with anti-nutritional compounds which hamper the uptake of nutrients in the body. Still, new studies are re-evaluating the health effects of these compounds and suggest that they could be linked to health benefits and that the content of anti-nutritional compounds can be greatly decreased through soaking and boiling (Röös *et al.*, 2020). Overall, grain legumes are important in the composition of healthy and sustainable diets which are marked by low consumption of animal products.

Another important facet to a potential increase in the consumption of grain legumes is to facilitate its local consumption. Here, the potential increase in production of Swedish produced grain should meet a local demand to ensure that it will contribute to more sustainable food systems. In 2017, only 1 per cent of Swedish protein intake originated from legume consumption (FAO, 2017). However, the environmental benefits of legume cultivation and positive health effects stress the need to increase its consumption. A study has shown that exchanging 50% of the Swedish protein intake through locally cultivated grain legumes would decrease the climate impact of the Swedish diet by 20 % and land use by 23 % (Röös *et al.*, 2020). This would imply a rise from an approximate consumption of 12 grams (Swedish Food Agency, 2012) to 55 grams per capita and a day of grain legumes (Röös *et al.*, 2020). Still, the underlying increase in production would lead to challenges that originate from a lack of well-adapted cultivars, necessary processing facilities and lack of consumer awareness. At the field level, the largest hinders are preventing the spread of diseases, pests and weed control. The current study focuses on yellow peas (Pisum Saitvum L), a grain legume that has been cultivated in Sweden for an extended period and that farmers are familiar with.

3.9 Yellow Peas (Pisum Saitvum L).

Yellow peas have been a staple food in Sweden since the 13th century and have a long tradition of being eaten in a Thursday soup. It has been one of the most frequently cultivated legumes in Sweden with a production size of 48.900 tons in 2018 and it was grown on 0.8% of the Swedish cropland which corresponds to 18.000 ha. It is further assumed that yellow peas and Faba beans have the greatest potential for expansion of cultivation area among grain legumes in Sweden due to suitable climatic conditions (Swedish Board of Agriculture, 2020). Currently, 80% of the Swedish produced legumes are utilized as animal fodder and only 3 % are used for human consumption in Sweden, the remaining grain legumes are exported

to Asia (Tidåker *et al.*, 2021). Simultaneously, the production of yellow peas has decreased in recent years. However, a shift in demand has been observed for more human consumption (Johnson, 2019). In general, early signals of an increase in demand for grain legumes (processed or raw) have been detected which is linked to a rise in flexitarian and plant-based diets (Dagevos, 2014; Cusworth, Garnett and Lorimer, 2021). To accelerate this trend, it is important to assure that the benefits, such as the high efficiencies to utilize nitrogen to produce proteins in grain legumes are exploited. Utilizing grain legumes as fodder undermines its beneficial effects as the efficiency to convert to human food is reduced considerably. Hence, it is crucial that an actual increase in grain legume cultivation in Sweden would correlate with an increase in human consumption.

It is also important that the production meets a local demand to minimize GHG emissions through (long-distance) transportation. The origin of grain legumes as well as the state in which they are sold, pre-boiled or dried, makes a large difference in its potential environmental impact. One of the biggest factors is the distance grain legumes are transported by truck. The largest emissions are caused by the trading of legumes that are cultivated in Sweden and then boiled in another country to be shipped back to the Swedish market for consumption (Tidåker *et al.*, 2021). To enable consumers to make conscious decisions about the environmental impact of their food choices, it is important to enhance the transparency of the supply chain. Still, it is uncertain how this information will affect consumer choices.

3.10 Challenges of diversifying the Swedish food system.

Consumer choices should be considered while developing strategies to diversify farming systems in Sweden. Changes in the production level should correlate with consumers' demand to assure that more sustainable food systems can be developed. The current situation in which the largest shares of Swedish produced grain legumes are either utilized for animal fodder or are exported to Asia for human consumption is not solving the common challenges in our food systems. To make sure that the environmental benefits of integrating grain legumes are not outweighed by emissions caused through transportation or by inefficiencies connected to meat production, it is important to establish a Swedish demand for human consumption of grain legumes. Still, changing food choices is complex and difficult to achieve since food choices are often accompanied by taste preferences, social norms and culinary traditions (Sabaté and Soret, 2014). However, in the past century, a clear shift in dietary habits in Sweden has occurred moving to higher levels of meat consumption and an overall decrease in the consumption of milk (The Swedish

Board of Agriculture, 2009). This showcases the capability of the Swedish consumers to adapt their diets and hence new trends could be established.

The uptick of interest in sustainable diets can be utilized to build up the momentum to change consumer behaviour. Here, it is important that consumers can make accurate decisions about the sustainability of products. The important role of awareness about the benefits of more diversified crop systems on the consumer side was further stressed by an analysis of perceived bottlenecks for crop diversification. This study carried out by Id and colleagues (2020) identified multiple factors at different levels of the food system in 11 countries that block farmers from developing more diversified cropping systems (Id *et al.*, 2020). The results are based on interviews with 25 stakeholders that promote the diversification of farming systems in the context of a horizon Europe project, DiverIMPACTS (http://www.diverimpacts.net). The most frequently mentioned bottleneck at the market level was the lack of awareness and/or low visibility of benefits of diversification benefits. This study tries to answer the question of whether increasing awareness about the benefits of more diversified cropping systems affects consumer behaviour.

The effect of communicating the environmental impacts of food systems to consumers is influenced by multiple factors. A study conducted in France has shown that the communication of environmental benefits of integrating grain legumes had different impacts depending on the type of product presented. It was shown that providing information about environmental benefits had a positive effect on consumers´ WTP for ´organic ´ and ´organic & local´ lentils, whereas no effect was found for lentils without labels (Marette, 2021). This is associated with halo effects that exist with organic labels. Previous research (Yiridoe et al., 2005) has indicated that consumers connect a multitude of positive aspects with organic labels. These benefits include health, taste, nutritional values and safety issues showing that consumers make broad assumptions about the organic label. However, this effect is unlikely to be replicated for other ecolabel schemes (Röös and Tjärnemo, 2011). Building upon this, three different Swedish grain legume resellers are included in this study which vary in their scale of production and whether their products are organically certified or not. Through the integration of the different products a deeper insight into the effect of communicating environmental benefits to Swedish consumers is gained.

4. Materials and Methods

To test the aforementioned hypotheses an online survey has been constructed. In this study, a convenience sample has been used. This survey was sent out to all student email accounts of the Swedish University of Agricultural Sciences (SLU), shared with employees of the Department of Biosystems and Technology (SLU) and the Department of Ecology (SLU), and the researchers/employees, in turn, shared the survey link to other friends, organizations, and the general public. The largest proportion (91.4%) utilized the link that was sent out through the student email accounts. To promote participation, an opportunity to take part in a lottery was offered. The lottery winner won a 50% discount voucher for the online shop of Nordisk Råvara. The Survey was constructed in Qualtrics and the average response time was advertised as 10 to 15 minutes. The questionnaire was first written in English and then translated into Swedish with the help of a native speaker. Subsequently, the translation was read and corrected by another native Swedish speaker before sending it out. Before making the survey public, a pilot test with 12 participants was performed to gather feedback and to work on further improvements.

4.1 Survey Structure

At the beginning of the survey participants were briefly introduced to the study and signed an informed consent that their data will only be utilized for research purposes. Hereby, participants were informed that the study surrounds food choices and that they will be asked questions about themselves and their food choices. A list of survey questions can be found in Appendix 1 (pp.70). A prerequisite to the participation was to be at least 18 years old. Afterwards, a measure of participants´ values was placed to assure that the responses were genuine and not influenced by the experimental design. Subsequently, two brief descriptions of the companies were provided. Then participants were asked to indicate their WTP for one package of Swedish produced yellow peas from one of the two companies included in the experimental condition they were assigned to. This was followed by information about the environmental benefits of cultivating grain legumes in Sweden. Thereafter a second round of measuring participants' WTP took place, however this time the yellow peas were from the second company. Next participants chose

between the two presented products followed by measures of their general food choices, their grain legume consumption, and general demographics. In the subsequent, the individual measures are presented in detail.

4.2 Environmental Schwartz Value Measure.

To measure personal values that influence the decision-making process in the context of pro-environmental behaviour, the Environmental Schwartz Value Survey (E-SVS) was used (de Groot and Steg, 2008; Steg *et al.*, 2014; Bouman, Steg and Kiers, 2018). The four values of interest are egoistic, hedonic, altruistic and biospheric. The E-SVS includes 16 items of which 14 are originating from the original Schwartz Value Survey (SVS) (Schwartz, 1994) and two additional items to measure biospheric values since they are thought to be underrepresented in the original SVS (Stern, Dietz and Guagnano, 1998). The E-SVS includes 16 different value statements (e.g, "Unity with nature") followed by short descriptions (e.g., "fitting in with nature") that clarify the meaning of the statement. Following Bouman, Steg and Kiers (2018), each value statement is accompanied by a 9-point Likert scale which ranges from -1 (opposing to my values) to 0 (not important) to 6 (very important) to 7 (of supreme importance). This was done to enable participants to differentiate between the importance of different values items as suggested by Schwartz (2012). The 16 items are clustered into the four overarching groups of values. The hedonic value is measured by three items (e.g.," Self-indulgence"), egoistic by five items (e.g., "Being ambitious"), altruistic by four items (e.g., "Helpful") and biospheric value by four times (e.g., "Unity with Nature"), see *figure 2* for an overview over the different items and how they connect to the overarching values. Following Schwartz (1992), participants were instructed to rate the importance of the value statements as a guiding principle in their lives. Simultaneously, participants were prompt to vary their responses and were reminded that usual respondents only rate two value statements with "of supreme importance" *(see the appendix pages 70 and 71 for the whole measure)*. This was done to achieve variation in the responses of the participants. The overall mean scores for the different values were as following egoistic (M = 4.37, SD = 1.22, α = 0.73), hedonic (M = 6.67, SD = 1.24, α = 0.76), altruistic (M = 7.25, SD = 1.15, α = 0.76) and biospheric values (M = 7.29, SD = 1.24, α = 0.81) these mean scores were later utilized in the analysis.

Values	*Means*	*Standard Deviations*	*Cronbach´s alpha (α)*
Hedonic *1. Pleasure* *2. Enjoying life* *3. Self-Indulgent*	6.67	1.24	0.76
Egoistic *4. Social Power* *5. Wealth* *6. Authority* *7. Influential* *8. Being Ambitious*	4.37	1.22	0.73
Altruistic *9. Equality* *10. A world at Peace* *11. Social Justice* *12. Helpful*	7.25	1.15	0.76
Biospheric *13. Respecting the earth* *14. Unity with nature* *15. Protecting the environment* *16. Preventing pollution*	7.29	1.24	0.81

Figure 2. Presents the overarching clusters of values and the items they were measured with. Furthermore, Means, Standard Deviation and Cronbach´s alpha of the items are reported.

4.3 The offered products.

			
Observed prices in stores not revealed in Study	45 SEK	11 SEK	13.95 SEK

Figure 3. Shows the three different products used in the study. On the left is Nordisk Råvara (small-scale organic) next to GoGreen Lantmännen (conventional) in the middle and ICA I love Eco (organic) on the right. All packages hold 500 grams of Swedish produced yellow Peas.

The three products included in the study were selected because they ought to be representative of the Swedish market for Swedish produced yellow peas. *Figure 3* shows the packages presented to participants. Each package contains 500 grams of yellow peas. The brands chosen were *Nordisk Råvara*, *GoGreen Lantmännen* and *ICA I love Eco*. All yellow peas are produced in Sweden and are organically certified besides *GoGreen Lantmännen*. The companies vary in their size of production and their organizational structures. The yellow peas of *Nordisk Råvara* are a niche product that can only be found in some supermarkets, independent shops and online shops across Sweden. Whereas the other products are commonly

available in supermarkets. To assure that participants are aware of the operations and goals of the different companies; descriptions were provided. Below you will find the descriptions of the companies included in the study.

Nordisk Råvara

Nordisk Råvara is a small company that works in close cooperation with 25 Swedish farmers. They aim to enable Swedish farmers to grow food in a good way by offering a market channel. The company ensures that its products are produced locally and with care for the environment. Further, they encourage farmers to try new methods of crop cultivation. They sell organically certified lentils, peas, beans and quinoa. All their products are produced in Sweden.

GoGreen

GoGreen is part of the Lantmännen group, which is a large-scale agricultural cooperative and is owned by 20.000 Swedish farmers. It includes many different branches and brands. The focus of GoGreen is to make sustainable food easier to access and more fun. The assortment includes dried grains, processed food and boiled legumes. The company sells diverse Swedish products as well as non-Swedish produce, some of the produce is organically certified.

ICA I love Eco

"ICA I love Eco" is part of the ICA group, which is a large company and has stakes in real estate, banking and pharmacy besides grocery retail. ICA is the leading supermarket chain in Sweden with around 1.300 stores across Sweden. ICA has multiple lines of products in their offer. One of their collections is "ICA I love Eco", which includes organically produced and certified products from around the world. Their focus is to offer organic products at a low price. In this collection, they include some Swedish products.

Figure 4. Shows the Information about the different resellers presented to participants in the study. Each participant received the corresponding descriptions of the two companies that were included in their assigned condition.

4.4 Questions about the relation to the presented company.

Each participant received two information texts about the companies included in their experimental condition. The information was presented on individual pages in the survey with the logo of the company. After each presentation of the company, participants were asked to answer questions about their relationship with the company. The first question was whether they have ever purchased a product from the described company. It was followed by a question on how they perceive the company with a 5-point scale ranging from 'very positive' to 'very negative'. Participants were further asked about the level of trust they experience towards the company with a 5-point scale ranging from 'very much' to 'not at all'. The information text on the companies was introduced to assure that participants are familiar with the goals and operations of the different companies. Hereby, the descriptions texts were based on information provided on the webpages of the different companies in *Figure 3* the information texts are displayed.

4.5 The measure of participants´ Willingness-to-pay.

The experimental design of the study consisted of a pretest-posttest experimental design. In this, it was looked at whether the provision of information about the environmental benefits of grain legume cultivation influenced participants´ WTP for Swedish yellow peas. Therefore, the WTP of participants was once measured before the presentation of information on the environmental benefits of cultivating grain legumes in Sweden and a second time after the provision. To minimize potential order effect that could cause biases in participants' responses, the order of products has been randomized. To further control for the different companies and whether the effect of information provision was influenced by the reseller company, participants were asked to indicate their WTP for one company´s product before information provision on environmental benefits and for another company after. This design allowed us to compare the effect of information across different participants by comparing pre-information WTP measures with post-information WTP measures across participants for the same product. It further gave the possibility to look at the effect of WTP within participants independent of the products by looking at the pre-information WTP and comparing it to the post-information WTP. The experimental design was as follows:
Participants were randomly assigned to one of the six conditions. Depending on the condition they were assigned to participants were presented with two informational texts about the operations and goals of the company, as presented in *figure 4*. Afterwards, a picture of two yellow pea packages of the previously described companies were presented. The brands of the yellow peas were dependent on the

experimental condition of the participant. With the image of the packages came a short description and the instruction that they will have the opportunity to indicate their WTP for the products as well as their assumed actual price in the next part of the study. Next, one of the two products was presented with a slider for the WTP and one for the assumed actual price. Both sliders ranged from 0 SEK to 100 SEK. Before moving on to the second product, information about the environmental benefits of including grain legumes in Swedish cropping systems was presented, see *Figure 6* for the full informational text. This information included three benefits of integrating grain legumes on the field level in Sweden. Namely a decrease in nitrogen application for the legume crop and subsequent crops, beneficial effects for pollinators and prevent the spread of diseases. After receiving the information, participants were asked to indicate whether the information provided is novel to them and whether they think this information is valuable to them as consumers. Subsequently, participants were asked to indicate their WTP and their assumed actual price for the second product. Following this task, participants chose between the two products when no price difference was assumed. They further had the opportunity to add reasoning for their choice into a text box. *Figure 5* presents the six different conditions resulting from the study design and illustrates the structure of product presentation, information provision and evaluation of the WTP for the different products. Illustrated are the three different combinations of products. In this, each product has either been placed in the first WTP measure or the second WTP measure dependent on the experimental condition of the participant. Every type of product has only been subject to one evaluation of WTP per participant. Thus, participants indicated their WTP two times in the whole survey: Ones for one of the products at the first measurement time point (pre-information) and a second time for another product at the second measurement time point (post-information).

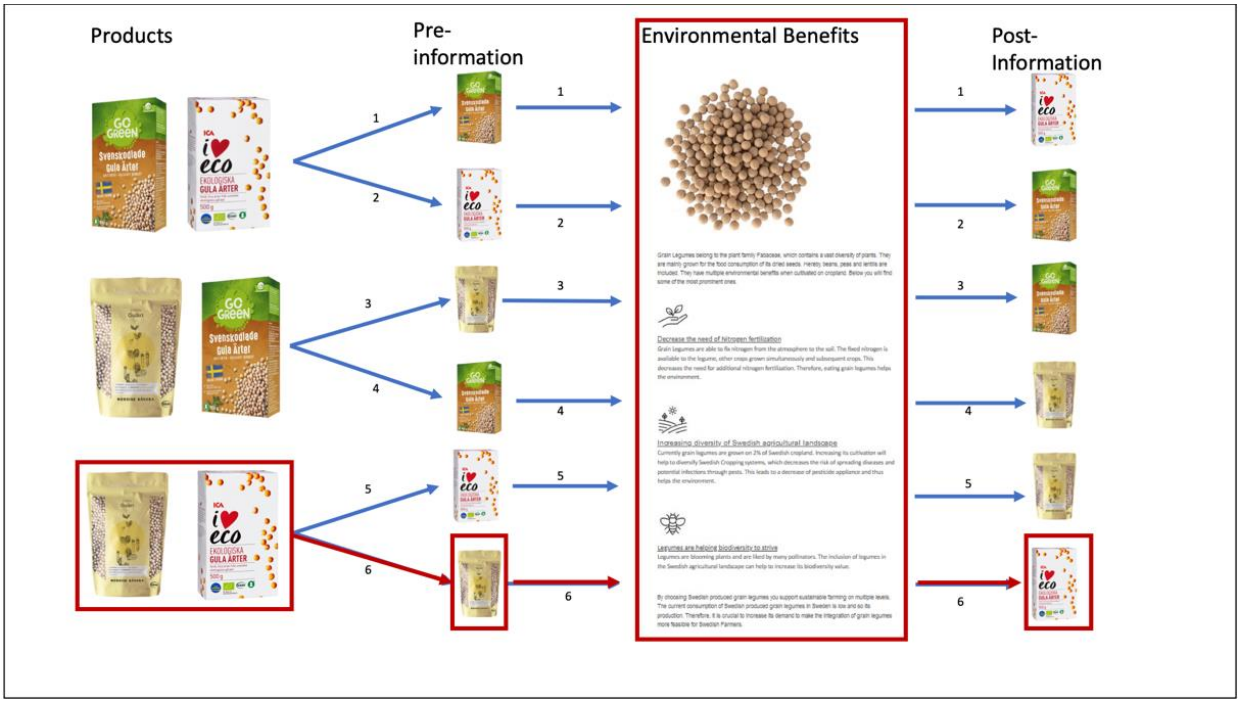

Figure 5. Presents the different conditions to which participants were randomly assigned to. Hereby, participants were first introduced to the two products, which are part of the study (Products). Afterwards, participants were asked to indicate their WTP and the assumed actual price for one of the products (Pre-information). Then the environmental benefits were presented (Environmental benefits, see Figure 3 for full text) followed by the evaluation of WTP and assumed actual price for the second product (Post-information). One of the six experimental conditions participants could have been assigned to is marked by red colour. The small numbers on the arrows indicate the six different conditions.

Grain Legumes belong to the family of Fabaceae, which contains a vast diversity of plants. They are mainly grown for the food consumption of its dried seeds. Hereby, beans, peas and lentils are included. They have multiple environmental benefits when cultivated on cropland. Below you will find some of the most prominent ones.

Decrease the Need of Nitrogen fertilization

Grain Legumes are able to fix nitrogen from the atmosphere to the soil. The fixed nitrogen is available to the legume and subsequent crops, which decreases the need for additional nitrogen fertilization. Therefore, eating grain legumes helps the environment.

Increasing diversity of Swedish agricultural landscape

Currently grain legumes are grown on 2% of Swedish agricultural land. Increasing its cultivation will help to diversify Swedish Cropping systems, which decreases the spread of diseases and potential infections through pests. This leads to a decrease of pesticide appliance and thus helps the environment.

Legumes are helping biodiversity to strive

Legumes are blooming plants and are liked by many pollinators. The inclusion of legumes in the Swedish agricultural landscape can help to increase its biodiversity value.

By choosing Swedish produced grain Legumes you support sustainable farming on multiple levels. The current consumption of Swedish produced grain legumes in Sweden is low and so its production. Therefore, it is crucial to increase its demand to make the integration of grain legumes more feasible for Swedish Farmers.

Figure 6. Presents the information about environmental benefits presented to participants in the study.

4.6 General Information about food choices

The Survey continued by asking participants to indicate general information on their food choices. In this, a list of ten different attributes of food items was presented followed by the question of how important each attribute is for them to make food choices. The ten attributes are taste, price, accessibility, locality, convenience, health, dietary restrictions, seasonality, environmental concern and pleasure of consuming. Participants indicated the importance on a 5-point Likert scale ranging from 'not at all important' to 'extremely important'. On the same page, participants indicated how often they consume meat products in their diet on a 5-point Likert scale ranging from ´Never´ to ´Multiple Times per Week´. The questionnaire continued with the question to what extent participants can identify themselves as vegetarian, vegan, flexitarian, LOHAS, meat-eater, and fish-eater. In this each participant indicated how much they can identify themselves with the presented diet regime, ranging from not at all to strongly identified. Additional explanations were provided for the LOHAS *(Abbreviation for Lifestyles of Health and Sustainability: used to refer to people who are interested in healthy living and social and environmental issues, and who buy products related to this.)* and Flexitarian diet *(Are people who are mostly consuming vegetarian and vegan meals, however, they still eat meat.).*

4.7 Measures on grain legume consumption.

Towards the end of the survey questions, participants answered four questions about their consumption of grain legumes. The questions were: (1) "How often do you eat grain legumes?" followed by five options ranging from ´never´ to ´multiple times per week´. (2) "How much grain legumes do you intend to eat in the future in comparison to current consumption after receiving information provided in the questionnaire?" followed by five options ranging from ´much less´ to ´much more´. (3) "What is the biggest reason for you not to eat more grain legumes?" followed by five options which included ´difficult to prepare´; ´not to my taste´; ´hard to digest´, ´lack of recipes´ and ´not applicable to me´. (4) "In which condition do you most commonly buy grain legumes?" followed by four options, namely ´pre-boiled`; `dried` ; `processed similar to Tofu` and `None of the options`.

4.8 Manipulation check for information about environmental benefits.

The participants were asked to answer questions about the environmental benefits associated with the cultivation of grain legumes in Sweden. This was done to assess whether participants have read and understood the information provided or not. To receive feedback about their understanding of the content of the information provided, participants were asked two questions, the questions were: (1) "what have you learned about grain legumes during the study?" followed by three choices (multiple answers were possible), the choices were: "There are different Swedish resellers."; "Growing grain legumes in Sweden has environmental benefits." and "Grain legumes are part of the Fabaceae plant family". (2) "What have you learned about environmental benefits of grain legumes during this study?" followed by five options (multiple answers were possible), the choices were: "They are a good alternative source of proteins compared to animal protein."; "They help to decrease the spread of crop diseases."; "They are easy to store."; "Decrease the need for chemical fertilizer." and "None of the options."

4.9 Statistical Analysis

The distribution of the data was analysed through a Kolmogorov-Smirnov normality test and a Shapiro-Wilk test to check for the assumption of a normal distribution and to choose the most appropriate statistical methods to analyse the gathered data on participants´ WTP. The Kolmogorov-Smirnov normality test tests the null hypothesis that the gathered data could have been collected from a normal distribution. The result of the test yielded that the distribution of pre-information WTP of participants differed significantly from a normal distribution ($D(339) = 0.110$, $p < 0.001$). Likewise, the distribution of participants WTP in the post-information condition significantly differed to a normal distribution ($D(339) = 0.111$, $p < 0.001$), similar results were found for the mean WTP (across the pre-and post-information measure) of participants ($D(339) = 0.088$, $p < 0.001$). The results of the Shapiro-Wilk test indicate whether a continuous variable follows a normal distribution or not. It yielded that the distribution of participants´ WTP in the pre-information condition differed significantly from a normal distribution ($W(339) = 0.950$, $p < 0.001$). Similar results were found for participants´ WTP in the post-information condition ($W(339) = 0.973$, $p < 0.001$) and for participants mean WTP ($W(339) = 0.088$, $p < 0.001$). Based on these results, non-parametric tests have been used for the analysis of participants´ WTP. *Figure 7* summarizes the results of the check for normal distributions in the data.

	Kolmogorov-Smirnov			*Shapiro Wilk*		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre-information WTP	0.110	339	< 0.001	0.950	339	< 0.001
Post-information WTP	0.111	339	< 0.001	0.973	339	< 0.001
Mean WTP	0.088	339	< 0.001	0.973	339	<0.001

Figure 7. Visualizes the results of the tests for normality of the distributions for participants´ WTP at pre-information and post-information measurement.

To test the first hypothesis that a main effect of information on participants´ WTP exists, a Wilcoxon Signed Rank Test was used. This test is the simplest form of a repeated measure design and matches a pair-wise t-test in its properties (Woolson, 2008). Consequently, it was tested whether participants´ WTP differed significantly across the two measurement points by assigning ranks to the indicated WTP (pre-and post-information provision).

Mann-Whitney U test was used to analyse the second hypothesis that the effect of information is influenced by the product presented. The Mann-Whitney U test functions similarly to a two-sample t-test but does not infer any assumption about a normal distribution of the data (McKnight and Najab, 2010). The compared WTP of each product was measured between participants since each participant has only evaluated one product before or after the provision of information. Thus, two independent samples were used to compare the indicated WTP pre- and post-information provision for each product.

A Spearman's rho correlation was used to test the third hypothesis, that a difference between pre-and post-information WTP would correlate positively with participants´ endorsement of biospheric values. Spearman´s rho correlation was chosen due to its ability to indicate whether two non-normally distributed variables are correlating (Myers and Sirois, 2006). The same method was used to analyse the relationship between endorsement of biospheric values and WTP at pre-and post-information measurement.

To test whether the WTP of participants differs for the different products, namely *Lantmännen GoGreen* (conventional), *ICA I love ECO* (organic) and *Nordisk Råvara* (organic & small-scale), two Kruskal-Wallis tests have been performed. A Kruskal-Wallis test is a non-parametric test that compares three or more groups on a single non-normally distributed dependent variable (McKight and Najab, 2010). Thus, it has similar properties as a One-way ANOVA but compares

ranks instead of mean scores. Two tests were performed one for the pre-information WTP and the second for the post-information WTP. Furthermore, Kruskal-Wallis tests were used to compare differences between WTP and assumed actual prices for the different products.

The analysis was performed with the statistical tool IBM SPSS 24.

5. Results

5.1 Descriptive statistics

In total 443 respondents participated in the survey. 104 responses were excluded due to insufficient completion of the survey resulting in a total sample size of 339 participants. The sample was overall well educated with 70.5% holding a bachelor's degree or a higher university degree. More females (74.6%) than males participated in the study (22.7%), 4 people indicated that they do not follow the binary sex classification and 5 participants preferred not to say. Participants' ages ranged from 19 to 76 years with a mean age of 28.99 (*SD=9.00*). Most of the participants (85.5%) earned less than 26.100 SEK (1 SEK= approx. 0.11 USD) per month before taxation and are thus earning less than the Swedish average. The remaining participants indicated in similar proportions that they either earn between 26.100 and 36.100 SEK (7.4%) or more than 36.100 SEK (7.1%). The largest group of participants is currently living in Sweden (96.2%) and are thus relevant to the Swedish food system. Most of the participants were students (40.2%) followed by students who are additionally employed (11.8%) and people with full-time employment (11.8%). See *Figures 8, 9, 10 and 11* for visualization of the demographics.

	Lower than 26.100 SEK per month	Between 26.100 SEK and 36.100 SEK per month	Higher than 36.100 SEK per month	Total
Frequency	288	25	24	337
Percentage	85.5	7.4	7.1	100

Figure 8. Presents the average income of participants.

	Range	Mean	SD
Age	19 - 76	28.99	9.00

Figure 9. Presents the age range, mean age, and standard deviation of participants´ age.

.

	Less than High school	High School	Technical/ Vocational	University Degree, Bachelor	University Degree, Master	Higher University Degree	Total
Frequency	1	95	4	145	63	31	339
Percentage	0.3	28.0	1.2	42.8	18.6	9.1	100

Figure 10. Presents participants´ level of education.

	Employed full time	Employed part time	Un-employed looking for work	Retired	Student	Student and employed	Self-employed	Total
Frequency	40	6	8	3	238	40	4	339
Percentage	11.8	1.8	2.4	0.9	70.2	11.8	1.2	100

Figure 11. Presents participants´ working situation.

5.1.1 Consumption of grain legumes.

The reported frequencies of participants' grain legume consumption are presented in *Figure 12*. In this, the greatest proportion of participants consumes grain legumes regularly, about once a week (37.8%). This was followed by participants that consume grain legumes multiple times per week (32.7%). This shows that the largest proportion of participants (70.5%) includes grain legumes into their diet frequently. Only 0.3% of participants indicated that they do not eat any grain legumes.

How often do you eat grain legumes?

	Never	*Rarely, about once a year*	*Occasionally, about once a month*	*Regularly, about once a week*	*Multiple times per week*	*Total*
Frequency	3	16	81	128	111	339
Percentage	0.9	4.7	23.9	37.8	32.7	100

Figure 12. Presents the frequency and percentages of participants' consumption patterns of grain legumes. It shows that the majority of participants (70.5%) consumes grain legumes at least regularly.

5.1.2 Commonly bought conditions of grain legumes.

Participants indicated in which condition they most commonly buy grain legumes. It was shown that the largest proportion of participants buys pre-boiled grain legumes (48.1%), followed by dried grain legumes (36.1%) and only a few participants buy processed grain legumes similar to tofu (5.3%). This information provides an insight into consumption patterns of grain legumes which can be useful in the light of developing a new product. The results are further visualized in *Figure 13*.

In which condition do you most commonly buy grain legumes?

	Pre-boiled	*Dried*	*Processed similar to Tofu*	*None of the Options*	*Total*
Frequency	163	122	18	35	338
Percentage	48.1	36.1	5.3	10.4	99.7

Figure 13. Presents in which condition participants consume their grain legumes most frequently. The largest proportion of participants (48.1%) consumes their grain legumes pre-boiled.

5.1.3 The biggest perceived hinders to consuming more grain legumes.

Participants indicated that a lack of recipes (26.3%) is one of the most dominant hinders to increasing their consumption. Whereas difficulty to prepare has only been a barrier to a small proportion of participants (5.3%). See *Figure 14* for a whole illustration of the results.

What is the biggest reason for you not to eat more grain legumes?

	Difficult to prepare	*Not to my taste*	*Hard to digest*	*Lack of recipes*	*Not applicable to me*	*Total*
Frequency	18	40	45	89	144	336
Percentage	5.3	11.8	13.3	26.3	42.5	99.1

Figure 14. Shows the responses of participants to the question of what hinders them from consuming more grain legumes. Here it is noteworthy that 26.3% stated that they experience a lack of recipes.

5.1.4 Future intentions to eat grain legumes.

Most participants indicated that they would continue eating the same amount of grain legumes after receiving the information provided in the study (58.4%). Whereas 36.3% indicated that they would increase their consumption to some extent. In *Figure 15*, you can find a summary of the responses.

How much grain legumes do you intend to eat in the future in comparison to current consumption after receiving the information provided in this questionnaire?

	Somewhat less	*About the same*	*Somewhat more*	*Much more*	*Total*
Frequency	5	198	123	13	339
Percentage	1.5	58.4	36.3	3.8	100

Figure 15. Presents participants´ responses to the question of how their grain legume consumption is likely to change after receiving the information provided in the study. In this, the majority (58.4%) is likely to consume the same amount and 36.3% are willing to increase their consumption to a certain extent.

5.1.5 Difference Between shelf price and WTP.

Participants WTP differed across the different resellers of Swedish yellow peas. To understand whether the WTP of participants corresponds to actual price differences between the products, actual shelf prices were compared to participants´ WTP. Here, it is observed that participants indicated the highest WTP for the yellow peas of *Nordisk Råvara*, however, it corresponds to a shelf price that is even higher resulting in a negative difference between WTP and actual price (-7.60 SEK). In contrast, the two averages of WTP for *Lantmännen GoGreen* and *ICA I love eco* are higher than the observed shelf price. The comparison is summarized in *figure 16*.

	Nordisk Råvara	*Lantmännen GoGreen*	*ICA I love Eco*
Mean WTP in SEK	37.40	32.48	30.16
Shelf price in SEK	45.00	11.00	13.95
Difference in SEK	-7.60	21.48	16.21

Mean Assumed actual price in SEK	41.30	29.95	27.60

Figure 16. Means of WTP for the different products are presented alongside shelf prices, differences between mean WTP and Shelf Prices and Mean assumed actual prices.

5.1.6 Participants' choice of Product when no price differences were assumed.

Responses of participants to the question 'which product they would have chosen if the same price would have been assumed' are shown in *Figure 17*. The results yield that most participants would have chosen *Nordisk Råvara* (74.1 %; 87.5%) over *Lantmännen GoGreen* (20.5%) or *ICA I love Eco* (7.1%). When participants were asked to choose between *Lantmännen GoGreen and ICA I love Eco* the majority chose *Lantmännen GoGreen* (61.1 %). This indicates that most participants would choose the product of *Nordisk Råvara* (small-scale and organic) when no price differences were assumed. Whereas most participants indicated a preference to choose *Lantmännen GoGreen* (non-organic) over *ICA I love Eco* (organic) when confronted with this choice.

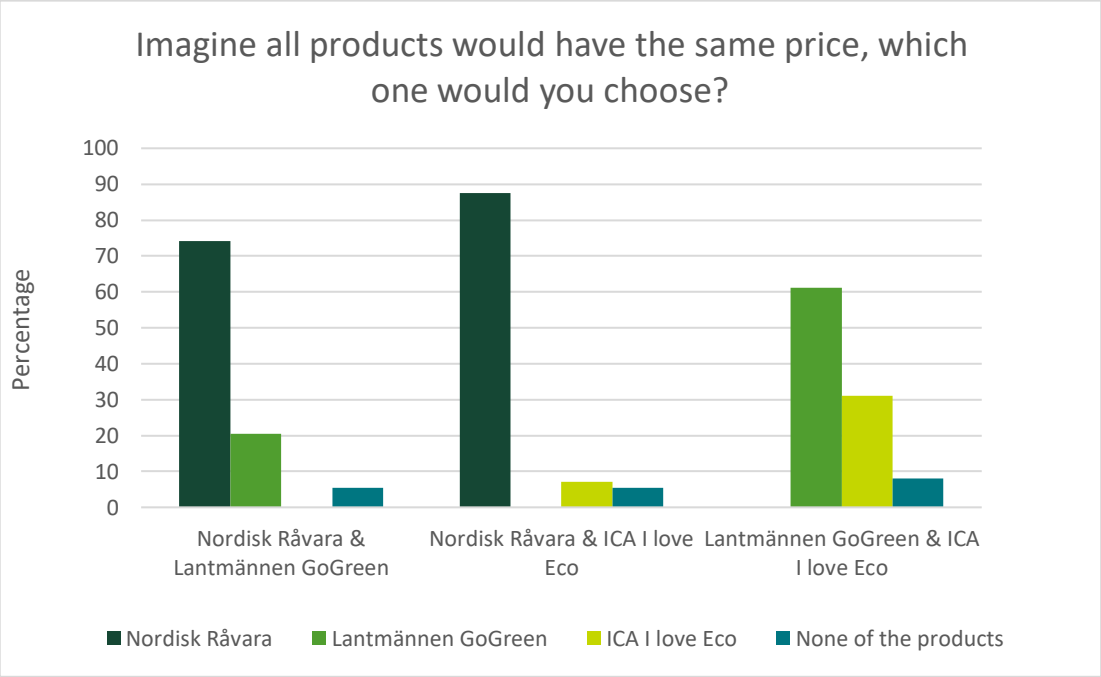

Figure 17. Illustrates participants' preference for products when the same prices are assumed. Responses are presented in percentages. Responses are further sorted into the three different conditions participants were allocated to (Nordisk Ravara & Lantmännen GoGreen; Nordisk Ravara & ICA I love Eco; Lantmännen GoGreen & ICA I love Eco).

5.2 Hypotheses Testing

5.2.1 Information provision and its effect on WTP.

Hypothesis 1

"The provision of information about environmental benefits of integrating grain legumes in the Swedish agricultural landscape increases consumers' Willingness-to-pay for Swedish produced yellow peas."

Results showed that participants indicated a WTP of 33.15 ± 13.41 SEK (Mean ± SD) in the pre-information evaluation (before the information was provided on the environmental benefits of cultivating grain legumes), while in the post-information the WTP was 33.54 ± 13.66. A Wilcoxon Signed Ranks Test yielded no significant differences in the distributions across the time points of measurement (T = 16606.50, z = -0.92, p = 0.36). Thus, there is no indication of an effect of the information about environmental benefits on participants´ WTP. Therefore, the first hypothesis of a main effect of the information provision on participants´ WTP has been rejected.

5.2.2 Information provision and the scale of the retailer company.

Hypothesis 2

"The extent of the increase in Willingness-to-pay is influenced by the goals and operations of the reseller, hereby, the increase will be the greatest for the small-scale organic reseller (Nordisk Råvara). "

The results reject the hypothesis and show there was no significant effect of the information about environmental benefits on participants´ WTP. The Mann-Whitney U test showed that the WTP for *ICA I love Eco* did not differ significantly across the two measurement points (p = 0.48). The mean of WTP for *ICA I love ECO* in the pre-information condition was 30.66 ± 12.41 SEK and 29.64 ± 12.67 SEK for post-information. The distributions did not differ significantly (Mann-Whitney U = 6060.50, n_1 = 117 n_2=110, p > 0.05). The means of WTP for *Nordisk Råvara* were 37.71 SEK in the pre-information condition and 37.17 SEK in the

post-information condition. The Mann-Whitney U test for *Nordisk Råvara* (p = 0.92) yielded that there was no significant difference in the distribution (Mann-Whitney U = 6275.50, n_1 = 109 n_2 = 116, p > 0.05). The means of WTP for *Lantmännen GoGreen* were 31.35 ± 11.34 SEK in the pre-information condition and 33.63 ± 14.05 SEK in the post-information condition. Here also, the Mann-Whitney U (p = 0.24) test showed no significant differences in the distributions (Mann-Whitney U =5804.00, n_1 = 113 n_2 = 113, p > 0.05). Overall, there was no effect of the information on the distribution of participants´ WTP to pay for the yellow peas for the different products. *Figure 18* visualizes the mean WTP for the different products across the two measurement points.

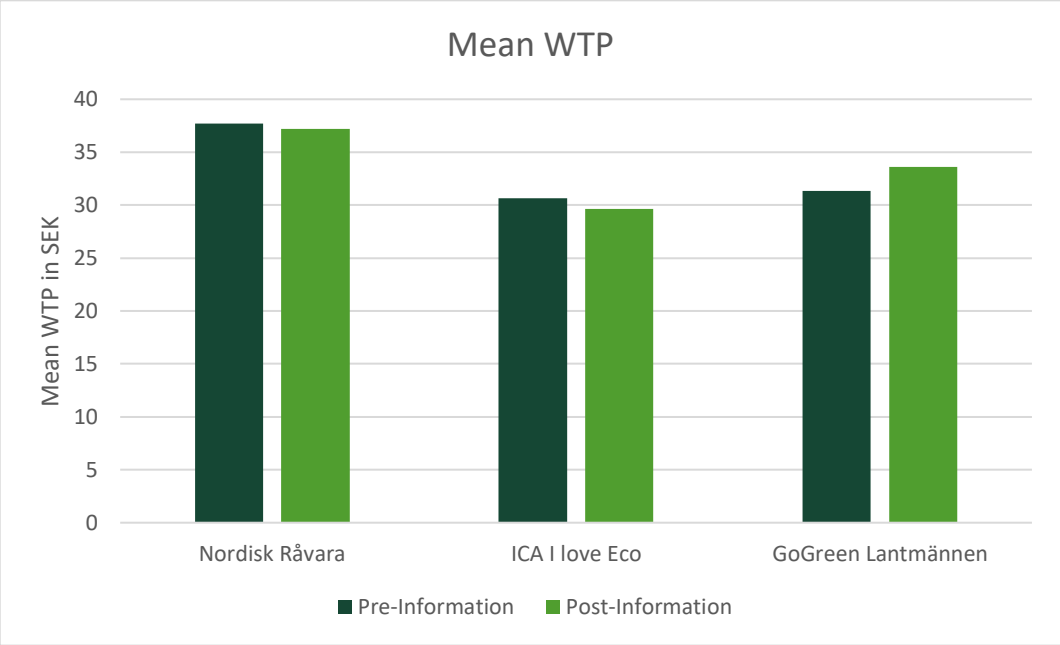

Figure 18. The mean WTP of the three different products for pre-and post-information.

5.2.3 Endorsement of biospheric values and the difference between pre-and post-information WTP.

Hypothesis 3

"An increase in Willingness-to-pay correlates positively with participants scores on biospheric values."

Spearman's rho correlation yielded that there is no significant correlation between participants´ endorsement of biospheric values and their indicated difference between pre-and post- information WTP (r_s (337) = -0.106, p = 0.05). Hereby,

difference between pre-and post- information scores have been calculated (*M* = 0.39, *SD* = 10.01) and correlated to participants scores on biospheric values (*M* = 7.29, *SD* = 1.24). Thus, there is no significant indication that the endorsement of biospheric influenced the effect of the information about environmental benefits in the sample.

5.3 Effect of personal values on WTP.

Further analyses were performed to gain a deeper understanding of the relationship between participants´ personal values and their WTP for Swedish produced yellow peas. In this context, mean scores of participants´ WTP between the two measurement points (pre-and post-information) have been calculated (*M* = 33.35, *SD* = 12.58) and correlated to participants´ scores on biospheric, altruistic, egoistic and hedonic values. Spearman´s rho correlation analysis yielded that the mean WTP correlated significantly with participants' biospheric values (r_s (337) = 0.15, $p < 0.01$). According to Frey (2018), a correlation coefficient of 0 to 0.19 means that no correlation or a very weak correlation exists. Therefore this analysis shows that the endorsement of biospheric values had no or a very weak effect on participants´ WTP for Swedish yellow peas.

	Biospheric	*Altruistic*	*Egoistic*	*Hedonic*
Correlation Coefficient	0.150	0.099	-0.052	0.039
Significance (two-tailed)	0.006*	0.068	0.336	0.480

Figure 19. Presents Spearmens´ rho correlation between participants´ mean WTP (M = 33.35, SD = 12.58) and participant´s scores on biospheric, altruistic, egoistic and hedonic values. The results show that biospheric values correlated significantly but weakly with participants´ mean WTP.

5.4 Initial WTP for different Products.

The Kruskal-Wallis tests showed that significant differences across the three products exist in the pre- (chi-square = 15.31, $p < 0.01$, *df* = 2) and post-information condition *(chi-square* = 18.74, $p < 0.01$, *df* =2). A post hoc analysis showed that the WTP for *Lantmännen* GoGreen (*chi-square* = -41.14, $p < 0.01$, *df* = 1) and *ICA I love ECO* (*chi-square* = -46.94, $p < 0.01$, *df* = 1) significantly differed to the WTP for *Nordisk Råvara* in the pre-information condition. Whereas in the post-information condition significant differences in WTP were found between all three products. In *Figure 8,* the results are presented through a mean plot of the WTP for

the different products. Visualizing mean scores across the two measurement points, pre-and post-information. This implies that a difference in the WTP for the different products exists, independent of the manipulation. Meaning that the information on environmental benefits of grain legume cultivation did not influence participants´ WTP, whereas the results show that significant differences in WTP between the products existed. Here, it has been found that the WTP for yellow peas from *Nordisk Råvara* is the highest followed by *GoGreen Lantmännen* and *ICA I love Eco*.

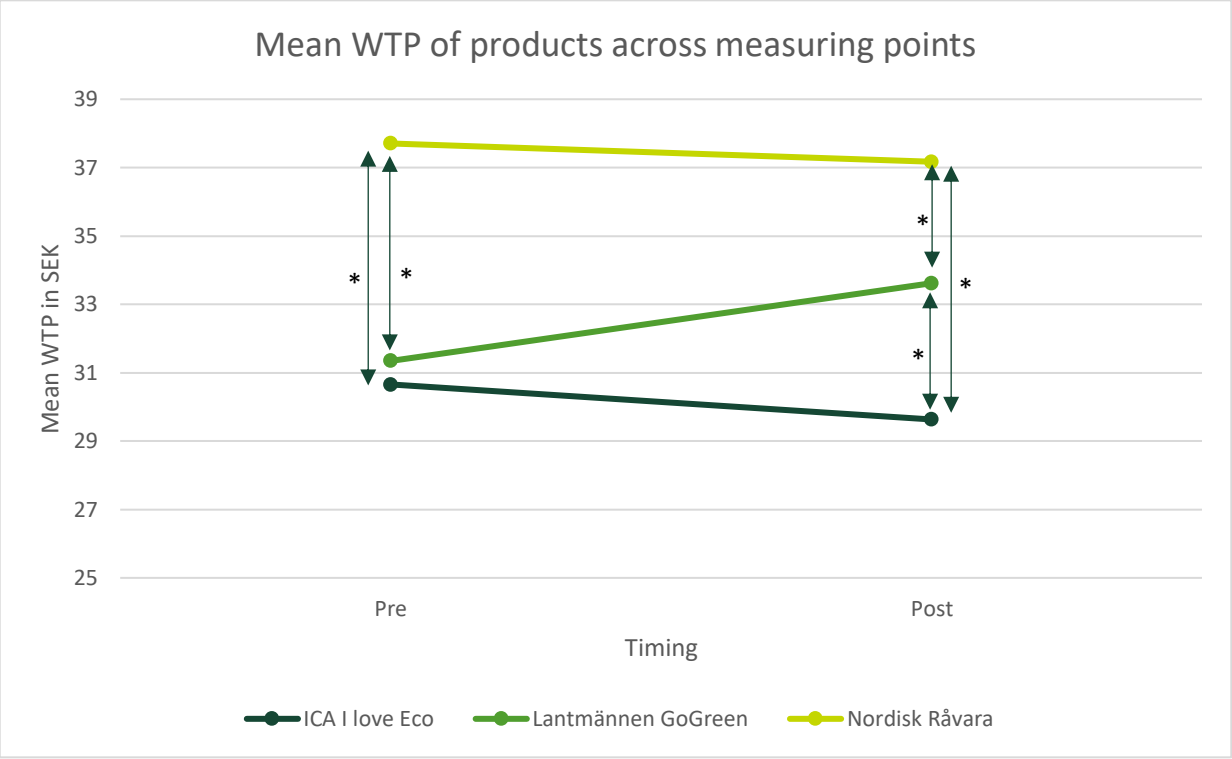

Figure 20. Mean values of WTP for the different products across the different conditions. Significant differences (p <.05) are marked by an arrow and a star (*) between the mean WTP of the products.

5.5 Difference between WTP and assumed actual price.

To receive an indication of whether the WTP of participants would translate into a willingness to buy the product, the actual assumed price of participants was compared to the WTP for the different products. In this, a positive difference between WTP and the assumed actual price would suggest that participants are willing to buy the product because their WTP would be higher than their assumed actual price. A Kruskal-Wallis analysis yielded that differences between the

products existed in the pre- (*chi-square* = 19.48, $p < 0.01$, $df = 2$) and post-information condition (*chi-square* = 17.16, $p < 0.01$, $df = 2$). It was found that the difference between assumed actual price and WTP was significantly lower for *Nordisk Råvara* than *GoGreen Lantmännen* (*chi-square* = 54.86, $p < 0.01$, $df = 1$) and *ICA I love Eco* (*chi-square* = 43.88, $p < 0.01$, $df = 1$) in the pre-information condition. In the post-information condition, a similar trend was observed in which the *Nordisk Råvara* product had significantly lower mean ranks than *ICA I love Eco* (*chi-square* = 47.50, $p < 0.01$, $df = 1$) and *Lantmännen GoGreen* (*chi-square* = 45.23, $p < 0.01$, $df = 1$). It is further observed that the mean differences were positive for *GoGreen Lantmännen* and *ICA I love Eco* suggesting that participants would be willing to pay the actual assumed price whereas the difference for *Nordisk Råvara* was negative. Furthermore, this trend did not change for the products through the provision of information. It can be further seen from *Figure 9* that the mean differences decreased for *Nordisk Råvara* and *ICA I love Eco* whereas it slightly increased for *Lantmännen GoGreen*.

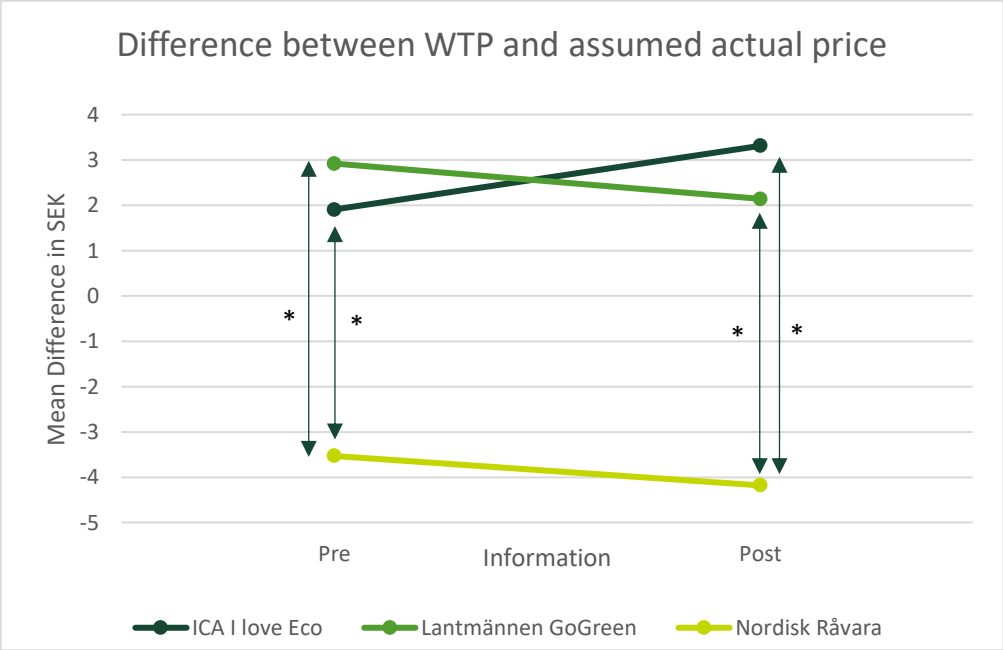

Figure 21. Illustrates the mean differences between WTP and actual assumed price across pre-and post-information measurements. Significant differences ($p < 0.05$) are marked by arrows and stars.

6. Discussion

This study attempts to give an insight into Swedish grain legume consumption and consumers´ decision-making processes. Three hypotheses have been tested which looked at the provision of information about environmental benefits and whether it influences participants´ WTP for Swedish yellow peas or not. The results yielded that there was no effect of the information about the environmental benefits on participants´ WTP for Swedish yellow peas. In addition to the three hypotheses, descriptive data on participants' consumer behaviour has been collected. In the subsequent, the results will be discussed and embedded into the current research.

6.1 Provision of Information about environmental benefits and participants´ WTP.

The results yielded that providing information about the environmental benefits of cultivating grain legumes in Sweden does not have an effect on participants´ WTP. This finding is in line with previous research, which has shown that the provision of information on its own is often insufficient to achieve behavioural change (Ratner *et al.*, 2008). However, it stands in conflict with the results of Marette (2021) in which providing information about environmental benefits resulting from grain legumes cultivation in France had weak effects on participants´ WTP (Marette, 2021). The rationale for this is that the information has not been highly relevant in the decision-making process of participants to decide on the price they are willing to pay. Here, it can be argued that food choices are habitual decisions that are rather based on environmental cues instead of deliberative decision-making processes (Wood and Neal, 2009; Lally *et al.*, 2010; Neal *et al.*, 2012). In psychology, decision-making has often been explained through a dual processing model (Evans, 2008). In this, two different routes of decision making have been suggested one that is quick, automatic and unconscious and another that is deliberative, slow and conscious (Kahnemann, 2011). The idea of providing information taps into the second more deliberative route of decision-making and thus assumes that people use reason to make their food choices (Abrahemese, 2020). However, many scholars suggest that food choices are more likely to be automatic, fast and unconscious (Wood and Neal, 2009; Lally *et al.*, 2010; Neal *et*

al., 2012). Thus, providing information on its own would be unlikely to influence food choices, because digesting the information is associated with deliberate decision-making processes. The result that the information provided did not influence participants´ WTP could support the argument that food choices are subject to more automatic decision-making processes and are thus not influenced by more deliberate decisions that include arguments which are built on information.

6.1.1 How information provision could relate to future intentions to consume grain legumes.

However, other research indicates that the mode of information provision influences its effectiveness. In this, it has been shown that providing written information about food waste recycling did not affect engagement in the behaviour, whereas providing information in face-to-face interviews affected the subsequent likelihood to engage in the behaviour (Bernstad Saraiva Schott *et al.*, 2013). Thus, the mode of communicating information can influence its effectiveness. In the study at hand, the information was presented in a written format and thus the mode of the presentation could explain why no effect has been observed. Therefore, it could be of interest to look at different modes of communicating the information to participants to control whether the mode of the presentation influences its potential effect.

In this context, another study has shown that establishing an interactive web-based intervention that focuses on environmentally friendly eating behaviours amongst university students had a significant effect on self-reported consumption of sustainable food (Monroe et al., 2015). Thus, effective interventions can be constructed that orbit around sustainable food choices based on the provision of information. Similarly, to potential differences in the effect of information provision based on its mode of communication, it seems important to choose a dependent variable that can be linked to the information provided. The information provided in this study has focused on the increase in the cultivation of grain legumes and its potential environmental benefits. However, establishing the link to an increased WTP seems very distant for participants. A closer approximation could have been the intention to consume grain legumes in the future. Since its consumption is linked to the presented environmental benefits, as well as the environmental impact of participants´ food choices. Whereas participants´ WTP is distant and not directly linked to potential environmental consequences. Yet, the information provided could have influenced participants´ food choices but may not influence their WTP for yellow peas. Therefore, it could strengthen the experimental design to look at intentions to consume grain legumes in the future instead of WTP for yellow peas.

In the results of this survey, it was presented that a proportion of participants indicated that they are likely to consume more grain legumes in the future in

comparison to their current consumption after receiving the information provided in the study. Building upon this, it could be interesting to research whether providing information on the environmental benefits of cultivating grain legumes in Sweden could influence future intentions to consume grain legumes. Hereby, a pre-and post-information measure of participants' intentions to consume grain legumes would be needed. Furthermore, the current study included information on the companies as well as on the environmental benefits of cultivating grain legumes. In this, the descriptions of the companies varied to a great extent as the goals and operations of the companies do vary. To decrease potential biases from the descriptions of the companies and to strengthen the link between the information provision and participants´ WTP, it would be of interest to conduct a study that includes no descriptions of the companies.

6.1.2 Strengthening the link between intention and action.

Future research could further focus on lifting perceived hinders to consuming grain legumes by providing participants with recipes. Research has shown that the provision of information is more effective when perceived barriers to engaging in the behaviour are removed (Campbell-Arvai, Arvai and Kalof, 2014). In the current study, one of the main barriers for participants to consume more grain legumes was their perceived `lack of recipes´. To decrease this hindrance, it could be beneficial to provide participants with recipes on how to utilize grain legumes. This initial experience of tasty grain legumes can elevate the likelihood of continued consumption, as suggested in the frame-based approach by de Boer and Aiking, (2017). Here, it is important that the cooking guide is well-tailored to its target group and considers factors such as price, availability, and time to prepare dishes (Micheelsen *et al.*, 2014). A further intervention to increase the consumption of grain legumes is to organize FoodJams, as it is done in the context of the DiverIMPACTS project in Sweden. Such events aim to familiarize participants with the product through collective cooking events. Unfortunately, there is no scientific evaluation of its effectiveness as of now.

The largest proportion of participants indicated that they most commonly buy pre-boiled grain legumes, this could be caused by a higher convenience to utilize such a product. In general, the preparation of most grain legumes is time-consuming due to long periods of soaking and boiling. To minimize such hinders choosing pre-boiled grain legumes is a good option. Still, previous research has shown that the transportation of Swedish grain legumes to the processing facilities is causing high emissions (Tidåker *et al.*, 2021). To minimize these emissions would mean to reduce distances between cultivation and processing facilities, which would translate into establishing the needed infrastructure to process grain legumes in Sweden.

6.2 Differences in WTP between products.

The absence of an interaction effect between the goals and operations of the companies and the information observed in the sample can be explained through the non-effect of the message. Whereas the WTP differed across the different products (*Lantmännen GoGreen*, *ICA I love ECO* and *Nordisk Råvara*) it did not differ across the two measurement points (pre-and post-information). The underlying reason can be found in the non-relevance of the message, or a too weak formulation of the information provided. The general differences between the products are in line with the findings of Marette (2021), however, in the study of Marette interaction effects between product type (conventional, organic, organic and local) and information provision were found on participants´ WTP. The current study has found that participants were willing to pay a higher price for the small-scale organic product, *Nordisk Råvara,* in comparison to *ICA I Love ECO* and *Lantmännen GoGreen*. However, no interaction effect of the goals and operations of companies and information provision about environmental benefits was found in the study. This result stays in contrast to the results of Marette (2021) that the effect of information depends on the product type. An underlying reason for the differences in results can be found in the study design of the current study. The WTP for the different products was only indicated once by participants and the order was dependent on the experimental condition they were assigned to. In contrast, the study of Marette included successive measures on participants´ WTP for the same products with increasing amount of information about environmental benefits. The choice of this experimental design caused participants to update their initial WTP after receiving information leading to a within participant design across products. Whereas the study at hand compared the WTP for the individual products across participants. Thus, the initial WTP of participants was not subject to a second evaluation after receiving additional information for the same product. However, the participants received information about the operations and goals of the companies before receiving the information about environmental benefits. Thus, it was not controlled for the information provided about the different companies. Therefore, the decision to set a maximum price for the different products could have been influenced by the company description instead of the information provision about environmental benefits. Henceforth, it would have been important to control for the effect of the information provision about the different companies. To replicate the results of Marette (2021) and to strengthen the current experimental design would mean to control for the provision of information about goals and operations of the different companies.

A further result that is conflicting with Marette (2021) results and general research on organic products is the significant difference between WTP for *Lantmännen GoGreen* and *ICA I love ECO*. In this, participants indicated a higher WTP for the conventional product of *Lantmännen GoGreen* in comparison to the organic product of *ICA I love ECO*. This difference could be firstly explained by the descriptions of the companies and subsequent framing effects. Framing effects refer to the context the message is presented in. Thus, the description of the different companies has constructed a certain context in which the information about environmental benefits is placed, as well as the indication of the WTP of the participants. This context could have influenced the participants' decision-making process to evaluate their WTP higher for the product of *Lantmännen GoGreen* over *ICA I love ECO*.

Another explanation could lie in the sample composition. The sample consists to its largest extent of students at the Swedish University of agricultural Sciences and *Lantmännen* is Sweden´s largest farmer cooperative. Participants are likely to perceive *Lantmännen* as a company that supports the Swedish farmer community, whereas a general scepticism towards *ICA* exists. This understanding was reflected in the open-ended question, it was stated several times that participants perceive *Lantmännen* to focus more on supporting Swedish producers whereas *ICA* competes over prices and sources their products from all over the globe. The lack of trust for *ICA* is further reflected in responses to the question of how much they trust the different companies. This stands in line with current research on consumers´ trust in the food sector in which smaller companies and farmers are trusted more than supermarkets (Gruhnert et al., 2021).

6.2.1 Willingness to pay versus Actual assumed price/ Shelf prices.

The observed differences between observed shelf prices and WTP indicate a potential for price optimization for Swedish produced grain legumes. On the one hand, the negative difference of *Nordisk Råvara* indicates that the asked shelf price is too high for participants in the study. On the other hand, participants are willing to pay a surplus and the majority would choose the yellow peas of *Nordisk Råvara* over yellow peas from *Lantmännen GoGreen* or *ICA I love Eco*. To conclude, it would mean that interest from the consumers' side for such products exists as well as a willingness to pay a higher price, however, the extent of the additional payment is limited. In this regard, the question should be raised about how much additional payment is needed to promote more diversified and sustainable farming systems in which farmers can work to improve the environment while assuring that the compensation can be borne by the consumer. To achieve the goals set out in the CAP 2020, it is important to identify such gaps and fill them to assure that more sustainable farming practices become economically feasible.

6.3 Willingness to pay and biospheric values.

In the study, no moderation effect of participants´ endorsement of biospheric values on the effect of the provision of information about the environmental benefits on participants´ WTP has been found. Building upon previous research (Abrahmese, 2020) a moderation effect could have been expected because the endorsement of biospheric values would have underlined the importance and relevance of the information in the decision-making process of the participants. However, the link between the information provided and the dependent measure of participants´ WTP could have been too weak. Thus, participants perceived the information as relevant, however, the indication of a WTP was too distant and not affected by the information. Moreover, other factors besides personal values could have influenced the indication of a WTP for the different products, such as knowledge about actual prices and financial limitations. Therefore, it is difficult to draw any conclusions about the potential moderation effects of the endorsement of biospheric values and information provision based on this study. Future research would benefit from using a different dependent measure as well as controlling for potential biases.

The very weak significant positive correlations between participants' endorsement of biospheric values and their average WTP for Swedish yellow peas could be an indication of a general relation between being willing to pay a higher price for grain legumes and one's affiliation to nature. This finding would be in line with previous research that the endorsement of biospheric values leads to a higher likelihood to engage in pro-environmental food choices independently of an intervention (Campbell-Arvai, Arvai and Kalof, 2014; Zhou *et al.*, 2019). In the study of Zhou and colleagues (2019) participants who affiliate themselves with biospheric values were more likely to choose a meat-free version independent of placed nudges. Moreover, it has been shown that biospheric values correlate positively with vegetarianism (Hayley, Zinkiewicz and Hardiman, 2015; Graham and Abrahamse, 2017) and vegetarian diets are often marked by higher consumption of grain legumes. However, the correlation was very weak to non-existing. Building upon previous research a stronger relation between participants´ WTP and biospheric values could have been expected. Still, this expectation may only hold true when the indication of a higher WTP for the presented products would have been considered as pro-environmental behaviour. However, this may not be the case and thus future research could look at intentions to consume grain legumes in the future instead of WTP. Because the consumption of grain legumes can be more clearly linked to an environmental impact. Whereas connecting participants´ WTP for a product with engagement in pro-environmental behaviour seems distant and weak.

7. Conclusion

The results of the study show that the information provision about environmental benefits did not influence participants´ WTP for Swedish produced grain legumes (Hypothesis 1). This result was independent of the product type (Hypothesis 2) as well as participants´ endorsement of biospheric values (Hypothesis 3). Thus, all three hypotheses have been rejected. In general, only weak effects of the information provision have been expected, however, the non-existence of an effect could be explained by weaknesses in the experimental design. In this, it should have been controlled for the information provided about the different operations and goals of the companies. This information could have influenced participants´ indication of WTP. Thus, future research which aims to look at the effect of information provision about environmental benefits should control for any additional information provided in the study to decrease potential biases and to strengthen the experimental design. Furthermore, it is important to link the information provided closer to the dependent variable. The choice of measuring the participants´ WTP as a dependent variable could have been a source of multiple biases, as the WTP is influenced by multiple factors besides the information provided in the study. Furthermore, the link between the information provided and the expectation to observe an increase in WTP may have been too distant. Therefore, future research could benefit from choosing another dependent variable, e.g., intention to consume grain legumes in the future.

The descriptive results of the study yielded that participants were willing to pay a significantly higher price for yellow peas of the small-scale organic retailer (*Nordisk Råvara)* in comparison to the conventional (*Lantmännen GoGreen)* and the organic (*ICA I love ECO)* retailers. However, the increased WTP seems limited and does not translate into actual purchase intentions since a negative difference between WTP and the actual assumed price has been observed for the yellow peas of *Nordisk Råvara*. Thus, participants anticipated that the asked price would be too high and the comparison to the actual shelf price confirmed them, suggesting that on average the participants are not willing to pay the asked price of *Nordisk Råvara*. Further results suggest that the information provided could have influenced participants´ intentions to consume more grain legumes in the future. Therefore, it could be of interest to research how the information provision influences the participants' intentions to consume grain legumes in the future. Moreover, the

results have shown that some participants experienced a lack of recipes to utilise grain legumes. Consequently, it could be beneficial to provide recipes and inspirations on how to utilize grain legumes to promote their consumption.

To summarize, this research is an initial attempt to look at the interplay of individual differences and the provision of information on the environmental benefits of grain legume cultivation in Sweden. In this, no indication of an effect of the information on environmental benefits has been found. However, due to limitations of the experimental design, no broad conclusions can be drawn and further research would be needed to shed light on the potential effects of information provision.

References

Abrahamse, W. *et al.* (2005) "A review of intervention studies aimed at household energy conservation," *Journal of Environmental Psychology*, 25(3), pp. 273–291. doi:10.1016/j.jenvp.2005.08.002.

Abrahamse, W. (2020) "How to Effectively Encourage Sustainable Food Choices: A Mini-Review of Available Evidence," *Frontiers in Psychology*, 11(November). doi:10.3389/fpsyg.2020.589674.

Alexander, P. *et al.* (2017) "Losses, inefficiencies and waste in the global food system," *Agricultural Systems*, 153, pp. 190–200. doi:10.1016/j.agsy.2017.01.014.

Alvarez-Kalverkamp, M. *et al.* (2014) "Meat atlas, Facts and figures about the animals we eat," *Heinrich Böll Stiftung and Friends of the Earth Europe*, pp. 1–68.

Angus, J.F. *et al.* (2015) "Break crops and rotations for wheat," *Crop and Pasture Science*, 66(6), pp. 523–552. doi:10.1071/CP14252.

Bajželj, B. *et al.* (2014) "Importance of food-demand management for climate mitigation," *Nature Climate Change*, 4(10), pp. 924–929. doi:10.1038/nclimate2353.

Balazs, B. *et al.* (2021) "Integrated policy analysis to identify transformation paths to more-sustainable legume-based food and feed value-chains in Europe," *Agroecology and Sustainable Food Systems*, 00(00), pp. 1–23. doi:10.1080/21683565.2021.1884165.

Bernstad, A. (2014) "Household food waste separation behavior and the importance of convenience," *Waste Management*, 34(7), pp. 1317–1323. doi:10.1016/j.wasman.2014.03.013.

Bernstad Saraiva Schott, A. *et al.* (2013) "Potentials for food waste minimization and effects on potential biogas production through anaerobic digestion," *Waste Management and Research*, 31(8), pp. 811–819. doi:10.1177/0734242X13487584.

de Boer, J. and Aiking, H. (2017) "Pursuing a Low Meat Diet to Improve Both Health and Sustainability: How Can We Use the Frames that Shape Our Meals?," *Ecological Economics*, 142, pp. 238–248. doi:10.1016/j.ecolecon.2017.06.037.

Bouman, T., Steg, L. and Kiers, H.A.L. (2018) "Measuring values in environmental research: A test of an environmental Portrait Value Questionnaire," *Frontiers in Psychology*, 9(APR), pp. 1–15. doi:10.3389/fpsyg.2018.00564.

Campbell-Arvai, V., Arvai, J. and Kalof, L. (2014) "Motivating Sustainable Food Choices: The Role of Nudges, Value Orientation, and Information Provision," *Environment and Behavior*, 46(4), pp. 453–475. doi:10.1177/0013916512469099.

Clemente, A. and Olias, R. (2017) "Beneficial effects of legumes in gut health," *Current Opinion in Food Science*, 14, pp. 32–36. doi:10.1016/j.cofs.2017.01.005.

Cusworth, G., Garnett, T. and Lorimer, J. (2021) “Legume dreams: The contested futures of sustainable plant-based food systems in Europe,” *Global Environmental Change*, 69. doi:10.1016/j.gloenvcha.2021.102321.

Dagevos, H. (2014) “Flexibility in the Frequency of Meat Consumption Empirical Evidence from The Netherlands,” *EuroChoices*, 13(2), pp. 40–45.

European Commission (2020) “THE POST-2020 COMMON AGRICULTURAL POLICY : ENVIRONMENTAL BENEFITS AND SIMPLIFICATION.”

FAO (2020) *The state of Agricultural Commodity Markets 2020. Agricultural Markets and sustainable development:Global value chains, smallholder farmers and digital innovations.* Rome, FAO.

Evans, J.S.B. (2008) *Dual-processing accounts of reasoning, judgment, and social cognition*. Annu. Rev. Psychol., 59, pp.255-278.

Federal Ministry of Food and Agriculture (2021) “Agrarministerkonferenz in Berlin,” pp. 1–7.

Frey, B.B. (2018) *The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation, The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation*. SAGE Publications, Inc. doi:10.4135/9781506326139.

Garnett, T. (2016) “Plating up Solutions,” *Public Health Nutrition*, 1 October, pp. 2654–2661. doi:10.1017/S1368980016000495.

Gifford, R. and Nilsson, A. (2014) “Personal and social factors that influence pro-environmental concern and behaviour: A review,” *International Journal of Psychology*, 49(3), pp. 141–157. doi:10.1002/ijop.12034.

Gliessman, S.R. (2015) *The Ecology of Sustainable Food Systems*. 3th edn. Edited by E.W. Engels. Santa Cruz: Taylor & Francis.

Graham, T. and Abrahamse, W. (2017) “Communicating the climate impacts of meat consumption: The effect of values and message framing,” *Global Environmental Change*, 44, pp. 98–108. doi:10.1016/j.gloenvcha.2017.03.004.

de Groot, J.I.M. and Steg, L. (2008) “Value Orientations to Explain Beliefs Related to Environmental Significant Behavior,” *Environment and Behavior*, 40(3), pp. 330–354.

Grunert, K.G., Hieke, S. and Wills, J. (2014) “Sustainability labels on food products: Consumer motivation, understanding and use,” *Food Policy*, 44, pp. 177–189. doi:10.1016/j.foodpol.2013.12.001.

Hayley, A., Zinkiewicz, L. and Hardiman, K. (2015) “Values, attitudes, and frequency of meat consumption. Predicting meat-reduced diet in Australians,” *Appetite*, 84, pp. 98–106. doi:10.1016/j.appet.2014.10.002.

Id, K.M. *et al.* (2020) “Innovating within or outside dominant food systems ? Different challenges for contrasting crop diversification strategies in Europe,” pp. 1–24. doi:10.1371/journal.pone.0229910.

Ivanova, D. and Wood, R. (2020) “The unequal distribution of household carbon footprints in Europe and its link to sustainability,” *Global Sustainability*, 3. doi:10.1017/sus.2020.12.

Jensen, E.S. *et al.* (2012) *Legumes for mitigation of climate change and the provision of feedstock for biofuels and biorefineries. A review*, *Agronomy for Sustainable Development*. doi:10.1007/s13593-011-0056-7.

Jensen, E.S. *et al.* (2020) “Diversifying European agricultural systems by intercropping grain legumes and cereals,” 47(3), pp. 174–186. doi:10.7764/ijanr.v47i3.2241.

Johnson, T. (2019) “Yellow peas-besides pea soup.” Available at: https://www.ja.se/artikel/60670/gula-rtor--utanfr-rtsoppan.html.

Köpke, U. and Nemecek, T. (2010) “Ecological services of faba bean,” *Field Crops Research*, 115(3), pp. 217–233. doi:10.1016/j.fcr.2009.10.012.

Köster, M. *et al.* (2021) “Behavioral Reluctance in Adopting Open Access Publishing: Insights From a Goal-Directed Perspective,” *Frontiers in Psychology*, 12(April). doi:10.3389/fpsyg.2021.649915.

Lally, P. *et al.* (2010) “How are habits formed: Modelling habit formation in the real world,” *European Journal of Social Psychology Eur.*, 40(June 2009), pp. 625–634. doi:10.1002/ejsp.

Leip, A. *et al.* (2014) “The nitrogen footprint of food products in the European Union,” *Journal of Agricultural Science*, 152, pp. S20–S33. doi:10.1017/S0021859613000786.

Marette, S. (2020) “Anymore legumes ? Just a little bit more ! Results from a European web-survey.”

Marette, S. (2021) “Sustainability and consumer willingness to pay for legumes: A laboratory study with lentils,” *Sustainability (Switzerland)*, 13(6). doi:10.3390/su13063408.

Martin, M. and Brandão, M. (2017) “Evaluating the environmental consequences of Swedish food consumption and dietary choices,” *Sustainability (Switzerland)*, 9(12). doi:10.3390/su9122227.

Mbow, C., C. *et al.* (2019) “Food Security,” *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*, pp. 437–550.

McKight, P.E. and Najab, J. (2010) “Kruskal-Wallis Test,” in *The Corsini Encyclopedia of Psychology*. Hoboken, NJ, USA: John Wiley & Sons, Inc. doi:10.1002/9780470479216.corpsy0491.

McKnight, P.E. and Najab, J. (2010) “Mann-Whitney U Test,” in *The Corsini Encyclopedia of Psychology*. Hoboken, NJ, USA: John Wiley & Sons, Inc. doi:10.1002/9780470479216.corpsy0524.

Micheelsen, A. *et al.* (2014) “The acceptability of the New Nordic Diet by participants in a controlled six-month dietary intervention,” *Food Quality and Preference*, 36, pp. 20–26. doi:10.1016/j.foodqual.2014.02.003.

Millward, D.J. and Garnett, T. (2010) “Plenary lecture 3 - Food and the planet: Nutritional dilemmas of greenhouse gas emission reductions through reduced intakes of meat and dairy foods,” *Proceedings of the Nutrition Society*, 69(1), pp. 103–118. doi:10.1017/S0029665109991868.

Moberg, E. *et al.* (2020) “Benchmarking the Swedish diet relative to global and national environmental targets-Identification of indicator limitations and data gaps,” *Sustainability (Switzerland)*, 12(4), pp. 1–22. doi:10.3390/su12041407.

Moors, A., Boddez, Y. and De Houwer, J. (2017) “The power of goal-directed processes in the causation of emotional and other actions,” *Emotion Review*, 9(4), pp. 310–318. doi:10.1177/1754073916669595.

Moran, D. *et al.* (2020) “Quantifying the potential for consumer-oriented policy to reduce European and foreign carbon emissions,” *Climate Policy*, 20(sup1), pp. S28–S38. doi:10.1080/14693062.2018.1551186.

Mullee, A. *et al.* (2017) “Vegetarianism and meat consumption: A comparison of attitudes and beliefs between vegetarian, semi-vegetarian, and omnivorous subjects in Belgium,” *Appetite*, 114, pp. 299–305. doi:10.1016/j.appet.2017.03.052.

Myers, L. and Sirois, M.J. (2006) “Spearman Correlation Coefficients, Differences between,” in *Encyclopedia of Statistical Sciences*. Hoboken, NJ, USA: John Wiley & Sons, Inc. doi:10.1002/0471667196.ess5050.pub2.

Neal, D.T. *et al.* (2012) “How do habits guide behavior? Perceived and actual triggers of habits in daily life,” *Journal of Experimental Social Psychology*, 48(2), pp. 492–498. doi:10.1016/j.jesp.2011.10.011.

Nemecek, T. *et al.* (2008) “Environmental impacts of introducing grain legumes into European crop rotations,” *European Journal of Agronomy*, 28(3), pp. 380–393. doi:10.1016/j.eja.2007.11.004.

Pekala, A. (2020) *Market Analysis of Organic Foods in the Nordic and Baltic countries*.

Preissel, S. *et al.* (2015) “Magnitude and farm-economic value of grain legume pre-crop benefits in Europe: A review,” *Field Crops Research*, 175(April), pp. 64–79. doi:10.1016/j.fcr.2015.01.012.

Ratner, R.K. *et al.* (2008) “How behavioral decision research can enhance consumer welfare: From freedom of choice to paternalistic intervention,” *Marketing Letters*, 19(3–4), pp. 383–397. doi:10.1007/s11002-008-9044-3.

Röös, E. *et al.* (2020) “Less meat, more legumes: Prospects and challenges in the transition toward sustainable diets in Sweden,” *Renewable Agriculture and Food Systems*, 35(2), pp. 192–205. doi:10.1017/S1742170518000443.

Röös, E. and Tjärnemo, H. (2011) “Challenges of carbon labelling of food products: A consumer research perspective,” *British Food Journal*, 113(8), pp. 982–996. doi:10.1108/00070701111153742.

Sabaté, J. and Soret, S. (2014) “Sustainability of plant-based diets: Back to the future,” *American Journal of Clinical Nutrition*, 100(SUPPL. 1), pp. 476–482. doi:10.3945/ajcn.113.071522.

Schultz, P.W. and Kaiser, F.G. (2012) *Promoting Pro-Environmental Behavior*. Oxford University Press. doi:10.1093/oxfordhb/9780199733026.013.0029.

Schwartz, S.H. (1992) “Universals in the Content and Structure of Values: Theoretical Advances and Empirical Tests in 20 Countries,” in, pp. 1–65. doi:10.1016/S0065-2601(08)60281-6.

Schwartz, S.H. (1994) “Are There Universal Aspects in the Structure and Contents of Human Values?,” *Journal of Social Issues*, 50(4), pp. 19–45. doi:10.1111/j.1540-4560.1994.tb01196.x.

Schwartz, S.H. (2012) “An Overview of the Schwartz Theory of Basic Values,” *Online Readings in Psychology and Culture*, 2(1). doi:10.9707/2307-0919.1116.

Sonestedt, E. *et al.* (2005) “Past food habit change is related to obesity, lifestyle and socio-economic factors in the Malmo Diet and Cancer Cohort,” *Public Health Nutrition*, 8(7), pp. 876–885. doi:10.1079/phn2005736.

Steg, L. *et al.* (2014) “The Significance of Hedonic Values for Environmentally Relevant Attitudes, Preferences, and Actions,” *Environment and Behavior*, 46(2), pp. 163–192. doi:10.1177/0013916512454730.

Stern, P.C. (2000) “Toward a coherent theory of environmentally significant behavior,” *Journal of Social Issues*, 56(3), pp. 407–424. doi:10.1111/0022-4537.00175.

Stern, P.C., Dietz, T. and Guagnano, G.A. (1998) “A Brief Inventory of Values,” *Educational and Psychological Measurement*, 58(6), pp. 984–1001. doi:10.1177/0013164498058006008.

Swedish Board of Agriculture (2020) *Use of Agricultural Land in 2020. Final Statistics*. Available at: https://jordbruksverket.se/om-jordbruksverket/jordbruksverkets-offic…02-03-jordbruksmarkens-anvandning-2020.-slutlig-statistik.printable.

Swedish Food Agency (2012) *Riksmaten - vuxna 2010-11 Livsmedels- och näringsintag bland vuxna i Sverige*. Livsmedelsverket.

The Swedish Board of Agriculture (2009) “Swedish Agriculture,” pp. 1–20.

The Swedish Board of Agriculture (2021) “Eco-schemes inom områdena miljö , klimat och djurvälfärd 1 Jordbruksverkets ståndpunkter,” 1(55), pp. 1–55.

Tidåker, P. *et al.* (2021) “Towards sustainable consumption of legumes: How origin, processing and transport affect the environmental impact of pulses,” *Sustainable Production and Consumption*, 27, pp. 496–508. doi:10.1016/j.spc.2021.01.017.

Tiu Wright, L., Nancarrow, C. and Kwok, P.M. h. (2001) “Food taste preferences and cultural influences on consumption,” *British Food Journal*, 103(5), pp. 348–357. doi:10.1108/00070700110396321.

Vermeir, I. *et al.* (2020) “Environmentally Sustainable Food Consumption: A Review and Research Agenda From a Goal-Directed Perspective,” *Frontiers in Psychology*, 11(July). doi:10.3389/fpsyg.2020.01603.

Vermeir, I. and Verbeke, W. (2008) “Sustainable food consumption among young adults in Belgium: Theory of planned behaviour and the role of confidence and values,” *Ecological Economics*, 64(3), pp. 542–553. doi:10.1016/j.ecolecon.2007.03.007.

Watson, C.A. *et al.* (2017) *Grain Legume Production and Use in European Agricultural Systems*. First edit, *Advances in agronomy*. First edit. Cambridge, England : Academic Press, (Advances in Agronomy). doi:10.1016/bs.agron.2017.03.003.

WBGU - Wissenschaftlicher Beirat der Bundesregiereung Globale Umweltveränderung (2020) *Landwende im Anthropozän: Von der Konkurrenz zur Integration*. Berlin: WBGU.

Willett, W. *et al.* (2019) “Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems,” *The Lancet*, 393(10170), pp. 447–492. doi:10.1016/S0140-6736(18)31788-4.

Wood, W. and Neal, D.T. (2009) “The habitual consumer,” *Journal of Consumer Psychology*, 19(4), pp. 579–592. doi:10.1016/j.jcps.2009.08.003.

Woolson, R.F. (2008) “Wilcoxon Signed-Rank Test,” in *Wiley Encyclopedia of Clinical Trials*. Hoboken, NJ, USA: John Wiley & Sons, Inc. doi:10.1002/9780471462422.eoct979.

Wynes, S., Zhao, J. and Donner, S.D. (2020) “How well do people understand the climate impact of individual actions?,” *Climatic Change*, 162(3), pp. 1521–1534. doi:10.1007/s10584-020-02811-5.

Zepeda, L. and Deal, D. (2009) “Organic and local food consumer behaviour: Alphabet theory,” *International Journal of Consumer Studies*, 33(6), pp. 697–705. doi:10.1111/j.1470-6431.2009.00814.x.

Zhou, X. *et al.* (2019) “Promotion of novel plant-based dishes among older consumers using the ‘dish of the day’ as a nudging strategy in 4 EU countries,” *Food Quality and Preference*, 75(December 2018), pp. 260–272. doi:10.1016/j.foodqual.2018.12.003.

Popular science summary

"How often do you eat Swedish cultivated beans, peas, or lentils?"

Living in Sweden, people remember that eating a yellow pea soup on Thursdays has been a great tradition. However, the regularity of this tradition has decreased and likewise the overall consumption of grain legumes. Still, the cultivation of grain legumes is promoted as an important tool to encounter climate change. Grain Legumes have multiple environmental benefits. One of the main benefits is their ability to bind nitrogen from the atmosphere to the soil, which results in a decreased need to apply fertilizers. Moreover, grain legumes are good for human health, especially in the face of reducing meat consumption as they are an important alternative source of proteins. Still, the cultivation area, as well as human consumption, are below suggested thresholds in Sweden.

Therefore, this research looked at how we can increase the consumer demand for grain legumes. Hereby, it was researched whether informing consumers about environmental benefits that result from its cultivation influences consumers´ choices. The results have shown that the information did not influence the willingness-to-pay of participants. This means that providing information about environmental benefits does not translate into a willingness to pay a higher price. However, it was also found that people who see the environment as a central part of their life were willing to pay a higher price for Swedish produced grain legumes. This could mean that grain legumes are a popular choice amongst people that value the environment.

Moreover, every third participant indicated that they intend to increase their consumption of grain legumes after receiving the information provided in the study. This makes hope that educating consumers about environmental benefits can influence their food choices. Furthermore, many participants pointed to a lack of recipes as a perceived hinder to consuming more grain legumes. This hinder should be aimed at by the Swedish food system by developing new ways of using grain legumes and by sharing the recipes. Let's be creative and accept the challenge to promote local grain legumes.

Acknowledgements

Being part of the Agroecology Master programme has opened my eyes to the complexity of modern food systems. It has taught me how different perspectives can merge into a holistic view. Being an agroecology student has repeatedly challenged my thoughts and ways of thinking. After finishing the programme, I am convinced that Agroecology has great potential to contribute to a more sustainable future. However, many stepstones are ahead of us and it's a long way to go. Writing this thesis has been a challenge which has shown me what complexity really means. Still, it seems important to start climbing the mountain and stop neglecting that the peak is far. I believe that small conscious steps will be the way forward to a more sustainable future in which educated and conscious consumer choices are an important factor.

I am very thankful for all the support along the way. A special thanks is directed to Raj and Jens, who have been my supervisors for this Thesis, who believed in the project and have been very supportive during the process of writing it. And for sure I would like to thank my family and friends for a great time and all the support. Here a special thanks goes to Lisa and Shiva, who proofread a lot of my work and always been by my side. At the SLU, I enjoyed the exchange of ideas and the energy within the student community. It is interesting to see how such a big buzzword as Agroecology only takes such a minor stage within the world of universities. Nonetheless, I am thankful and honoured to be part of this niche group that tries to combine different disciplines and perspectives to achieve a holistic and just transition to our food systems.

Appendix 1

English

Introduction

Welcome and thank you for entering the study about food choices!

The study is designed by me, Kalle Köster, a master student in the field of Agroecology at the Swedish University of Agricultural Sciences in Alnarp. This study is part of my Master Thesis project. During this survey you will be asked to answer questions about yourself and your consumer choices. The collected data will only be utilized for research purposes and no tracing will be possible. Every response is voluntarily and highly appreciated. To make the participation more interesting, I included the opportunity to take part in a lottery. In this lottery you can win a 50 % reduction code for Nordisk Råvara. To participate in the lottery you will need provide your email address. This information will solely be used to send out your reward and/or summary of results and will be deleted afterwards. To participate in the study you have to be older than 18 years.

I hope you find joy in participating in this study!

Du kan ändra språket till svenska på knappen i övre högra hörnet. (you can change the language to Swedish in the upper right corner.)

All the best, Kalle Köster

Master student of the Agroecology Program at the Swedish University of Agricultural Sciences
For questions and comments you can contact: knko0002@stud.slu.se

Please indicate whether you consent to these terms.
You have to consent with the conditions to take part in the survey.

- ○ Yes
- ○ No

Instructions

Great that you are here!
In the first part of the study you will be asked to provide some information about important aspects in your life.

Values

Below you will find 16 personal values. Behind each value is a short description of its meaning.
Please indicate how important each value is as a guiding principle in your life.
Your scores can vary from -1 to 7. The higher the number the more important the value is as a guiding principle in your life.
Try to vary your scores as much as possible and only rate a few values as extremely important. Usually, someone has up to two values which they give a score of 7.

	Opposing to my values -1	0	1	2	Important 3	4	5	Very Important 6	Of supreme Importance 7
Helpful (working for the welfare of others)	○	○	○	○	○	○	○	○	○
Social Power (control over others, dominance)	○	○	○	○	○	○	○	○	○
Enjoying Life (enjoying food, sex, leisure, etc.)	○	○	○	○	○	○	○	○	○
Wealth (material possessions, money)	○	○	○	○	○	○	○	○	○

	Opposing to my values -1	0	1	2	Important 3	4	5	Very Important 6	Of supreme Importance 7
Social Justice (correcting injustice, care for the weak)	○	○	○	○	○	○	○	○	○
Pleasure (gratification of desires)	○	○	○	○	○	○	○	○	○
Preventing Pollution (protecting natural resources)	○	○	○	○	○	○	○	○	○
Self-indulgent (doing pleasant things)	○	○	○	○	○	○	○	○	○
Equality (equal opportunity for all)	○	○	○	○	○	○	○	○	○
Influential (having an impact on people and events)	○	○	○	○	○	○	○	○	○
Protecting the Environment (preserving nature)	○	○	○	○	○	○	○	○	○
Being Ambitious (hardworking, aspiring)	○	○	○	○	○	○	○	○	○
A world at Peace (free of war and conflict)	○	○	○	○	○	○	○	○	○
Authority (the right to lead or command)	○	○	○	○	○	○	○	○	○
Respecting the Earth (harmony with other species)	○	○	○	○	○	○	○	○	○
Unity with the Earth (fitting into nature)	○	○	○	○	○	○	○	○	○

Instruction descriptions

Well done so far!

Now you will receive brief descriptions of two different Swedish food brands.

Information text Nordisk Råvara

NORDISK RÅVARA

Nordisk Råvara

Nordisk Råvara is a small company that works in close cooperation with 25 Swedish farmers. Their aim is to enable Swedish farmers to grow food in a good way by offering a market channel. Hereby, they ensure that their products are produced locally and with care for the environment. Further, they encourage farmers to try new methods of crop cultivation. They sell organically certified lentils, peas, beans and quinoa. All their products are produced in Sweden.

Have you ever purchased a product of Nordisk Råvara?

- ○ Yes
- ○ Uncertain
- ○ No

How do you perceive Nordisk Råvara?

- ○ Very positive
- ○ Positive
- ○ Neutral
- ○ Somewhat negative
- ○ Very Negative

How much do you trust Nordisk Råvara?

- ○ A great deal
- ○ A lot
- ○ A moderate amount

- ○ A little
- ○ Not at all

Information text Lantmännen

GoGreen

GoGreen is part of the Lantmännen group, which is a large scale agricultural cooperative and is owned by 20.000 Swedish farmers. It includes many different branches and brands. The focus of GoGreen is to make sustainable food easier to access and more fun. The assortment includes dried grains, processed food and boiled legumes. Here, they include diverse Swedish products as well as non-swedish produce, some of the produce is organically certified.

Have you ever purchased a product of GoGreen?

- ○ Yes
- ○ Uncertain
- ○ No

How do you perceive GoGreen?

- ○ Very positive

- ○ Positive
- ○ Neutral
- ○ Somewhat negative
- ○ Very Negative

How much do you trust Lantmännen GoGreen?

- ○ A great deal
- ○ A lot
- ○ A moderate amount
- ○ A little
- ○ Not at all

Products NR and LM

In the following you will be presented with two different Swedish produced yellow peas from the aforementioned companies. Yellow peas are one of the most commonly cultivated grain legumes in Sweden. They are famous as the main ingredient for Swedish
yellow pea soup, which is a traditional dish on Thursdays. However, new ways of utilizing them are developed and they are called the chickpeas of the north.
In the subsequent section you will have the opportunity to indicate a potential price you would be willing to pay for the product and your assumed actual price of the product.
Each package carries 500 gram of Swedish yellow peas.

Willingness to Pay: Nordisk Råvara

500 gram of yellow peas (organic)

Please indicate the maximum price you would be willing to pay for yellow peas from Nordisk Råvara.

SEK

0 10 20 30 40 50 60 70 80 90 100

Maximum price I am willing to pay

What do you think the actual selling price is?

0 10 20 30 40 50 60 70 80 90 100

Actual price

instruction environmental benefits

Before evaluating the second product, you will receive information about environmental benefits of cultivating grain legumes in Sweden.

Environmental Benefits of integrating grain Legumes into crop roation

Grain Legumes belong to the plant family Fabaceae, which contains a vast diversity of plants. They are mainly grown for the food consumption of its dried seeds. Hereby, beans, peas and lentils are included. They have multiple environmental benefits when cultivated on cropland. Below you will find some of the most prominent ones.

Decrease the need of Nitrogen fertilization

Grain Legumes are able to fix nitrogen from the atmosphere to the soil. The fixed nitrogen is available to the legume, other crops grown simultaneously and subsequent crops. This decreases the need for additional nitrogen fertilization. Therefore, eating grain legumes helps the environment.

Increasing diversity of Swedish agricultural landscape

Currently grain legumes are grown on 2% of Swedish cropland. Increasing its cultivation will help to diversify Swedish Cropping systems, which decreases the risk of spreading diseases and potential infections through pests. This leads to a decrease of pesticide appliance and thus helps the environment.

Legumes are helping biodiversity to strive

Legumes are blooming plants and are liked by many pollinators. The inclusion of legumes in the Swedish agricultural landscape can help to increase its biodiversity value.

By choosing Swedish produced grain legumes you support sustainable farming on multiple levels. The current consumption of Swedish produced grain legumes in Sweden is low and so its production. Therefore, it is crucial to increase its demand to make the integration of grain legumes more feasible for Swedish Farmers.

Have you heard about these environmental benefits of grain legumes before?

- ○ Yes, I have heard about these benefits before.
- ○ Yes, I have heard about some of the benefits before.
- ○ No, I have not heard about these benefits before.

Do you think that this information is valuable for you as consumer?

- ○ Yes, I think this information is valuable for me as a consumer.
- ○ Yes, I think the information is valuable to some extent for me as consumer.
- ○ No, I thin this information is not valuable for me as a consumer.

Willingness to pay: Lantmännen

500 gram of yellow peas (non-organic)

Please indicate the maximum price you would be willing to pay for yellow peas from Lantmännen.

SEK

0 10 20 30 40 50 60 70 80 90 100

Maximum price I am willing to pay

What do you think the actual selling price is?

0 10 20 30 40 50 60 70 80 90 100

0 10 20 30 40 50 60 70 80 90 100

Actual price

Forced Choice LM and NR

Imagine all products would have the same price, which which one would you choose?

- Yellow peas from Nordisk Råvara
- None of the products
- Yellow peas from Lantmännen GoGreen

How do you motivate your choice?

Information text ICA

ICA I love Eco

ICA I love Eco is part of ICA group, which is large company which includes real estate, banking and pharmacy besides grocery retail. ICA is the leading supermarket chain in Sweden with around 1.300 stores across Sweden. ICA has multiple lines of products in their offer. One of their own collections is ICA I love Eco, this includes organically produced and certified products from around the world. Their focus is to offer organic products at a low price. In this collection they include some Swedish products.

Have you ever purchased a product of ICA I love Eco ?

- ○ Yes
- ○ Uncertain
- ○ No

How do you perceive ICA I love Eco?

- ○ Very positive
- ○ Positive
- ○ Neutral
- ○ Somewhat negative
- ○ Very Negative

How much do you trust ICA I love Eco?

- ○ A great deal
- ○ A lot
- ○ A moderate amount
- ○ A little
- ○ Not at all

NRandICA

In the following you will be presented with two different Swedish produced yellow peas from the aforementioned companies. Yellow peas are one of the most commonly cultivated grain legumes in Sweden. They are famous as the main ingredient for Swedish
yellow pea soup, which is a traditional dish on Thursdays. However, new ways of utilizing them are developed and they are called the chickpeas of the north.
In the subsequent section you will have the opportunity to indicate a potential price you would be willing to pay for the product and your assumed actual price of the product.
Each package carries 500 gram of Swedish yellow peas.

Willingness to pay: ICA

500 gram of organic yellow peas

Please indicate the maximum price you would be willing to pay for yellow peas from ICA I love Eco.

SEK

0 10 20 30 40 50 60 70 80 90 100

Maximum price I am willing to pay

What do you think the actual selling price is?

0 10 20 30 40 50 60 70 80 90 100

Actual price

Forced Choice ICA and NR

Imagine all products would have the same price, which which one would you choose?

- Yellow peas from Nordisk Råvara
- None of the products
- Yellow peas from ICA I love Eco

How do you motivate your choice?

LM and ICA

In the following you will be presented with two different Swedish produced yellow peas from the aforementioned companies. Yellow peas are one of the most commonly cultivated grain legumes in Sweden. They are famous as the main ingredient for Swedish
yellow pea soup, which is a traditional dish on Thursdays. However, new ways of utilizing them are developed and they are called the chickpeas of the north.
In the subsequent section you will have the opportunity to indicate a potential price you would be willing to pay for the product and your assumed actual price of the product.
Each package carries 500 gram of Swedish yellow peas.

Forced Choice ICA and LM

Imagine all products would have the same price, which which one would you choose?

- ○ None of the products
- ○ Yellow peas from Lantmännen GoGreen
- ○ Yellow peas from ICA I love Eco

How do you motivate your choice?

Instructions Food choices

Thank you for choosing your peas!
In the subsequent part you will be asked to provide information on your common food choices.

Food choices

How important are the following attributes for you while making food choices?

	Not at all important	Slightly important	Moderately important	Very important	Extremely important
Price	○	○	○	○	○
Dietary restrictions	○	○	○	○	○
Taste	○	○	○	○	○
Acessibility	○	○	○	○	○
Seasonality	○	○	○	○	○
Health	○	○	○	○	○
Environmental concern	○	○	○	○	○
Pleasure of consuming	○	○	○	○	○
Convenience	○	○	○	○	○
Locality	○	○	○	○	○

How often do you eat Meat products?

- ○ Never
- ○ Rarely, about once a year
- ○ Occasionally, about once a month
- ○ Regularly, about once a week
- ○ Multiple times per week

To what extent can you identify yourself with the following statements?

	Not all		Somewhat identify		Strongly identify
Vegeterian	○	○	○	○	○
Vegan	○	○	○	○	○
Flexitarian*	○	○	○	○	○
LOHAS*	○	○	○	○	○
Meat-eater	○	○	○	○	○
Fish-eater	○	○	○	○	○

*Flexitarian: Are people who are mostly consuming vegetarian and vegan meals, however they still eat meat.
*LOHAS: Abbreviation for Lifestyles of Health and Sustainability: used to refer to people who are interested in healthy living and social and environmental issues, and

who buy products related to this.

Legumes

How often do you eat grain legumes?

- ○ Never
- ○ Rarely, about once a year
- ○ Occasionally, about once a month
- ○ Regularly, about once a week
- ○ Multiple times per week

How much grain legumes do you intend to eat in the future in comparison to current consumption after receiving the information provided in this questionnaire?

- ○ Much less
- ○ Somewhat less
- ○ About the same
- ○ Somewhat more
- ○ Much more

What is the biggest reason for you not to eat more grain legumes?

- ○ Difficult to prepare
- ○ Not my taste
- ○ Hard to digest
- ○ Lack of recipes
- ○ Not applicable to me

In which condition do you most commonly buy grain legumes?

- ○ Pre-boiled
- ○ Dried
- ○ Processed similar to Tofu
- ○ None of the options

Has your knowledge about grain legumes increased during this survey?

- ○ Yes, my knowledge has increased.
- ○ Yes, my knowledge has increased to some extent.
- ○ No, my knowledge has not increased.

What have you learned about grain legumes during this study? (Multiple answers are possible)

- ☐ That grain legumes are part of the Fabaceae plant family.
- ☐ That growing grain legumes in Sweden has environmental benefits.
- ☐ That there are different Swedish reselllers.

What have you learned about environmental benefits of grain legumes during this study? (Multiple answers are possible)

- ☐ They help to decrease the spread of crop diseases.
- ☐ They are easy to store.
- ☐ They are good alternative source of proteins compared to animal protein.
- ☐ None of the options.
- ☐ Decrease the need for chemical fertilizer.

Instructions Demographics

As a last part you are asked to provide some general information about yourself.

Demographics

What is your Gender?

- ○ Male
- ○ Female
- ○ Non-binary
- ○ Prefer not to say

What is your current age in years?

Where are you currently living?

- ○ Sweden
- ○ Outside Sweden

What is the level of your monthly income (before taxation)?

- ○ Lower than 26,100 SEK per Month
- ○ Between 26,100 SEK and 36,100 SEK per Month
- ○ Higher than 36,100 SEK per month

How would you describe your current working situation?

- ○ Employed full time
- ○ Employed part time
- ○ Unemployed looking for work
- ○ Retired
- ○ Student
- ○ Student and employed
- ○ Self-employed

What is the highest level of education achieved?

- ○ Less than highschool
- ○ High School
- ○ Technical/vocational
- ○ University degree, Bachelor
- ○ University degree, Master
- ○ Higher university degree

Final Questions

You have almost arrived at the end of the questionnaire. Well done!
One last question: Could you please elaborate on what you think the purpose of this study is?

Please indicate whether you would like to receive a summary of the results.

- ○ Yes and my email address is
- ○ No

In order to participate in the lottery and to potentially receive the discount code please provide your email address.
Participation is voluntary so you can skip this question if you do not wish to participate in the lottery.

Powered by Qualtrics

Appendix 2

How to promote grain legume consumption and why?

Many scientific discussions are orbiting around the cultivation and consumption of grain legumes, however, only a few research papers have investigated how the consumption of grain legumes can be promoted.

Currently, grain legumes are only responsible for 1% of Swedish protein consumption and are only cultivated on 1.6% of the arable land. Despite the promissory of grain legumes to benefit the environment through
(1) Ability to engage in biological nitrogen fixation and thus decreases in the need for external nitrogen fertilizer; (2) Positive effects as a pre-crop due to residual nitrogen and break-crop effects (Angus et al., 2015; Preissel et al., 2015); (3) Increases biodiversity and crop diversification (Köpke and Nemecek, 2010).
Furthermore, grain legumes are considered to be a healthy food choice. A recent study by Röös et al. (2020) has shown that exchanging 50% of Swedish consumed red meats through locally grown legumes would result in environmental benefits as well as benefits for human health.

The Swedish consumption of grain legumes is as low as 12g per day on average (Swedish Food Agency, 2012), whereas 50g are promoted in a sustainable and healthy diet developed by Willet and colleagues (2019). The paradox of health and environmental benefits and low consumption rates led me to research how the consumption of Swedish produced grain legumes can be promoted.

Figure 1. Dried yellow peas contained in a pot. source:https://sumtradecorp.com/product/yellow-peas/

Promoting Sustainable Food Choices - Nudges

One line of research suggests that food choices are habitual and not influenced by deliberate decision-making processes. This assumption originates from the dual processing model in this two strains of thinking occur (Kahnemann, 2011). One is associated with automatic decision-making processes that are intuitive, fast and influenced by emotions. The second is associated with more deliberate decision-making that incorporates arguments. When food choices are considered habitual small changes in the environment affect them. Here, products are placed differently in supermarkets or vegetarian dishes are placed as default options (Abrahamse, 2020). Subsequently, the likelihood to choose such a product is elevated. These relatively small changes in the presentation of products are often called nudges.

Abrahamse, W. (2020) "How to Effectively Encourage Sustainable Food Choices: A Mini-Review of Available Evidence," Frontiers in Psychology, 11(November). doi:10.3389/fpsyg.2020.589674.
Kahnemann, D. (2011) Thinking, Fast and Slow. New York: NY: Macmillan.
Köpke, U. and Nemecek, T. (2010) "Ecological services of faba bean," Field Crops Research, pp. 217–233. doi:10.1016/j.fcr.2009.10.012.
Preissel, S. et al. (2015) "Magnitude and farm-economic value of grain legume pre-crop benefits in Europe: A review," Field Crops Research, 175(April), pp. 64–79. doi:10.1016/j.fcr.2015.01.012.
Röös, E. et al. (2020) "Less meat, more legumes: Prospects and challenges in the transition toward sustainable diets in Sweden," Renewable Agriculture and Food Systems, 35(2), pp. 192–205. doi:10.1017/S1742170518000443.
Swedish Food Agency (2012) Riksmaten - vuxna 2010-11 Livsmedels- och näringsintag bland vuxna i Sverige. Livsmedelsverket.
Willett, W. et al. (2019) "Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems," The Lancet, 393(10170), pp. 447–492. doi:10.1016/S0140-6736(18)31788-4.

Promoting Sustainable Food Choices – Information Provision

Another line of research suggests that food choices are deliberate and include arguments. Building upon this approach providing information can influence consumers´ decision-making. In this, research has shown that people who value the environment and associate themselves with it are more likely to choose vegetarian options despite nudges placed in the environment (Zhou et al., 2019). Here, information can activate personal norms which are associated with one's life goals (Vermeir et al., 2020). Consequently, the likelihood to engage in such behaviour is elevated after receiving information about how the behaviour leads to the fulfilment of one's goals.

Online Survey and Results

An online survey has been constructed to test whether providing information on environmental benefits influences food choices. In this, 329 people participated of which the majority were students at the Swedish University of Agricultural Sciences. The information provided focused on environmental benefits resulting from the cultivation of grain legumes in Sweden. In this, participants were asked to fill out the Environmental Values measure of Schwartz to receive an inside into participants´ value systems. Afterwards, participants indicated their willingness to pay for Swedish produced yellow peas before and after receiving information about the environmental benefits of cultivating grain legumes. To assure that participants were familiar with the operations and goals of the different resellers' short descriptions were provided before the indication of WTP. The results show that the willingness to pay was not affected by the information about environmental benefits independently of participants´ value system or the product type presented (conventional, organic, small scale organic). Significant differences in Willingness-to-pay for the different products have been observed. In this, participants indicated a higher Willingness-to-pay for the small scale organic products (Nordisk Råvara) in comparison to the organic product (ICA-I love Eco) and the conventional product (Lantmännen GoGreen). However, comparisons between Willingness-to-pay and assumed actual shelf prices have shown that the participants assumed that the price for the small-scale organic product would be too high.

	Nordisk Råvara	Lantmännen GoGreen	ICA I love Eco
SHELF PRICES	45.00 SEK	11.00 SEK	13.95 SEK
WILLINGNESS-TO-PAY	37.40 SEK	32.48 SEK	30.16 SEK
ASSUMED ACTUAL PRICE	41.30 SEK	29.95 SEK	27.60 SEK

Figure 2. Shows the three different products included in the study. On the left is Nordisk Råvara (small-scale organic) next to GoGreen Lantmännen (conventional) in the middle and ICA I love Eco (organic) on the right. All packages hold 500 grams of Swedish produced yellow Peas. The provided numbers are calculated mean scores of participants.

Conclusions of the study:

An increase in consumers´ Willingness-to-pay is unlikely to be achieved through the communication of environmental benefits resulting from the cultivation of grain legumes in Sweden.

Information provision could potentially affect Food choices for example leading to the intention to consume more grain legumes in the future.

Higher Willingness-to-pay for small-scale organic products, however, shelf price exceeds Willingness-to-pay. Indicative of the potential for price optimization.

Future research should control for the effect of providing additional information on the goals and operations of companies to strengthen the experimental design.

Further Recommended Readings

Abrahamse, W. (2020) "How to Effectively Encourage Sustainable Food Choices: A Mini-Review of Available Evidence," Frontiers in Psychology, 11(November). doi:10.3389/fpsyg.2020.589674.

Marette, S. (2021) "Sustainability and consumer willingness to pay for legumes: A laboratory study with lentils," Sustainability (Switzerland), 13(6). doi:10.3390/su13063408.

Röös, E. et al. (2020) "Less meat, more legumes: Prospects and challenges in the transition toward sustainable diets in Sweden," Renewable Agriculture and Food Systems, 35(2), pp. 192–205. doi:10.1017/S1742170518000443.

Vermeir, I. et al. (2020) "Environmentally Sustainable Food Consumption: A Review and Research Agenda From a Goal-Directed Perspective," Frontiers in Psychology, 11(July). doi:10.3389/fpsyg.2020.01603.

Vermeir, I. et al. (2020) "Environmentally Sustainable Food Consumption: A Review and Research Agenda From a Goal-Directed Perspective," Frontiers in Psychology, 11(July). doi:10.3389/fpsyg.2020.01603.
Zhou, X. et al. (2019) "Promotion of novel plant-based dishes among older consumers using the 'dish of the day' as a nudging strategy in 4 EU countries," Food Quality and Preference, 75, pp. 260–272. doi:10.1016/j.foodqual.2018.12.003.

Publishing and archiving

Approved students' theses at SLU are published electronically. As a student, you have the copyright to your own work and need to approve the electronic publishing. If you check the box for **YES**, the full text (pdf file) and metadata will be visible and searchable online. If you check the box for **NO**, only the metadata and the abstract will be visible and searchable online. Nevertheless, when the document is uploaded it will still be archived as a digital file. If you are more than one author, the checked box will be applied to all authors. Read about SLU's publishing agreement here:

- https://www.slu.se/en/subweb/library/publish-and-analyse/register-and-publish/agreement-for-publishing/.

☑ YES, I/we hereby give permission to publish the present thesis in accordance with the SLU agreement regarding the transfer of the right to publish a work.

☐ NO, I/we do not give permission to publish the present work. The work will still be archived and its metadata and abstract will be visible and searchable.