Heritage cereals: tasty and sustainable?

Acceptance and important qualities of heritage cereals

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Kulturspannmål: goda och hållbara? Acceptans och viktiga kvaliteter kopplat till kulturspannmål

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Abstract

Heritage cereals, a group of cereals that have not been subjected to modern crop breeding, have been getting attention due to their generally high genetic diversity, traits like high drought and disease tolerance as well as high nutritional values. Knowledge about how consumers relate to heritage cereals in Sweden is limited, and therefore this thesis aims to, firstly, explore acceptance, awareness and preferences among a specific consumer group; students in the agriculture program at the Swedish University of Agricultural Sciences, and, secondly, quality perception in relation to heritage cereals among consumers, bakers and retailers, in a Swedish context. The thesis used a mixed-method approach, and is based on quantitative data from a survey to capture perspectives from the student consumer group and semi-structured interviews with bakers and retailers to gain additional perspectives about food quality.

The findings from this study suggests that the awareness of heritage cereals is high among the specific consumer group. Bread and pasta make up the most preferred food products, and supermarkets were the most preferred shopping location. Gender had some influence on differences within the group, while high similarities were found between the different educational backgrounds. Results from the survey indicate that taste and Swedish food production are two very important food quality aspects for heritage cereals. Additionally, quality aspects like health, environmental impact, organic and local production were also found to be important to consumers, bakers and retailers. Consuming heritage cereals can also be seen as a tool to support sustainable food systems and different political discourses, avoiding risks associated with industrial farming and express belonging to certain cultural identities. These were also important dimensions of heritage cereal food quality.

Keywords: heritage cereals, consumer acceptance, consumer awareness, consumer preference, food quality

Sammanfattning

Kulturspannmål, en grupp av spannmål som inte genomgått modern växtförädling, har under de senaste åren fått allt mer uppmärksamhet på grund av faktorer såsom deras generellt höga genetiska diversitet, resistans mot torka och sjukdomar samt nutritionsvärden. Kunskap om konsumenters syn på dessa spannmål i Sverige är idag begränsad och därför syftar denna uppsats till att undersöka acceptans, familjaritet och preferenser hos en specifik konsumentgrupp; studenter som går agronomprogrammet på Sveriges Lantbruksuniversitet, samt konsumenters, bagares och handlares syn på viktiga kvalitetsaspekter kopplade till kulturspannmål. Denna studie utgår från både kvantitativ data från en enkät, som använts för att undersöka konsumentgruppens perspektiv, samt semistrukturerade intervjuer för att undersöka bagares och handlares perspektiv.

Resultaten visade på hög familjaritet av kulturspannmål hos konsumentgruppen. Bröd och pasta var de kulturspannmålsprodukter som flest föredrog, och flest föredrog att handla på stora matbutiker. Skillnader inom konsumentgruppen var framför allt beroende av kön och resultaten visade på stora likheter mellan olika utbildningsbakgrunder inom agronomprogrammet. Från enkäten framkom att smak och svenskproducerat var två väldigt viktiga kvalitetsaspekter kopplat till kulturspannmål. Från intervjuerna framkom även att kvalitetsaspekter som hälsa, miljöpåverkan, ekologisk och lokal produktion också var viktiga. Konsumtion av kulturspannmål kan också ses som ett verktyg för att stödja hållbar matproduktion och olika politiska diskurser, undvika olika typer av risker som associeras med industriellt jordbruk samt för att uttrycka tillhörighet till en viss kulturell identitet. Dessa aspekter visade sig också vara viktiga dimensioner av matkvalitet kopplat till kulturspannmål.

Nyckelord: kulturspannmål, konsumentacceptans, konsumentfamiljaritet, konsumentpreferenser, matkvalitet

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Abbreviations

HCs	Heritage cereals
GHG	Greenhouse gas
MCs	Modern cereals
SLU	Swedish University of Agricultural Sciences

1. Introduction

Since the Green revolution, which began in the 1950s, the agricultural productivity has more than doubled (Colombo *et al.*, 2018). Inventions like new hybrid seeds and machines as well as intensified use of pesticides and fertilisers resulted in great increases of yield efficiency (Clapp, 2020). The developments have contributed to major reductions of hunger and poverty around the world (Koning, 2015). However, these improvements have also resulted in sustainability issues that make up major challenges for food systems today. Formal crop improvement programs, which generated varieties that fit into high-input monoculture farming systems, greatly increased production efficiency (Clapp, 2020). But it also led to a genetic uniformity on the agricultural fields, which today are dominated by only a few crop species (Longin & Würschum, 2016). This lack of agrobiodiversity comprise a serious problem for food system resilience, and may especially become a great vulnerability in a context of climate change (Dwivedi *et al.*, 2013). Recent attention has been directed at old crop varieties in order to re-introduce genetic material and increase the genetic heterogeneity in food production (Longin & Würschum, 2016). While there is no exact definition of which cereals are included in this group (see 1.2 for discussion on definition of heritage cereals), *heritage cereals* in particular have been shown to have characteristics like high drought tolerance (Gerhardt et al., 2019; Slama et al., 2018) and disease resistance (Konvalina *et al.*, 2012; Bordini *et al.*, 2017). Such traits make them an interesting group of cereals for increased food sustainability. Furthermore, recent food trends in Western countries suggest that heritage cereals may satisfy qualities that are increasingly important for consumers (Longin & Würschum, 2016; Gerhardt et al., 2019; Wendin et al., 2020). Health benefits, reduced environmental impact, organic and local foods are just some examples of quality aspects that have become progressively more important to some consumer segments (Longin & Würschum, 2016). Due to the potential sustainability benefits and promising market potentials, the interest in increasing production and consumption of heritage cereals have grown. Nonetheless, little is still known about consumer acceptance and how consumers relate to heritage cereals. Further, there lacks bakers' and retailers' perspectives on these new old cereals.

Understanding the acceptance of heritage cereals today may provide important insights for future expansion of heritage cereal consumption and is therefore an

interesting topic to further investigate. Hence, this study aims to deepen the understanding of acceptance and quality perception connected to heritage cereals in Sweden today. The study will focus on a consumer, baker and retail perspective.

1.1 Aim and research questions

The purpose of the study is to investigate the consumer acceptance of heritage cereal food products and what qualities are important for heritage cereal food products in Sweden. These aspects will be investigated from the perspective of a specific consumer group consisting of students from the agriculture program at the Swedish University of Agricultural Sciences (SLU), as well as bakers and retailers. The following research questions will guide this effort:

1. How do the specific consumer group express themselves on the topic of heritage cereals and food products made with heritage cereals?
    a. How aware is the consumer group of heritage cereals?
    b. What are the preferences for different kinds of food products made with heritage cereals and different food shopping locations?
    c. Are there any differences between genders and educational backgrounds within the consumer group investigated?
2. What constitutes important qualities for products containing heritage cereals according to the specific consumer group and bakers/retailers?

1.2 Definition of heritage cereals

There is no exact common definition of what constitutes *heritage cereals*, and hence no universal consensus on which cultivars are considered a part of this group of cereals or not. Other terms used in the scientific literature to describe old cereal cultivars include *ancient cereals* (see for example Giambanelli *et al.*, 2013; Bordoni *et al.*, 2017; Pontonio & Rizzello, 2019) and *landraces* (see for example Camacho Villa *et al.*, 2005; Newton *et al.*, 2010). In this thesis, *heritage cereals* (HCs) and *heritage cereal cultivars* will be the term used, from now on, when referring to cultivars that can be considered as heritage cereals, ancient cereals or landraces.

Although there is a lack of a universal definition of HCs, some commonly used identifiers can be found in the scientific literature. HCs are considered to be cultivars that have not been subjected to formal crop improvements, associated with the agricultural developments during the Green Revolution (Camacho Villa *et al.*, 2005; Newton *et al.*, 2010; Giambanelli *et al.*, 2013; Gerhardt *et al.*, 2019; Pontonio

& Rizzello, 2019). In other words, HCs include cultivars developed prior to the era of industrial agriculture. Hence, heritage cultivars do not have characteristics adapted to high-input agriculture (Pontonio & Rizzello, 2019) and retain to a larger extent characteristics of wild and ancient ancestors (Giambanelli *et al.*, 2013; Pontonio & Rizzello, 2019). Thus, HCs are rather associated with ancient, traditional, low-input or organic agricultural systems (Camacho Villa *et al.*, 2005; Bordoni *et al.*, 2019). HC cultivars have often adapted over a long time period to specific geographic locations, and are often considered to be better adapted to changing environmental conditions, including both biotic and abiotic stresses (Camacho Villa *et al.*, 2005; Giambanelli *et al.*, 2013). Moreover, HCs are often also characterized by a higher degree of genetic diversity among the populations compared to cultivars that have undergone formal crop improvement (Harlan, 1975; Camacho Villa *et al.*, 2005; Newton *et al.*, 2010; Pontonio & Rizzello, 2019). Cereals which have been formally improved to fit within high-input agriculture will from now on be referred to as *modern cereals* (MCs).

To summarize, albeit the lack of an exact definition, HCs are identified in the literature through characteristics such as *lack of formal genetic improvement* (developed prior to industrial agriculture), *used in traditional agricultural systems* (low-input systems), *adapted to specific geographic locations and their changing environments* and *high genetic diversity*.

In this thesis, HCs are referred to as one group of cereals. However, they are not a homogeneous group, and it is important to highlight that there exists variations within this group of cereals. This should be kept in mind throughout the whole thesis.

1.3 Definition of food quality

Throughout this thesis, food quality in relation to HCs will be discussed. Quality insurance has a great influence over which products consumers choose to purchase (Jordbruksverket, 2008). Food quality comprises different quality aspects, which may be more or less important for individual consumers or consumer groups in the evaluation of the overall perception of a food product's quality (Grunert, 2007; Beck-Friis *et al.*, 2013). Thus, the perception of food quality is often decided through the interplay between multiple different aspects (Beck-Friis *et al.*, 2013). The concept of food quality is therefore complex, but can be defined as *the ability of food product(s) to meet the needs and expectations of consumers* (ibid). This definition will be used in this thesis to understand the concept of food quality. A review of the scientific literature on food quality and food trends will be presented later on, see Chapter **4.1**.

1.4 Delimitations of the thesis

This thesis will be focusing on investigating the perspectives of a specific group of consumers; students in the agricultural program at the Swedish University of Agricultural Sciences (SLU). Further, it will center around the perspectives of bakers and retailers that are more or less involved with HCs today, and how they express themselves on HCs and the consumers they engage with through their businesses. Therefore, this thesis will not include any discussions about awareness, preferences and quality perception in other consumer, baker and retailer segments. All informants are based in Sweden, and thus the scope is limited to understanding perspectives connected to the Swedish HC market, and will not focus on other countries. Further, the thesis is limited to understanding the context of the HC market today. Therefore no conclusions about different strategies for increasing the consumption and use of heritage cereals in the future, in particular among other groups that are more unfamiliar with HCs, will be drawn.

1.5 Thesis outline

This introduction will be followed by a review of previous research on food quality and HCs, presented in Chapter 2. Next, an account of the methodological choices for data collection will be presented in Chapter 3. Since this thesis is a mixed-method study, one section will be dedicated to the quantitative data collection and the other to the qualitative. Then, the analytical framework will be discussed in Chapter **4**, which adheres to the same logic, with a presentation of the statistical analysis of the quantitative data first, and then the theoretical concepts used for the analysis of the qualitative data. After that, the findings of this thesis will be discussed in Chapter 5. The presentation and discussion of the results are separated into two sections. The first section (Chapter **5.1**) is dedicated to the first research question, and will focus on the quantitative data from the survey. The second section (Chapter **5.2**) then focuses on the second question, and will include discussions of both quantitative data from the survey, and qualitative data from the interviews. The presentation and discussion of the results are integrated throughout these two sections. Lastly, the conclusions in Chapter 6 will highlight the insights from the thesis.

2. Background

Here follows two sections on previous research related to this thesis. First, a review of food quality and food trends is given. Second, previous research on HCs is presented.

2.1 Review of food quality and trends

One important theme in this thesis is quality aspects in relation to HCs, particularly in consideration of the second research question. Even though food quality is something individual, people who belong to the same culture share major commonalities in what they perceive as important food qualities (Köster & Mojet, 2007). Hence, here follows a review of some previous research on such mutuality. The food quality aspects in focus are the ones most relevant for this study, and will provide an understanding related to the discussions of the results. Moreover, this review also influenced the design of the survey questions related to food quality. It should be pointed out that individual consumers and different consumer groups may find the mentioned food qualities more or less important.

One of the most important food qualities is *taste* (Grunert, 2007; Rozin, 2007; Jordbruksverket, 2008; Beck-Friis *et al.*, 2013; Longin & Würschum, 2016; Longin *et al.*, 2016; Wendin *et al.*, 2020). Food needs to taste good, and consumers are often reluctant to compromise taste for other qualities, such as health (Teuber *et al.*, 2016). *Price* is also considered one of the major determinants for food purchasing and an important quality for food in general (Judd, 2000). But price is also an important indicator of other qualities important for consumers (ibid). Certain consumer groups are becoming more willing to pay for food qualities such as *health* (Bruschi *et al.*, 2015; Meier & Oehen, 2021), *organic*, *local*, and *sustainable food production* (Hobbs, 2019; Meier & Oehen, 2021). Hence, the interplay between taste, price tag and other food quality aspects is important to consider when discussing food quality.

Interest in health has expanded over the recent years, and is a quality aspect that is increasingly paid attention to by consumers and the food industry (Grunert, 2007; Hobbs, 2019). Perceived ‘health crises’ and health risks in modern Western society has included discussions about toxic additives, chemical residues and unhealthy diets that are making people sick (Beck, 1992; Campbell, 2009; Orlando, 2018).

These notions about health issues are influencing consumers' ideas about food quality (ibid). In terms of nutrition, dietary fibres, proteins and minerals are some categories that are important in relation to cereal consumption (Zamaratskaia *et al.*, 2021). These discussions on health also relate to a broader discussion on sustainable food production. Sustainability is not a new topic, but it has successively expanded in scope and complexity (Hobbs, 2019). While human health is a part of the sustainability discourse, it also touches on topics of environmental problems connected to food production, like biodiversity loss, climate change and depletion of water resources (ibid). Thus, the environmental impact of food production is becoming an important area of food quality for many actors within the food chain.

In Sweden, the demand for organic food products is growing, and is considered as an important food quality that consumers are becoming more willing to pay extra for (Bosona & Gebresenbet, 2018; Nicolosi *et al.*, 2019). In recent years, sales of organic food products in Sweden have increased (Statistics Sweden, 2020). This trend applies to many different categories of food, including bread and other cereal products (ibid). This may be connected to a variety of reasons, but the scientific literature highlights that organic farming is considered to be more environmentally friendly compared to conventional, which is a big driver for this increased demand (Reganold & Watcher, 2016; D'amico *et al.*, 2016; von Oelreich & Milestad, 2017). Further, it has been shown that organic food is often seen as more healthy, partly due to the lack of chemical use in the production systems (Jordbruksverket, 2008; Kjaernes & Torjusen, 2012; Hasselbach & Roosen, 2015; Hansen *et al.*, 2018; Orlando, 2018). Nonetheless, it should also be noted that a small decrease in Swedish organic food purchases has been reported by Ekoweb (2021). This may have been influenced by factors such as heightened competition with food products marketed as locally produced, which have been gaining more attention in for example retail campaigns (Pekala, 2020).

Another relevant food trend is rising interest in the origin of food (Autio *et al.*, 2013). Domestic food production in Sweden is often recognised as having multiple benefits compared to food imported from other countries (Ekelund *et al.*, 2007). Advantages include e.g. restrictive use of pesticides, more safe food and less environmental impact (Lannhard Öberg *et al.*, 2017). Additionally, local foods have become an important aspect for many consumers. Often, local food production is associated with small-scale farming (Jordbruksverket, 2008), and perceived as generating more healthy food (Autio *et al.*, 2013; Litavniece *et al.*, 2017), produced in systems with low environmental impact (Jordbruksverket, 2008; Autio *et al.*, 2013). Buying local food is also argued to be connected to growing notions about the negative side-effects of global industrial food systems, and the expanding consumer interest in transparent food chains (Autio *et al.*, 2013; Rytkönen *et al.*, 2018).

2.2 Review of previous research on HCs

Much of the previous research on HCs has placed these cereal varieties within discussions about sustainable food systems. Particular attention has been paid to certain attributes that make HCs interesting in terms of positive impacts on the environment and health. It has been highlighted by several authors that HCs are more genetically diverse compared to MCs, which is important for several reasons (Newton *et al.*, 2010; Longin & Würschum, 2016; Massawe *et al.*, 2016; Bordini *et al.*, 2017;). Crop diversity plays an important role in the functioning of regulatory ecosystem services like soil erosion control and nutrient cycling (Cheng, 2018). Also, genetic heterogeneity within and between cereal populations seems to contribute to better resistance against biotic and abiotic stresses (Newton *et al.*, 2010; Berni *et al.*, 2018). Studies have shown results indicating that certain HC cultivars are more resistant to pests, including brown rust and mildew, compared to more modern cultivars (Newton *et al.*, 2010; Moudrý *et al*., 2011; Konvalina *et al.*, 2012; Bordini *et al.*, 2017). This has clear advantages in terms of crop loss and reduced needs for pesticides. Furthermore other studies have indicated that certain HC cultivars are more resistant to drought, which may become increasingly important due to water shortages and other changes as a result of climate change (Konvalina *et al.*, 2012; Konvalina *et al.*, 2014; Slama *et al.*, 2018; Gerhardt *et al.*, 2019). Intensive use of fertilisers have been connected to environmental problems such as disrupting natural nutrient cycles and contributing to GHG emissions (Foley *et al.*, 2011). In this context, HCs has also been represented as a possible alternative to cereals bred for high-intensive agricultural systems, since some HC cultivars can bring stable yields in low-input environments (Newton *et al.*, 2010; Mouldrý *et al*., 2011; Konvalina *et al.*, 2012; Migliorini *et al.*, 2016; Dinu *et al.*, 2018). In terms of health benefits, research findings have suggested that HCs possess high content of proteins (Mouldrý *et al*., 2011; Zamaratskaia *et al.*, 2021), zinc, iron and other minerals (Bordini *et al.*, 2017; Zamaratskaia *et al.*, 2021). Moreover, they are considered to be high in dietary fibres, in particular when consumed as whole grain (Bordini *et al.*, 2017). It has been shown that increasing fibre intake can have health benefits and reduce risks for diseases such as type 2 diabetes, which is a growing problem particularly in Western countries (Wendin & Olshov, 2018). These traits are making HCs interesting in a sustainability context, as they may provide ways to mitigate some environmental challenges in food systems, as well as provide healthy cereal options. Growing HCs may also be interesting both in terms of new crops on the fields, and for genetic material in crop breeding (Cheng, 2018).

Even though HCs are not able to compete with MCs regarding yield, it has been suggested that it is an interesting group of cereals for new and emerging markets, in particular for targeting specific consumer segments who are interested in the quality aspects discussed above (Longin & Würschum, 2016; Jankielsohn & Miles, 2017). However, there is limited knowledge about the acceptance of these cereals

among consumers. The few previous studies on the topic has suggested that the awareness of HCs varies between different consumer groups (see Bruschi *et al.*, 2015; Teuber *et al.*, 2016; Wendin *et al.*, 2020). There seem to be positive attitudes towards HCs among studied consumer groups (ibid). Attributes associated with HCs include, for example, good taste, environmentally-friendly production and health benefits (Teuber *et al.*, 2016). Such connotations seem to affect the consumer acceptance of HCs (ibid). Nonetheless, supplementary knowledge about how consumers relate to HCs is needed to deepen the understanding of consumer acceptance, and to test previous findings again. Since awareness and exposure to unfamiliar foods, as well as preferences for different food products, shopping locations and food qualities are dimensions contributing to acceptance, focusing on these areas may add additional insights about HC acceptance today. Furthermore, there is also a lack of perspectives from actors within bakeries/retail. How they relate to food quality and what have been successful factors for consumer interest in HC products according to their experiences may broaden the understanding of food quality perception and acceptance of HCs.

3. Methodology for data collection

The following chapter is dedicated to describing the methodological choices for the data collection. A mixed-method approach was used, which entails that the data has been collected through both quantitative and qualitative methods (Creswell & Creswell, 2018). The quantitative data has enabled an extensive coverage of the awareness of HCs as well as preferences for different products and qualities among the specific consumer group under investigation (Prowse, 2010). The qualitative data has provided in-depth understandings on quality perception among bakers and retailers (Kvale & Brinkmann, 2014; Creswell & Creswell, 2018). The quantitative data was collected through an online survey (Chapter **3.1**) and the qualitative data through semi-structured interviews (Chapter **3.2**). Additionally, literature was collected for both the scientific context of HCs, and for the theoretical analysis of the findings (Chapter **2.3**). Methodological limitations will be discussed throughout the chapters.

3.1 Online Survey

3.1.1 Selection of the specific consumer group

The specific consumer group under investigation in this thesis consists of students from the agriculture programs at SLU. There are five agriculture programs, including *Animal science, Food science, Economics, Rural development* and *Soil/Crop science*. Students from all five programs were asked to participate in the online survey.

The decision to investigate this group was partly based on a previous study by Wendin *et al.* (2020) that investigated the acceptance and preference for HCs among students and staff from SLU and Kristianstad University. Thus, a similar consumer group was used in this thesis in order to repeat and compare the findings of Wendin *et al.* (2020). Moreover, it was also assumed that many of the students may have at least a little previous knowledge of HCs, due to their background in agricultural science. Therefore, this group could be assumed to contribute with insightful findings on preferences for different products and qualities in relation to HCs today. Groups of consumers completely unaware of HCs may not be able to provide such insights. In order to test if the assumption about previous knowledge

was correct, questions about awareness was also included in the survey. Another factor that influenced the selection of the consumer group was accessibility, which was important when considering the time frame of this project.

While the decision to use this specific consumer group have enabled a comparison and a re-test of the results from Wendin *et al.* (2020), it also means that perspectives from other consumer groups have been excluded. One limitation is therefore that results may not be applicable, in a statistical sense, to other segments of the population in Sweden.

3.1.2 The survey

A self-completion survey was used in order to explore the specific consumer group's awareness of HCs and their preference for different products, shopping locations and qualities in relation to HCs. The survey was constructed in the online survey tool Netigate. The survey was divided into four sections in order to create an easy logic for the respondents to follow, including 1) *background*, 2) *awareness*, 3) *previous experience of tasting HCs* and 4) *preference for quality, food products and food shopping locations* (cf. Fjelkegård & Persson, 2016). In total, the survey consisted of 14 questions (see Appendix 1). Respondents who had never tasted HC products did not answer questions in section 3). Hence, the respondents answered 11-14 questions, see Table 1.

Table 1. The question sections in the online survey, including who answered which sections.

	Section	Answered by
1	Background	Everyone
2	Awareness	Everyone
3	Experience tasting	Only respondents who had tasted HCs
4	Preferences	Everyone

Most questions were closed with predetermined response alternatives, which provides benefits like making it easy for respondents to understand and answer the survey (cf. Fjelkegård & Persson, 2016). However, a textbox response alternative was included at the end of many questions. This gave respondents the option to formulate their own answers and provided a possibility to gather information beyond the predetermined alternatives. This was an important feature for collecting e.g. known cultivars that were not included as a response alternative in the survey. While closed questions can be beneficial, it also limits the respondents' freedom to develop their answers (cf. ibid). Personal background and researcher's biases influence decisions in the scientific process, and in this case, the predetermined responses to questions may have been shaped by my ideas about awareness, preference and food quality (cf. Creswell & Creswell, 2018). To minimize the risk of limiting the response alternatives, dialogues with both supervisors, HC research

experts, and other students influenced the development of the survey. Further, previous literature on HCs, food quality and consumer studies also guided the process. Finally, text-boxes provided opportunities for alternative responses. These steps have hopefully contributed to limited researcher's bias in the survey.

To minimize the risk of not getting enough responses, the survey was tested on a group of students before it was distributed to the participants. This was done to ensure that the questions were easy to understand and did not take too long to respond to (cf. Fjelkengård & Persson, 2016).

A link to the online survey was emailed to all students in the agriculture programs. Included in the email was a presentation of me and the thesis project in order to invoke trust and motivate participation (cf. Teorell & Svensson, 2007). After the initial email, two reminders were sent.

For the scope of this thesis, a sufficient number of students responded to the survey. In total, 154 respondents completed the online survey, presented in Table 2. In order to compare if any differences existed within the specific consumer group, two subgroups were used; gender and educational background. For comparison based on gender, students were clustered into two groups, *women* and *men.* 116 identified as women and 38 as men. For comparison based on educational background, the students were clustered into two groups; *social science*: students from economics and rural development, and *natural science:* students from animal science, food science and soil/crop science. 73 respondents had a social science background and 81 had a natural science background. The students were between 20 (youngest) and 49 (oldest) years old. The average age was 25 years old, and the median age was 25 years old.

Table 2. Description of the survey respondents.

	Total	Women	Men	Social Science	Natural Science
Number	154	116	38	73	81
Percent (%)	100	75	25	47	53

It should be noted that the sample sizes for the gender comparison were uneven. Significantly more women compared to men responded to the survey. In consumer studies, this is a common phenomenon (Wendin *et al.*, 2020). It may also reflect that more women compared to men study at SLU (SLU, 2021). This means that results from the subgroup men are statistically more insecure, as the group is significantly smaller than women. Moreover, for the subgroup comparison of the educational backgrounds, students from five different programs were clustered into two groups. While this enabled larger sample groups, and thus more secure statistical comparisons, it may also have affected the results. Nonetheless, programs with the most similar educational focus were clustered, and can therefore be suspected to provide similar perspectives. The subgroups were created in dialogue

with my supervisors to minimize the risk of biased clustering, since I am myself an agriculture program student.

3.2 Interviews

3.2.1 The informants

To get perspectives from other actors in the HC food chain, bakers and retailers from different parts of Sweden were interviewed. Their perspectives were included to complement the quantitative findings on important food qualities for HCs. In total, nine interviews were conducted, including four bakers and five retailers, see Table 3. All informants were more or less involved in selling HC food products. The bakers were found through google searches on 'heritage cereal bakeries' and contacted by email. Two retailers were approached through my personal contacts. The rest were recommended through the first two retailers. Pseudonyms are used in order to protect their identity.

Table 3. Description of interview informants.

Name	Short description	HC products sold	HC cultivars sold/used
Baker 1	Combined artisanal bakery and café	Bread, pastries, flour	Emmer, Einkorn, Dala wheat, Petkus rye, Naked Barley
Baker 2	Artisanal bakery, artisanal pastry shop, café	Bread, pastries, flour	Dinkel, Emmer, Einkorn, Svedje-rye, Öland wheat
Baker 3	Artisanal bakery	Bread, granola, buns/cookies, flour	Local wheat landraces, Dinkel, Einkorn, Emmer, Svedje-rye
Baker 4	Artisanal bakery	Bread, flour	Local wheat landraces, Emmer, Svedje-rye, Naked Barley, Naked oats, Öland wheat
Retailer 1	Specialty store	Flour	Öland wheat
Retailer 2	Food company	*	Dinkel, Öland wheat
Retailer 3	Grocery store	Flour	Dinkel
Retailer 4	Grocery store	Flour	Dinkel
Retailer 5	Supermarket	Flour	Dinkel

* Intentionally left blank

One limitation is the availability of informants. As there is only a limited number of actors involved with HCs, the access to different informants was narrow. Therefore, I certainly lost important perspectives, in particular from small-scale retailers involved with HCs. Moreover, some of the informants from grocery stores/supermarkets had little knowledge about HCs compared to e.g. the bakers. However, I still chose to include these perspectives because it gave insights about differences between retailers and how they relate to HC products. Hence, the interviews managed to cover multiple different perspectives even as the number of available informants was small.

3.2.2 The semi-structured interviews

The interviews with the bakers/retailers had a semi-structured approach, which placed the focus on how the informants understand their reality (cf. Kvale & Brinkmann, 2014). The interviews were conducted using an interview guide which pinpointed the important themes to cover during the interviews (Robson, 2002). It included open-ended questions about the informants' own views about food quality in relation to HCs. Questions also covered how the informants experience interactions with their customers. The guide was complemented by improvised follow-up questions in response to the informants' answers and flow of the conversations (Creswell & Creswell, 2018). This approach allowed the informants to highlight the experiences and topics that they found most important in relation to the themes from the interview guide (cf. Robson, 2002). Moreover, it allowed space for the informants to bring up topics that I had previously not been aware of as relevant, which allowed for meaningful insights (ibid). This was important in order to explore the complexity of how the informants view food quality, both in terms of what they personally think is important and what they experience as important to their customers.

All interviews were completed via telephone, which have both advantages and disadvantages (Opdenakker, 2006). The ability to pick up on social codes conveyed through body language and gestures is lost. It may also be more difficult to create a feeling of safety and trust between the informant and the interviewer over the phone (ibid). However, in many cases, the telephone interview is a great alternative to face-to-face interviews (Sturges & Hanrahan, 2004). For this thesis, telephone interviews have allowed access to informants that were not geographically close to me (cf. Opdenakker, 2006). Since there are a limited number of actors involved with HCs in Sweden, doing interviews over the phone has been important in order to reach informants. I find that telephone interviews have been a satisfactory choice for this thesis.

The interviews were all conducted in Swedish because all informants were native Swedish speakers. Moreover, all interviews were recorded and then transcribed. Quotes presented in the thesis have been translated to English and extra

attention has been paid to making sure that the meanings in the narratives are not lost during the translation process.

3.3 Literature collection

The collection of literature has revolved around three different areas: scientific research on HCs, food quality and theoretical concepts. Previous research on HCs enabled an understanding of the scientific context of this project, which was important during the whole process of this thesis. The literature played an important role in formulating the survey questions and the interview guide. For example, it influenced the decisions around appropriate fixed response alternatives for different survey questions. Further, this literature was also important for comparing and discussing the findings of this project. Since this thesis involves the topic of food quality, previous research on food quality and food quality trends were also included for similar reasons, and has been important for the survey and interview guide as well as discussions of the results.

In order to discuss the qualitative data, and connect it to a theoretical background, the collection of literature also included the theoretical concepts *cultural identity and taste*, *the corporate food regime*, and *risk society and reflexive modernity*. This literature gave an understanding of the concepts, as well as guided the process of how these concepts can be used on data material.

The literature collection has been done in dialogue with my supervisors.

4. Analytical method and framework

In this chapter follows a description of the analytical tools used for both the quantitative and qualitative data. Chapter **4.1** is devoted to the statistical evaluation of the survey data. Chapter **4.2** accounts for the theoretical concepts used for analysing the qualitative data.

4.1 Statistical evaluation

The methods for statistical evaluation were pre-determined prior to the data collection, and used to help answer the first research question, focusing on awareness and preference in relation to HCs. The raw data from the survey was descriptively analysed in excel. This was done in order to show variations and tendencies in the data (Heeringa *et al.*, 2017). Further, it demonstrated differences between men and women, and between students with a background in social and natural science.

Cochran's Q-test was used to identify significant differences between different response alternatives in the multiple choice questions (see Appendix 1). SPSS Statistics 27 was used to perform the analysis. Cochran's Q-test was chosen since it allows for pairwise multiple comparison tests between more than two samples (NCSS Statistical Software, n.d.). This was important in this case because all multiple choice questions involved more than two response alternatives (samples). The analysis was performed on the results of the whole group and on each sub-group (men, women, social science, natural science). Significant differences between different response alternatives were determined by the p-value, which was set to 0.05, giving a 95% security of significant difference. Hence, p-values ≤ 0.05 reveals a significant difference between two samples, while ≥ 0.05 signals that there was no significant difference.

To compare the responses of the sub-groups to each other, two-tailed preference test using table 3 in Roessler *et al*. (1978, p. 941) was used. Since the sample groups were uneven in number, results from the descriptive analysis for each subgroups' answer to a certain question was used for the comparison. Therefore, the results from the descriptive analysis were treated as a nominal number when performing the two-tailed preference test.

Probably due to glitches in the survey program, some data was distorted and therefore excluded from the analysis. Yet, these quality issues were small and had no major implications for analysis of the results. For transparency, how the data was handled can be found in Appendix 2 .

4.2 Theoretical concepts

The following theoretical concepts were used in order to connect the interview narratives to a broader discussion, and relate it to the second research question about important food qualities. Decisions on which theoretical concepts to use was done after thematic coding of the interview data. Therefore, multiple concepts were tested on the material. Through this process, three theoretical frameworks, presented below, were chosen.

4.2.1 Cultural identity and taste

Cultural identity was used in this thesis in order to discuss how the informants relate to their customers, and to themselves, and how this is reflected in the way they spoke about food quality in relation to HCs. It also provided a framework for exploring how creation of cultural identity, and expressions of group belonging can be understood as an additional food quality connected to HCs.

Food has for a long time been an arena for the (re)creation of cultural identities and group membership (Ashley *et al.*, 2004; Paddock, 2015; Tal & Gvili, 2022). Cultural identities can be described as the internalised meanings attached to a specific group or community (Burke & Stets, 2009), which works as a guide for social behaviour for the group members (Cohen, 2002). Hence, a group can be understood as a collective of people bound by their similarities (Jenkin, 2014). However, commonality does not exist without the differentiation from others (Cohen, 2002; Jenkin, 2014). Therefore, a group's identity is partly created through a process of contrasting the group to other groups, creating the notion of a 'boundary' (Cohen, 2002). These distinctions are often created through stereotypical simplifications of the 'others' and affect how individuals view other groups and their place in the world. The boundary of differentiation is assembled through a cultural distancing, which may take many forms. Certain norms, values and behaviours also mark the boundaries between groups (ibid).

To complement and deepen the discussion about (re)production of cultural identity and group belonging, the concept of taste, drawing on ideas from Bourdieu (1984) was also applied to the interview material. Taste is one aspect connected to food that is used by groups to distinguish themselves from others (Bourdieu, 1984). In a group with a certain cultural identity, some tastes are seen as more legitimate compared to others (Ashley *et al.*, 2004). Knowledge about what is tasty confirms

the belonging to a certain cultural identity (Bourdieu, 1984; Ashley *et al.*, 2004). In sum, both concepts were used to deepen the discussion on different dimensions connected to HC food quality. They functioned as a framework for exploring the relationship between cultural identity, taste and food quality.

4.2.2 The corporate food regime

To further deepen the informants' notions of important HC food qualities, and to connect their discussions to more general discourses, the corporate food regime concept was applied on the interview data. The concept provide a lens for examining dominating and alternative discourses on food politics (Campbell, 2009). In relation to the purpose of this study, it contributes to the discussion on how the informants relate to HCs as something different from MCs, and in extension how these two groups of cereals are connected to different discourses on how food systems should be organised. It also assist in exploring connections between food quality and food politics, and how the consumption of certain food products, in this case HCs, can be seen as a way to express resistance against mainstream food politics. While the corporate food regime concept is a macro-perspective framework for exploring larger societal organisation, it is used in this thesis to connect the micro-level discussions about HC food quality to broader societal discourses on food.

So far, three food regimes have been identified, and represent a moment in political history, defined by a framework which influences the organisation of food systems (McMichael, 2005). Today, the third 'corporate food regime' shapes the dominating way of producing, processing and consuming food. This food regime is defined by neoliberal activity at global scale, and the increasing activity of private corporations in food systems (McMichael, 2013; von Oelreich & Milestad, 2017). Under this regime, the agricultural sector has become an arena for private investments and monetary growth. The focus on economic gains has generated serious environmental problems through monocultures and high-input agricultural systems, which are argued to be best suited for creating both food and profit (ibid). The contemporary corporate food regime has also been discussed in terms of negative impacts on health through the focus on cheap and convenient foods, produced in long global production chains (McMichael, 2005; Campbell, 2009).

As a reaction to the significant environmental costs and health concerns connected to food systems under the corporate food regime, resistance to mainstream trajectories has developed (McMichael, 2005; Campbell, 2009). Social movements like La Via Campesina and the organic food movement are examples of such resistance, and present alternative ideas of how food could, and in their opinion should, be produced and consumed (McMichael, 2005; von Oelreich & Milestad, 2017). Thus, within the framework of the corporate food regime exists tensions between the hegemonic discourse on how to organise food systems as well

as the opposition against these mainstream ideas. To summarise, the corporate food system assist to highlight how different discourses on how food systems should be organised are connected to the informants' discussions on food quality in relation to HCs.

4.2.3 Risk society and reflexive modernity

Risk society and reflexive modernity was also applied to discuss different dimensions of HC food quality. This framework help explore the interconnection between risk avoidance and HCs. It shines light on how the informants may associate industrial agriculture and large-scale processing industry with risks, and how the avoidance of these risks make up a dimension of different food quality aspects. The framework was also be used as a tool to discuss links between trust and food quality, and how the informants' express the value of certain production systems because they are associated with less risks.

The concept of risk society refers to a society where new types of risks have arisen as a side effect of the industrial era (Beck, 1992). These risks are not limited at spatial or temporal scales, but instead global in scope (Giddens, 2007; Engdahl & Larsson, 2016). One example of such risks is climate change. In risk society, the organisation of society is influenced by the perceived risks generated from the industrial era (Sørensen & Christiansen, 2012). Thus, in risk society, action is guided through how risks and problems can be avoided (ibid). Moreover, these new risks bring a growing uncertainty, leading to a decreasing trust in authorities (Kjaernes & Torjusen, 2012).

Giddens draws on Beck's ideas about risk society, and connects risk and trust in what he calls 'reflexive modernity' (Kjaernes & Torjusen, 2012). As an effect of risk society, a new reflexive type of trust emerges, where trust is actively negotiated as individuals reflect on the risk of different decisions (Abbinett, 2003; Kjaernes & Torjusen, 2012). In other words, reflections about the risks in risk society are impacting how individuals act, and influencing the feeling of trust or distrust towards other individuals and institutional systems in society (ibid). Hence, trust can be understood as the reliability that a certain system will produce a certain set of outcomes (Abbinett, 2003; Giddens, 2009). E.g., conventional food systems may not be trusted in terms of the risk of pollution, and thus individuals may turn to alternative food networks, for example organic production, in order to ensure certain outcomes they trust will prevent certain risks (Kjaernes & Torjusen, 2012). Summarising, to deepen the discussion and investigate the multidimensionality of different food quality aspects, risk society and reflexive modernity was used to connect food quality to risk avoidance and trust.

5. Findings

Here, the results will be presented and discussed. The presentation and discussion is integrated throughout the whole chapter. Chapter **5.1** will be dedicated to answer the first research question and its sub-questions. Thus, it will focus on how the specific consumer group express themselves on HCs and food made with HCs. Results on how aware the consumer group is of HCs, what the preferences are for different kinds of food products and shopping locations as well as differences between the subgroups gender and educational backgrounds will be presented and discussed. This chapter includes findings based on the quantitative data from the online survey. The second part, Chapter **5.2** relates to the second question, focusing on important food qualities, and includes both data from the survey and the qualitative data from the interviews.

5.1 Awareness and preference in relation to HCs

Throughout this section, the descriptive analysis of the survey data can be found in the figures. Results from Cochran's Q-test will be presented throughout the text and sometimes indicated by the *p-value*, where $p=\leq 0.05$ means that there was a significant difference between two response alternatives. In cases where no significant differences were found, $p=\geq 0.05$. The two-tailed preference test will be accounted for in written text. Additional tables of results from Cochran's Q-test and the two-tailed preference test can be found in Appendix 4 and Appendix 5.

5.1.1 Respondents' awareness of HCs

Awareness of, and exposure to unfamiliar foods can lead to higher consumer acceptance of them (De Leon *et al.*, 2020). Moreover, the group of consumers were expected to have at least a little previous knowledge about HCs. Hence, familiarity with HCs has been included as a theme in this thesis to relate to the overall aim; exploring consumer acceptance of HCs, and to test if assumptions about previous awareness was true. To investigate the awareness, the respondents were asked if they had previously heard of HCs and different HC cultivars.

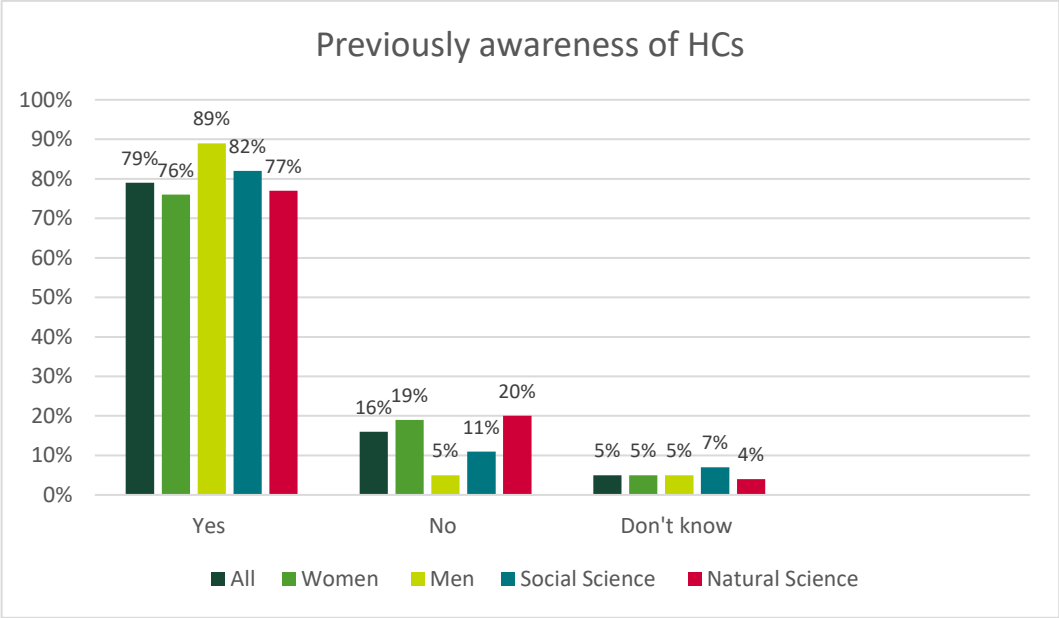


Figure 1. Respondent's previous awareness of HCs.

A presentation of the results is found in Figure 1. In total, 79% of all respondents had previously heard of HCs. No significant difference was found between men and women, and between students with a social science and natural science background.

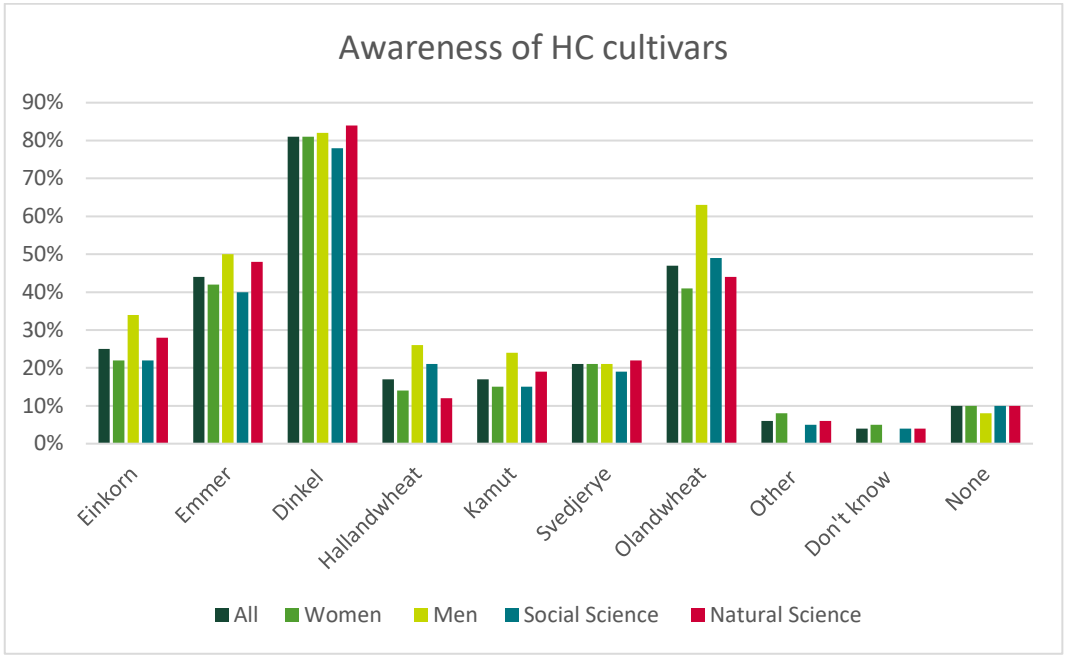


Figure 2. Respondents' awareness of different HC cultivars.

As shown in Figure 2., the most commonly recognised HC cultivar was Dinkel (81%). According to Cochran's Q-test, it was significantly more known compared to all other cultivars (p=>0,001). This was true for all consumers and for all genders

and educational backgrounds. Close to 50% of respondents had previously heard of Öland wheat (47%) and Emmer (44%). These two cultivars were recognised significantly more than Svedje-rye, Kamut and Halland wheat. Regarding differences and similarities between the genders, men recognised Öland wheat significantly more than women. Among women, Emmer was significantly more known than Einkorn. However, for men, no significant differences were found between Emmer and Einkorn. When comparing students from different educational backgrounds, natural science students recognised Einkorn significantly more compared to Halland wheat, which was not the case for social science students. Additional cultivars that were known are presented in Table 4.

Table 4. Other cultivars identified by the respondents.

Name of cultivar	Number of respondents
Petkus	1
Fylgia wheat/ Fylgia read wheat	2
Jamtland barley	1
Naked barley	1
Sun oat	1
Dala wheat	2
Black oat	1

To further investigate respondents' previous awareness of HCs, they were asked about their experiences of tasting HCs. Results are found in Figure 3.

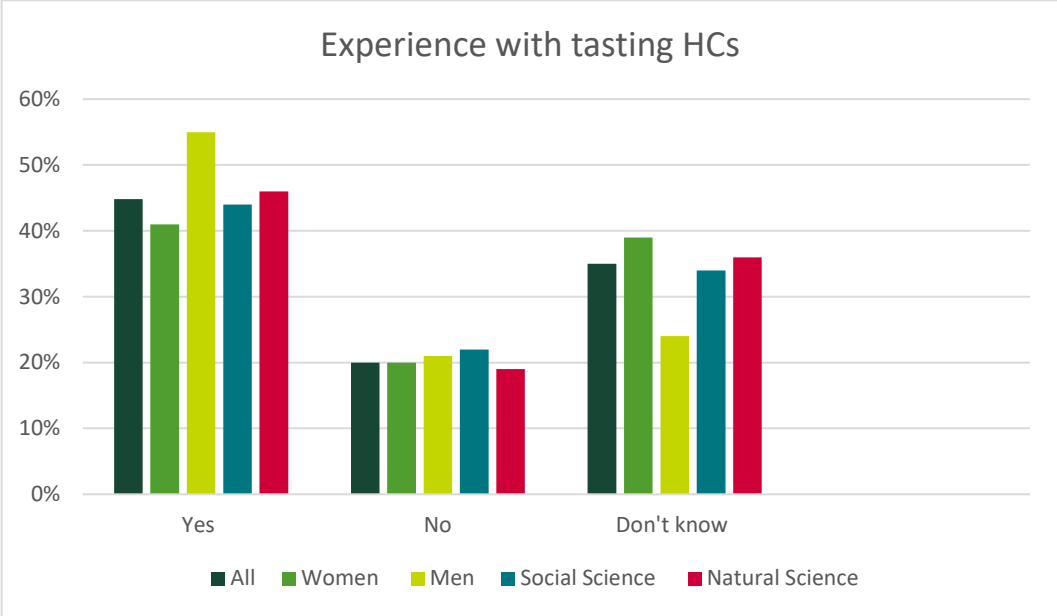


Figure 3. Respondents' experience with tasting HCs.

In total, 45% of respondents had tasted HCs, while 35% did not know and 20% had not. No significant difference was found between the genders or between the educational backgrounds.

Respondents who had tasted or did not know if they had tasted HC products were asked to answer additional questions about their tasting experiences (totally 123 respondents). Results are presented in Figure 4.

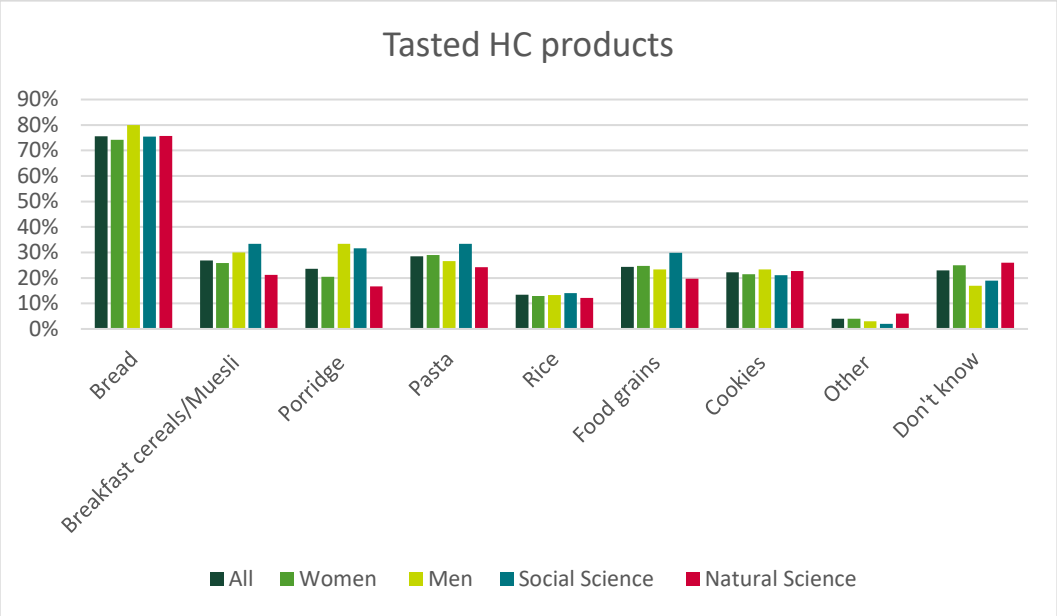


Figure 4. Respondents' experience with tasting different HC food products.

Bread was the most commonly tasted product (76%), and was tasted significantly more than all other food products. Rice was the least commonly tasted product (13%). The two-tailed preference test revealed no significant differences between men and women. When comparing the different educational backgrounds, social science students had tasted porridge made with HCs significantly more than natural science students. Additional products that had been tasted can be found in Table 5.

Table 5. Other HC products tasted

Product	Number of respondents
Cinnamon buns	1
Flour	1
Semlor (Swedish pastry)	1
Pastries	1
Crispbread	1

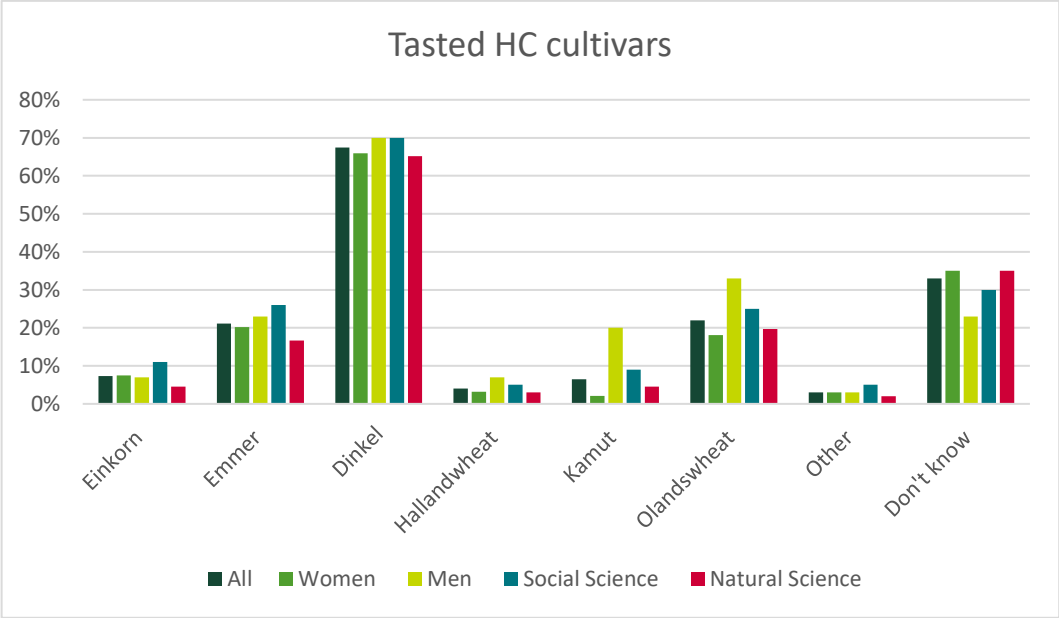


Figure 5. Respondents' experience with tasting HC cultivars.

The most commonly tasted HC cultivar was Dinkel (67%), which was tasted significantly more compared to all other cultivars (p=<0,001). Halland wheat was the least tasted (4%) of all cultivars. Significantly more men (20%) compared to women (2%) had tasted Kamut. Öland wheat had also been tasted significantly more by men (33%) compared to women (18%). For women, Emmer had been tasted significantly more compared to Einkorn, Halland wheat, and Kamut. This was not true for men. According to the two-tailed preference test, no major differences were found between the two educational backgrounds. Other cultivars that had been tasted by the respondents are found in Table 6.

Table 6. Other cultivars tasted.

Name of cultivar	Number of respondents
Fylgia wheat	1
Naked barley	1
Dala wheat	1
Jacobi Bors wheat	1
Svedje-rye[1]	2

[1]This specific response alternative disappeared when respondents' participated in the survey, probably due to a glitch. Thus, data on Svedje-rye was obtained through the response alternative "other". There is hence a possibility that more people had tasted Svedjerag than what is presented in the results.

Most commonly, the HC products that the respondents had tasted were cooked or baked at home (50%). Additional information about where the tasted HC products were purchased can be found in Appendix 3.

Among the respondents in this thesis, results imply that the awareness of HCs and different cultivars is high. 76% of had prior knowledge of HCs. In comparison, a study on the acceptance of HCs as functional food[2], Bruschi *et al*. (2015) reported that 25% of respondents had previous awareness of HCs. In a similar study, Teuber *et al.* (2016) found 47% of their respondents to have prior knowledge of HCs. This result may have been influenced by the fact that all respondents in this study have a background within agricultural science. Furthermore, Dinkel was the most commonly recognised HC cultivar. These results conform to findings by Wendin *et al.* (2020). Dinkel has in recent years gained increasing attention for characteristics like stress tolerance and health attributes (Yan *et al.*, 2002; Packa *et al.*, 2019). Moreover, it appears to have a high acceptance among consumers (Angioloni *et al.*, 2011). These factors may partially have contributed to the high awareness of Dinkel. This is also reflected in the respondents' tasting experiences, where Dinkel was tasted significantly more compared to other cultivars. Bread was the most tasted HC product. In Sweden, bread is one of the most commonly consumed cereal products (Wirfält *et al.*, 2002). Contrasting bread and rice, swedes consume on average 50 kg bread and 5,5 kg rice per year (Statistics Sweden, 2018). Furthermore, flour and bread are some of the most common HC products on the Swedish market today (Gerhardt *et al.*, 2020). This could potentially, to some extent, have affected the results. When comparing the genders and the educational backgrounds, differences between the genders were more pronounced. Therefore, gender seems to be more influential in terms of awareness compared to educational backgrounds. This may to some extent depend upon the fact that even though the students have some differences in their educational background, they all belong to a similar education. To conclude, the results indicate a high awareness of HCs and different cultivars, as well as familiarity with tasting different HC cultivars and products.

5.1.2 Respondents' preference for HC products and shopping location

Preferences for food products and shopping locations are also dimensions that relate to the acceptance of HCs. Results on preferences for different food products are presented in Figure 7.

[2] Functional foods is a group of food which have documented health benefits (Lantmännen, n.d).

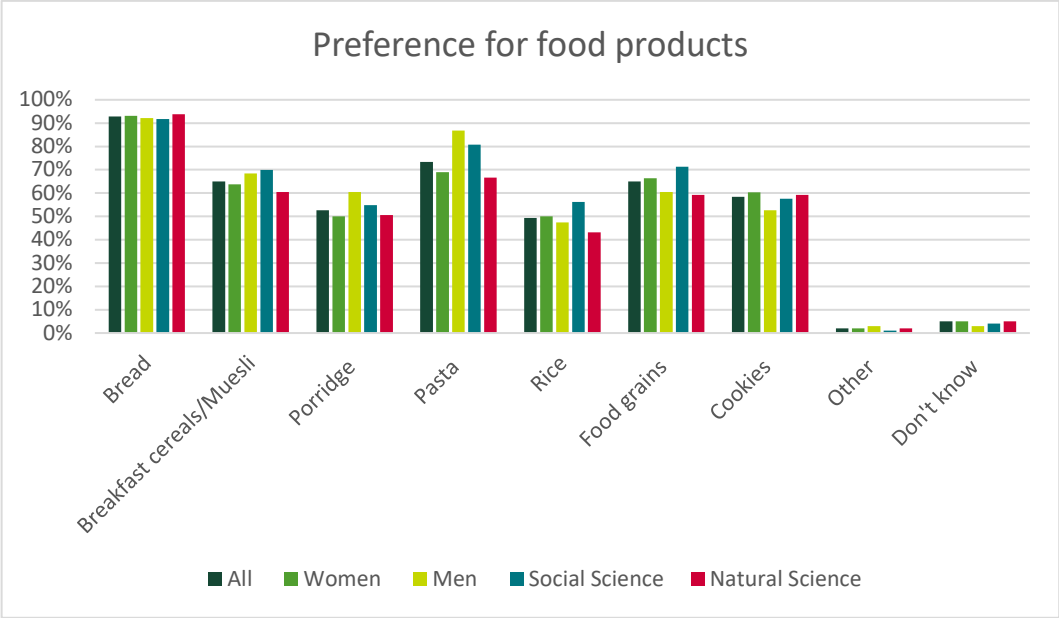


Figure 6. Respondents' preferences for different HC food products.

The HC food product that the most amount of participants would purchase was bread (93%), followed by pasta (73%). These findings correspond to results by Wendin *et al.* (2020) who also reported bread as the most preferred food product made with HCs. Women and students with a natural science background showed a significant preference for bread according to Cochran's Q-test. However, among men and social science students, there was no significant difference between bread and pasta. No significant differences were found between men and women, and between social and natural science backgrounds in terms of preferences for different products according to the two-tailed preference test. Other products that the respondents named includes flour and unprocessed cereals (raw material).

To get an understanding of the preferences regarding accessibility of HC food products, the respondents were asked about which location(s) they would prefer to purchase HC food products from. Results are shown in Figure 8.

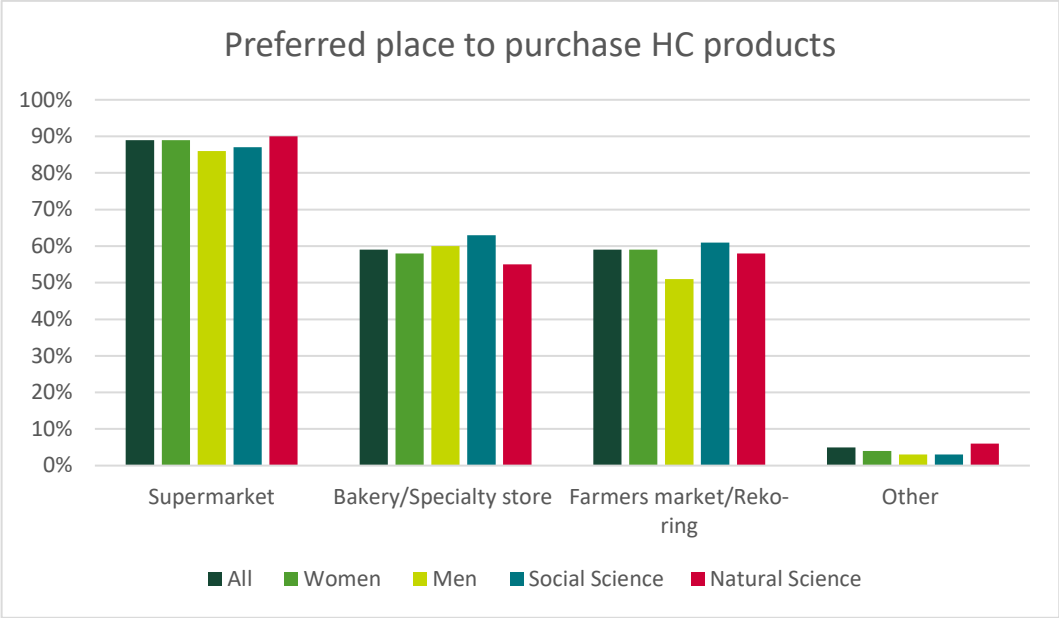


Figure 7. Preferred place to purchase HC products.

The most popular site was supermarkets (89%), and was significantly more preferred compared to bakeries/specialty stores and farmers markets/REKO-rings. However, 59% of respondents preferred bakeries/specialty stores and farmers markets/REKO-rings. No significant difference was found between the two ($p=0.91$). Additional statements about preferred locations are summarised in Table 9.

Table 7. Respondents' comments on preference for purchasing location.

Comment:
"Supermarket because it is more easily accessible"
"Does not matter"
"Don't know"
"Food store in general, the size don't matter"
"I very rarely purchase food products at a bakery/specialty store/farmers market/ REKO-ring, so I would purchase from the supermarket. I would have tried a bread made with heritage cereals if there was a conspicuous special price at my regular supermarket."

Bread and pasta were the most popular HC food products among the consumer group. This is supported by the findings of Wendin *et al.* (2020). As bread, in particular, makes up a considerable part of the cereal products Swedes' consume (Wirfält *et al.*, 2002), it is possible that this already existing consumption pattern contributes to the high preference for HC bread. Moreover, the study found that supermarkets were the preferred location for purchasing food products, which also coincides with Wendin *et al.* (2020). As also suggested by the quotes in Table 9,

convenience and habits of purchasing food at the supermarket may have some influence over the preferred purchasing location. More than half of respondents preferred bakeries/specialty stores and farmers' markets/REKO-rings. Thus, it can be assumed that among this specific consumer group, many are open to other locations than supermarkets. In Sweden, REKO-rings and farmers' markets have increased rapidly in popularity during the last couple of years (Wendin *et al.*, 2020; Gruvaeus & Dahlin, 2021). In the scientific literature, this expansion has partly been explained as a growing concern about the negative effects connected to conventional food networks (Kjaernes & Torjusen, 2012). Thus, consumers turn to alternative systems such as farmers' markets, which they trust to produce for example environmental and health benefits (ibid). These trends may be connected to the fact that many respondents seem open to purchasing food in other locations than supermarkets. When looking at the sub-groups, no major differences were found between men and women, and between educational backgrounds in their preference for food products. This suggests that in terms of preference, there are strong similarities within the group.

5.2 Food quality in relation to HCs

Understanding consumers' perceptions of food quality is important for acceptance and success of new food products (Grunert, 2007). The following sections are going to focus on food quality. First follows a presentation and discussion on the results from the survey. After that follows the results and discussions on the material from the interviews.

5.2.1 Results from the survey

To get an understanding of how the specific consumer group relates to HC qualities, they were asked to choose which quality aspects that would be important for them when purchasing HC food products. The survey included a set of predetermined quality aspects to choose from (results presented in Figure 9.) and the option to formulate their own answers in a text-box (results found in Table 10.).

Results show that *"from Sweden"* (81%), followed by "*taste*" (72%) were the most popular quality aspects among the respondents. According to Cochran's Q-test, no significant difference was found between the two. They were, however, chosen significantly more compared to all other quality aspects. The least popular quality aspect was *"from a specific brand"* (1%). "*Health qualities"* and "*locally produced"* was chosen by around 50% of respondents, with no significant difference between the two (p=0.81). When exploring similarities and differences between the genders, *"health qualities"* was chosen by almost the same percentage of men and women. Significantly more women (42%) chose *"environmental*

impact" as an important quality compared to men (16%). According to the two-tailed preference test, there were no significant differences between the two educational backgrounds on any quality aspect.

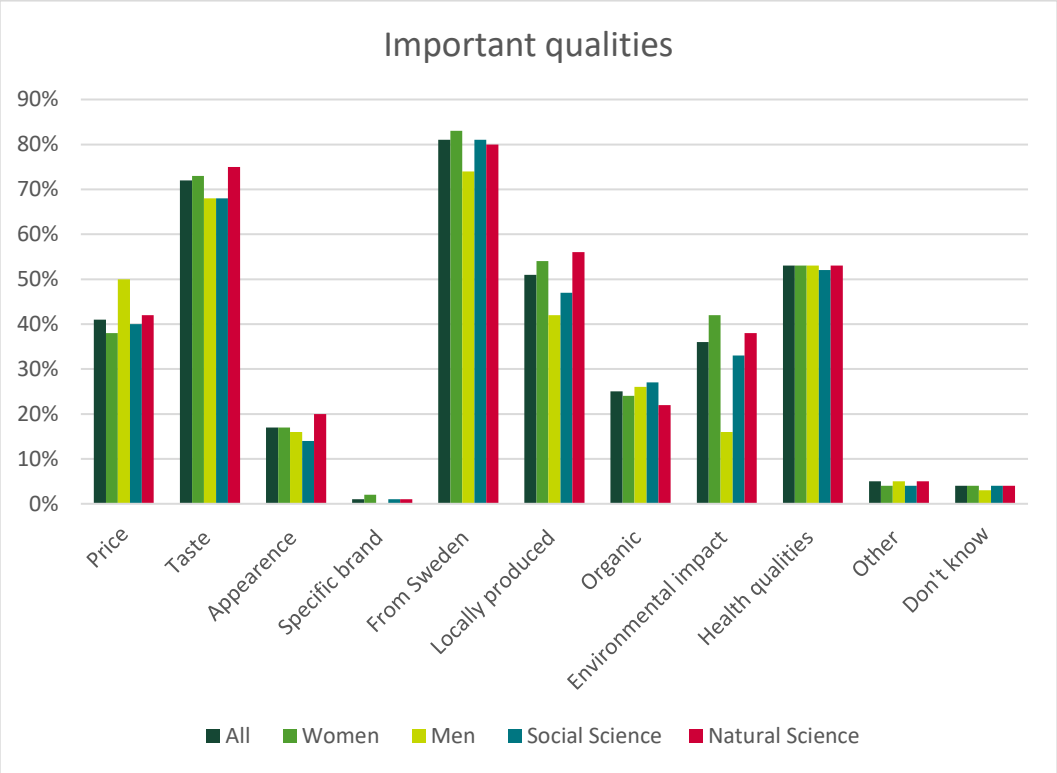


Figure 8. Important qualities for HC food products.

Table 8. Other qualities important for HC food products.

Quality	Number of respondents
Spreading knowledge	1
Availability	1
Baking characteristics/qualities	2
History	1
Trust in producers	1

Price, in particular the willingness to pay more, can be considered an indicator for other qualities that consumers find important (Judd, 2000). Hence, the specific consumer group was also asked how much they were willing to pay for products made with HCs. In total, 58% of respondents stated that they were willing to pay more for products made with HCs compared to MCs. Following, 33% stated they would pay the same price for HC products as for MC products. Women were slightly more willing to pay more (60%) compared to men (50%), however, no significant difference was found between the genders. Almost no difference was found in the willingness to pay more between the educational backgrounds.

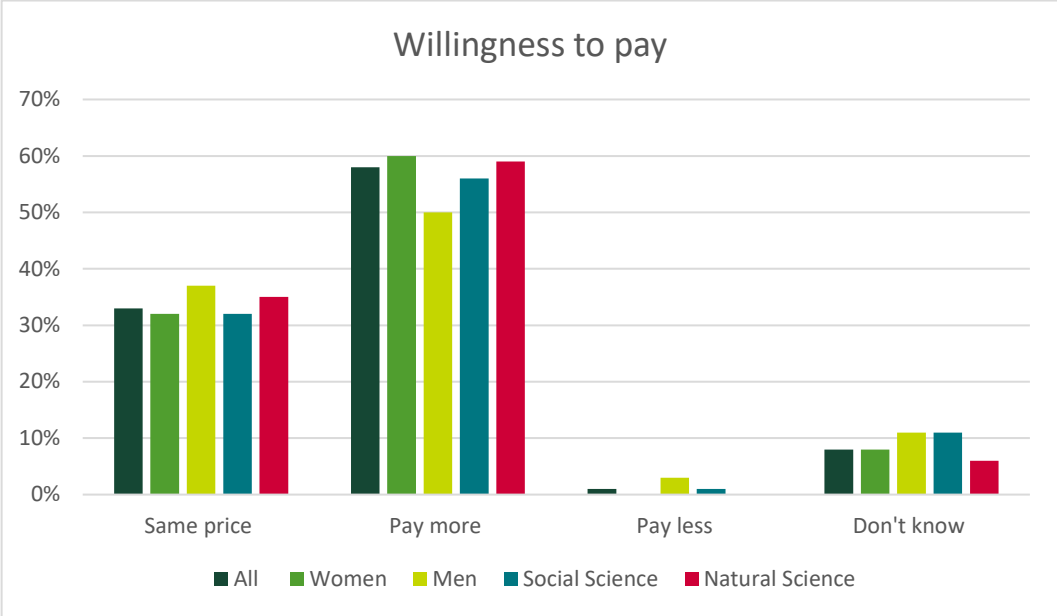


Figure 9. Willingness to pay for HC food products..

The results suggest that factors such as "*from Sweden*" and "*taste*" are of great importance to the respondents in relation to HCs. The importance of domestic food production can partly be related to the notion that Swedish food production is considered to have certain benefits compared to imported food (Eklund *et al*., 2007; Lannhard Öberg *et al.*, 2017). For instance, Swedish farming is often associated with a more regulated chemical use and a lower environmental impact (Lannhard Öberg *et al.*, 2017). The debate about Swedish self-sufficiency and emergency preparedness may also be a contributing factor to the importance given to domestic production (Renmark, 2020). Furthermore, taste is considered to be one of the most important food quality aspects to consumer choices (Grunert, 2007; Longin *et al.*, 2016; Hobbs, 2019). Previous studies focusing on bread made with HCs show similar results, suggesting that taste is a very important quality for consumers (Teuber *et al.*, 2016; Wendin *et al.*, 2020). As will be discussed later, the informants also expressed the importance of taste in conversations during the interviews. It is usually considered that women care more about "*health aspects*" and healthy foods compared to men (Øygard, 2008; Kraus *et al.*, 2017). This was however not the case in this study, where almost no difference between the genders was found. However, it has also been suggested that consumers with a university background also attach great importance to health (Kraus *et al.*, 2017). All consumers under investigation in this thesis are taking part in university education, and in studies related to agriculture and food. Thus, this may partly contribute to the small difference between men and women.

Among other trends in the cereal market, organic production and environmental protection have in recent years become increasingly important to consumers and

the food industry (Barry-Ryan *et al.*, 2021). Rather surprisingly, the quality aspects "*environmental impact*" and "*organic production*" were not as important to the informants compared to other qualities. In particular, men cared significantly less about the environmental impact compared to women. These results also contrast the statements from the interviews, which will be discussed later on. Previous research has suggested that consumers may find it difficult to determine if organic farming is more sustainable in comparison to conventional (Bosana & Berbresembet, 2018). Attention has been brought to that organic production systems, in particular in developed countries, adopt a similar production model to conventional farming (von Oelreich & Milestad, 2017; Tal, 2018). Also, recent discussions on sustainable farming have highlighted the comparably lower land-use efficiency and yields of organic farming (Meemken & Qaim, 2018). Higher land-use requirements may involve turning natural habitats into agricultural land, which have negative environmental consequences, e.g. greenhouse gas (GHG) emissions (ibid). These aspects may, to some extent, have affected how respondents' relate to organic farming. Further, compared to other food products, such as meat and dairy, cereals contribute to relatively little GHG emissions (Reisch *et al.*, 2013). It has been suggested that cereals have potential to make up a sustainable alternative to animal proteins, and thus reduce environmental impact by switching consumption (Poutanen *et al.*, 2021). In relation to this discourse, it is possible that focus on environmental impact is more important for food products that are perceived as high-impact products, and something less reflected upon for low-impact products such as cereals.

One thing that should be highlighted is that there is a possibility that some quality aspects are overlapping. For example, organic and local production may be perceived as healthier and better for the environment (Hasselbach & Roosen, 2015; D'Amico *et al.*, 2016; Bosona & Gerbresembet, 2018; Orlando, 2018). As will be discussed later, the informants highlighted the importance of local production, partly because local food systems are recognised as more sustainable. This notion may also apply to how Swedish consumers and producers relate to domestic food production, and hence contribute to overlaps between local production and Swedish production. Accordingly, this reflects the complexity of food quality, and the importance of understanding connections between different quality aspects at different scales.

5.2.2 The 'aware consumers'

Exploring the survey data gives a broad understanding of what the specific consumer group regarded as important qualities for HC food products. The material from the interviews suggests that the informants view their customers in a specific way. They describe HC customers as 'aware consumers', which can be understood as a specific group of consumers, with a specific cultural identity (see Ashley *et al*.,

2004). Just like the specific consumer group investigated in the survey, the 'aware consumers' may not be a homogeneous group, or even identify as a group. However, the informants relate to them as a group of customers who share very similar views on food quality, particularly in relation to HCs. Thus, the following section will be dedicated to discussing how the group of 'aware consumers' is characterised.

All informants gave distinct descriptions of a specific customer group that is interested in HCs: the 'aware consumers'. This particular group of customers was described as aware of some specific issues connected to food production and consumption, and therefore prioritise certain food qualities when they purchase food in general and HCs in particular. According to the informants, the aware consumers want food to be produced locally and in organic production systems. Baker 3 expressed it like: "*They think a lot about what they buy, and they buy their products locally, they buy organic products and products produced nearby"*. Further, the informants also highlighted that, according to them, the aware consumers care substantially about environmental and social sustainability. Retailer 1 explained this interest as follows:

> They are environmentally aware and try to make aware decisions in their lives and adapt their lifestyles according to these beliefs. (…) We always sell organic products [in her store], but the aware consumer can also be someone who chooses products based on environmental sustainability or social sustainability, that the products are produced under good conditions. That is how I would describe the aware consumer. Someone who is trying to reduce their social and environmental impact through their lifestyle choices *- Retailer 1*

Health is also something that was frequently mentioned during the interviews as important to the 'aware consumers'. Caring about health, according to Baker 4, is about "*being aware about exercise, that type of health, but also what you eat, to be aware of what you put into your body*". Other informants' highlighted that health concerns both one's own health, but also the health of family members, in particular children. Both nutritional composition of foods, and avoidance of chemical residues was mentioned as important health aspects for aware consumers.

Another aspect that identifies the aware consumers is their willingness to pay for these qualities, according to the informants. In a conversation with Retailer 3 about who, in her experience, purchases HC products, she described the type of customer as follows:

> the people who spend time doing research about food and that is not too particular about the price. You can probably not be sensitive to the price, I think, when you want to be an aware consumer. Often, these type of products [organic HC products] have another price *- Retailer 3*

In similarity Baker 4 expressed that: "*They* [aware consumers] *are also aware in the way that they are willing to pay extra for a certain level of standard"*. Moreover,

informants highlighted that this consumer group is predominantly made up by middle-aged women. Thus, these statements suggest that the aware consumers are people who are willing to spend time and money on certain quality aspects. Quality labels such as organic, local production and nutrition/health have mainly been targeted at markets for middle-class consumers and women from higher social classes (Luetchford, 2014). The willingness to pay for these types of qualities, as described in the interviews, suggests that the aware consumers often have a good economic status and can thus afford a higher price (ibid).

The statements from the informants indicate that they identify their customers as belonging to a specific group, with a certain cultural identity. A group's cultural identity is established through their shared common interest (Cohen, 2002; Jenkins, 2014), which in this case revolves around caring about food qualities in certain ways. Moreover, it is also constructed through the differentiation to other groups (ibid). Choices around food is one marker that has commonly been used for pointing to differences and similarities between groups, hence creating boundaries of distinction (Luetchford, 2014; Paddock, 2015). In this case, the informants bring attention to that belonging to the group of aware consumers not only involves caring about food qualities like organic production, environmental protection and health, but it also entails *not* being as aware of other qualities, like the price tag. As will be discussed later on, the informants seem to share the views of what the important qualities are with their customers. Accordingly, they can be understood as belonging to the same group of aware consumers, or as a group of 'aware bakers and retailers' (Cohen, 2002; Jenkins, 2014). This aspect will be further explored in Chapter **5.2.6**.

Descriptions of this cultural identity suggests that HCs are connected to a certain set of qualities that adheres to the values of aware consumers and bakers/retailers. Their decisions to consume or work with heritage cereals can be understood as linked to the cultural identity of being aware of, and caring about, aspects like organic and local production, environmental protection and health. HCs can thus be seen as a tool to confirm belonging to a certain cultural identity, and certain consumer group (cf. Cohen, 2002; Ashley *et al.*, 2004; Jenkins, 2014). In this way, confirmation of a certain cultural identity can be seen as an important aspect for why people choose to consume and work with HCs. Moreover, how the informants view their customers may have affected what they talked about during the interviews. In other words, their understanding of their customers may have filtered what they have highlighted as important qualities for HC food products. Therefore, it is possible that if the conversations had revolved around other types of consumers, or with other bakers/retailers, other quality aspects would have been expressed as important. This point should be kept in mind throughout the rest of the discussion in this thesis.

5.2.3 Taste

A quality aspect that many informants expressed as one of the most important for choosing to consume HCs is taste. This importance is also reflected in the survey results, where taste was one of the most popular qualities. In particular, conversations with the bakers and Retailer 1 and Retailer 2 revolved a lot around taste. However, the informants from the grocery stores did not mention taste during the interviews, and instead rather focused on aspects such as health and organic production. However, this does not necessarily mean that taste is not important to grocery store shoppers. Rather, it may reflect that Retailer 3, Retailer 4 and Retailer 5 had little experience with HC products in comparison to the other informants.

The taste of HCs was described as different, better and more intense compared to MCs. During one interview Baker 3, explained:

> People really experience a taste difference [between HCs and MCs]. So the taste is absolutely the most important [quality aspect], people would not choose these cultivars if they tasted like shit. People do think that this is actually really delicious. – Baker 3

This view is shared by all the other bakers who also highlight that HCs have a superior taste to MCs, and that it is an important reason for their customers when they choose to buy the informants' HC products. Moreover, Retailer 2 and Retailer 1 also gave similar descriptions about why consumers choose HCs. The superior taste profile of HCs is also an important reason why the bakers chose to start baking with these cultivars. Baker 3 said that "*I realised pretty early that it was very difficult to get the same taste with modern wheat* (…) *the taste was completely different with the heritage wheat cultivars*". Similarly, Baker 4 expressed how "*Taste was a big part of it (...) I could not bake the bread I do today with conventional and in particular industrially milled flour, that would be something completely different*". Some informants highlighted that this taste difference is connected to certain production systems and methods. This can be exemplified by a statement from Retailer 2:

> Heritage cereals are original cultivars that have not been exposed to modern crop breeding at all (...) you began to mix in genetic material that did not really belong in cereals. What you got out of that was higher yields and larger quantities. (...) I usually exemplify the taste of our flour with parallels to buying tomatoes (…) if you buy the more expensive tomatoes that are maybe organic and that have been grown slowly, and have been fertilised with natural fertiliser and so on, then you get a completely different flavour profile. You can clearly taste the difference. (...) The older cultivars have a deeper root system, and a larger uptake of minerals. And the minerals contribute to the more intense flavours. So there is a clear connection there. – *Retailer 2.*

Retailer 2's description connects to the discourse on the corporate food regime, which draws attention to the hegemonic framework for organising agriculture and food systems (cf. McMichael, 2005). Under the corporate food regime, the dominating form of agricultural production are high-input systems, focused on

economic growth and large yields (McMichael, 2013). According to Retailer 2, tasteless crops are a symptom of the genetic adaptation to high-yielding industrial agriculture. The organic movement is one of the most established oppositions to industrial farming (von Oelreich & Milestad, 2017). Retailer 2 pointed out that organic systems can produce more tasty crops. Hence, his discussion on taste can be understood as an expression of the tensions between the corporate food system and a countermovement against industrial food production (cf. McMichael 2013; von Oelreich & Milestad, 2017). Better taste can be recognized as one of the benefits of alternative food systems, such as organic. In accordance, taste - a very important quality aspect for both consumers and bakers/retailers - can be fulfilled through the consumption of HCs. Another dimension to taste is further that talking about taste in certain ways can be understood as a way to highlight why the corporate food system should be replaced by alternative systems, and organised in different ways. In other words, taste is one way in which the resistance against the corporate food system is argued at a micro-level in this case.

Food tastes are deeply interconnected to social and cultural values, and to the construction and preservation of cultural identities (Ashley *et al.*, 2004; Tal & Gvili, 2022). In social science research, taste has been described as a tool to display belonging to a cultural identity or a group (Bourdieu, 1984). Within a certain group, or in connection to a certain cultural identity, some tastes are viewed as more legitimate than others (Ashley *et al.*, 2004). Statements about the superior taste of HCs, as described by the informants, can be seen as a way for the informants to express how they belong to a certain cultural identity (cf. Bourdieu, 1984; Ashley *et al.*, 2004). Furthermore, the superior taste of HCs may be viewed as more legitimate from the informants' perspectives in this context. In accordance, they express a distaste for MCs, and a distaste for foods produced in industrial agriculture (cf. ibid). Knowing this about the taste of HCs thus becomes a tool to distinguish the informants from other groups who are not involved with HCs. In other words, belonging to a group of specific bakers/retailers, that are involved with HCs, is confirmed through the descriptions of HCs superior taste compared to MCs.

To summarise, the quality of taste may be multi-dimensional. The fact that HCs make tasty food products is important. Moreover, the excellent taste-quality of HCs is also a way to support a discourse on the need for alternative food systems. Finally, taste may function as a tool to express belonging to the group of people involved with HCs, and the cultural identity connected to this group.

5.2.4 Environmental impact

Both bakers and retailers expressed that low environmental impact from HCs is an important quality aspect. This partly contrasts to the results from the survey, where other qualities were found to be more popular. However, the informants explained low environmental impact as something important to both themselves and their

customers. In conversation with Baker 4, he described that he usually talks to customers about how HCs are "*generally more resistant towards weather, drought"* and "*better adapted to grow in organic systems"*. He also expressed how MCs are "*bred to depend on artificial fertilisers and chemicals* [pesticides] *to survive and deliver a large volume* [crop yield]", which is something he does not want to support. Baker 1 also gave similar descriptions about why she chooses to work with HCs.

> "Why would I spend my money investing in a giant industry which benefits monoculture systems with genetically poor (…) we know that in order to handle climate change we need to work with a greater gene pool of crops, because the modern wheat cultivars that are grown today, we will not be able to grow them in the way we do today in 20 years anyways. So I feel like that is an important value I bring into the bakery, that I use products that are sustainable in the long term for the producers I work with." - Baker 1.

This brings attention to the comparisons that informants' make between HCs and MCs in terms of their environmental impact. The informants associate HCs with lower environmental impact through crop genetics (e.g. disease resistance, drought resistance, agrobiodiversity) and certain modes of production (e.g. no use of fertilisers and pesticides). Accordingly, HCs are not associated with the negative environmental consequences generated by the agro-industrial model of production, such as high-input monocultures (cf. McMichael, 2013). Instead, HCs can be understood as representing an alternative to the corporate food regime, and a way to support alternative modes of production (cf. ibid). Statements from the informants also highlight a link between industrial agriculture and certain environmental risks, e.g. environmental damages from using fertilisers and pesticides, loss of biodiversity and climate change (cf. Campbell, 2009; Kjaernes & Torjusen, 2012). Through the consumption of HCs, these risks can be, at least to some extent, avoided. Supporting the alternative can hence also be understood as an expression of risk avoidance (Giddens, 2009).

Organic and local production were frequently mentioned in relation to environmental impact. Baker 3 expressed that the combination of organic and local is a strong purchasing factor for customers and bakers. Organic production was partly given importance through the informants' assumption that these farming systems are more environmentally sustainable because no artificial fertilisers or pesticides are used (cf. Bosona & Gebresenbet, 2018). The organic movement emerged as a critique against the negative environmental impacts connected to the corporate food regime, and is one of the most established oppositions to industrial farming (von Oelreich & Milestad, 2017). This connection between environmental consciousness and organic food systems is one of the most important drivers for choosing organic food products (D'Amico *et al.*, 2016). However, some informants, e.g. Baker 2, also highlighted that *"organic production has lost its name, it's being exploited. I care about the fact that no chemicals* [pesticides and

artificial fertilisers] *have been used and that it* [the production of food] *is biodynamic"*. Furthermore, Retailer 2 described how the food processing company he works for "*only works with organic cereals* (...) *You don't just do a little organic and make money on the other* [non-organic cereals]". As organic foods have become more popular, the organic food industry has increasingly become just that: an industry (Klintman & Boström, 2012). This has weakened its identity as a countermovement to the corporate food regime (Klintman & Boström, 2012; McMichael, 2013). At least to some informants, organic farming may become a less important quality if these farming systems become progressively incorporated into industrial modes of production and therefore cannot be trusted to deliver certain environmental outcomes (cf. Campbell, 2009).

Similarly, local production is also connected to reduced environmental impact through, as Retailer 1 mentioned, "*shortening the transportation* [of food products]". Reduction of food miles has been recognised as one important advantage of local food networks (Luetchford, 2014). Local production is also an important aspect of environmental protection in the sense that local food systems are considered more transparent and thus, as pointed out by e.g. Baker 4, "*you can more easily control under which circumstances the products have been produced"*. In contrast to globalised food systems and long production chains associated with the corporate food regime, the transparency of local food networks can help to ensure that environmental care has been considered during the production (Campbell, 2009). This importance given to transparency within the food production chain will be explored in more detail later on (Chapter **5.2.7**). The point to highlight here is that one of the reasons that the informants' and their customers may turn to organic and local food production is to reduce their environmental impact. In other words, they may turn to alternative systems to avoid the environmental problems generated from the corporate food regime (cf. McMichael, 2013). In this sense, organic and local production interconnects with reduced environmental impact, and all make up important quality aspects as to why people choose to consume HCs, according to the informants' perspectives.

Summing up, the interview material suggests that the informants and their customers care about the environmental impact connected to the food they consume. One important quality aspect for HCs is therefore that they contribute with the less negative environmental consequences compared to MCs. In addition, the way in which HCs are described connects to a larger discourse on the need for alternative food systems that do not generate the same negative environmental consequences as industrial agriculture. Organic and local farming systems are, at least to some extent, seen as environmentally friendly options. The combination of these aspects can thus be understood as important dimensions of food quality in relation to HCs.

5.2.5 Health: nutrition and chemicals

Concerns about health also appeared as an important aspect in connection to the use and consumption of HCs according to the informants. Two themes appeared in conversations about health: nutritional aspects and the avoidance of harmful chemicals and additives.

Baker 4 mentioned that he often talks to customers about the nutritional benefits of HCs, and expressed that it *"is a crop which generally contains more minerals and more nutrition, we have scientific studies which show such results"*. Scientific findings do support this statement, for example Bordini *et al.* (2017) and Zamaratskaia *et al.* (2021) indicated high content of zinc, iron and other minerals, as well as dietary fibre in HCs. Beyond knowledge of scientific findings, the informants also expressed how they and their customers have physical experiences of feeling the health benefits from HC products. Baker 3 described how many of her customers have told her that they "*can't eat white bread, but this bread* [HC bread] *does not give me a stomach ache*". Further, in her experience customers "*notice that this* [HC bread] *is more nutritionally dense and they notice that they don't have to eat as much of this bread compared to fluffy white bread*". Baker 2 talked about her own experience with weight gain from bread she purchased from the supermarket. People told her to stop eating bread if she wanted to lose weight. She noted how it made her think: *"for god's sake, we have been eating bread for many, many years, so something must have happened as years have passed if bread is suddenly not good for us"*. Baker 4, in similarity, described a change in food that have negative effects on health:

> "When I went to school in the 80s there was no one who was gluten intolerant. Today, it is rather the rule than the exception (...) The food we eat today is not what it used to be. (…) If we take the dairy as an example, products from the dairy are some of the most processed food products we have. We take the milk, split it into different elements and then we put them together again. And of course our bodies are not used to this, of course our bodies will act strange when what we put into it is new from an evolutionary perspective. It will take 10 000 years or something like that before we get used to it (…) Do we feel good today? No we don't. Why are we feeling so bad? It is obvious that something is wrong." -Baker 4

The physical experience of consuming HCs was described as superior to MCs. This calls attention to the relationship between the physical experience of the body and the consumption of certain food products (Orlando, 2018). Also, the informants' descriptions suggest a connection between certain changes in the food systems over time and health problems. The interview material suggests that the genetics of HCs, in comparison to MCs, are perceived as contributing to more healthy cereals. Commonly, traditional crops and foods are often associated with beneficial health and nutrient properties (Barry-Ryan *et al.*, 2021). Moreover, the bakers and some of the retailers expressed how the food industry today is full of ultra-processed foods, food additives and sugar that are making people sick. For example, Baker 2 remarked on a connection between the use of additives and sugar: *"the reason why*

there is so much sugar [in bread from the supermarket] *is because these additives often have undesirable flavours and then you must use sugar to hide the disgusting flavours"*. In contrast, HC flour was described as, for example by Baker 2, *"not containing any shit, no ascorbic acid or anything as it usually does in regular wheat flour"*. HCs health benefits connects to a larger discourse on problems within the corporate food regime, and a criticism towards toxic additives and cheap calories (cf. Campbell, 2009). MC genetics (e.g. loss of nutrition due to crop breeding) and the processing industry (e.g. industrial bakeries) are associated, according to some of the informants, with health risks. As follows, the use and consumption of HCs can be understood as a way to avoid health risks (Giddens, 2007). In other words, an important quality connected to HCs is that they are *not* posing the same health threats as other cereals and cereal products. To some informants, these risks are also associated with products bought at the supermarket and industrial bakeries. However, it is important to clarify that not all informants connected health risks to the industrial bakeries and supermarkets. Retailer 3, Retailer 4 and Retailer 5 noted health as an important quality trend that involves less consumption of sugar and ultra-processed foods. And according to their perspective, such foods can be found in supermarkets. Therefore, it should be highlighted that health is not necessarily related to a criticism of the corporate food system according to all informants, but rather to the informants who do operate in more small-scale businesses.

Another aspect of health that was laid-out by the informants are concerns about chemical residue on food. Beyond being a concern for environmental problems, the use of pesticides in food production is seen as risky for human health (Orlando, 2018). As previously discussed, the importance of HCs being organic seem to be connected to avoiding risks associated with pesticide use, which also applies to human health concerns (cf. ibid). For consumers, one of the clearest options in order to avoid pesticides has been organic food, and one of the biggest driving forces in consuming organic has been due to health concerns (Kjaernes & Torjusen, 2012; Hasselbach & Roosen, 2015; Hansen *et al.,* 2018; Orlando, 2018). This was reflected in the interviews, for example by Retailer 2:

> From the beginning I wanted to purchase organic products due to my health. It is enough with the chemicals which we are already receiving through air pollution, or through the consumption of fish from the Baltic Sea or something like that. We don't have to apply it to food.
> - Retailer 2

Baker 4 talked about how he had a hard time finding organic bread or "*poison free as I usually joke"* in the bread aisle at the supermarkets. These statements can also be understood as an expression of critique against the corporate food regime. Ties between industrial agriculture and the agrochemical industry generates food that is perceived as dangerous for human health (Campbell, 2009; McMichael, 2013). These ties appear through cereal breeding, which according to the informants have

adapted MCs to high-input production. The opposite is true for HCs, which are described as not bred to fit into production systems that the informants associate with these risks. Hence, the consumption of HCs can also be interpreted as a way to avoid health risks connected to use of pesticides and chemicals in agricultural production (Giddens, 2007).

In sum, according to the informants' perspective, they and their customers care about their food being healthy. Two aspects of health appear as important. Firstly, HCs were recognised as more nutritious, an important dimension of health quality in these discussions. Secondly, HCs were not associated with pesticide residues, food additives or highly processed foods, which the informants, and according to them, their customers, perceive as dangerous to health. Consuming HCs, that are farmed and processed in systems not associated with these negative risks, can hence be seen as another important dimension of food quality in relation to HCs.

5.2.6 The small businesses

One aspect that was outlined by the bakers, Retailer 1 and Retailer 2 in relation to HC quality was the value of 'the small businesses'. This was not something that Retailer 3, Retailer 4 and Retailer 5 discussed during their interviews. This may reflect that these informants operate larger grocery stores or supermarkets. However, a large retailer can buy from small-scale actors, or show understanding of other actors' perspectives, or the value of operating different types of businesses. Nevertheless, in this context, these specific informants did not highlight such aspects. Thus, there may exist differences between the different informants in terms of how important this dimension of quality is perceived.

All the bakers noted that to work with HCs, certain baking methods need to be adapted. Special characteristics of HCs, in comparison to MCs, are not suitable for large-scale industrial baking processes, according to the bakers. For instance, Baker 4 mentioned that the quality of HC flour "*can vary a lot from one harvest to another*". Another difference described was the gluten quality which, for example noted by Baker 1, is "*a different type of gluten, it is not the strong gluten* [gluten of regular wheat flour]. *The gluten in a flour made from heritage cereals has the character of a rubber band that is about to break, a very thin gluten that cannot be pulled out as much compared to a modern gluten*". Special consideration to these characteristics impact how the bakeries work, and what type of food products they produce. Moreover, this also applies to consumers who bake at home. This can be exemplified through a statement by Baker 3, who reflected on conversations with her customers on using HC flour:

> That is something you have heard many times, that people try to move away from regular flour completely, people who maybe have used regular wheat flour with a lot of added gluten, or a Tipo 00 flour that you make pizza dough with, and replace it with a heritage cereal and think it will be the same thing (...) You cannot put it into a dough mixer for 20 minutes, you need to

> keep an eye on the dough. The flour reacts in a different way, and it is not the same product as flour with very high protein content that will give super fluffy bread" -Baker 3

Choosing to work with HCs entails baking methods and a final product that contrasts to industrial bakeries, according to the informants. What should be pointed out here is that these accounts about HCs baking qualities can be understood as a way for the informants to distinguish themselves from *other* bakeries (cf. Cohen, 2002; Jenkins, 2014). Operating a relatively small-scale bakery allows the informants to work with cereals they, and at least some consumer groups, in many ways consider as superior to MCs. Based on their statements, positive benefits of HCs, e.g. a lower environmental impact and higher nutritious density, cannot be realised in more large-scale bakeries, since industrial baking processes are not adapted to handle qualitative differences, or the gluten structures of HCs. Consequently, the bakers can be understood as belonging to a certain group of bakeries, which are identified through their commonality of being small-scale, using HCs and therefore producing certain benefits that are appealing to consumers (ibid). Hence, being small-scale, and using HCs may also be interpreted as a way to create and reproduce a certain cultural identity, or group belonging (cf. Ashley *et al.*, 2004), which can be seen as an important aspect of quality in relation to HCs. As I will return to, being a small-scale bakery may also relate to trust in that other quality aspects are fulfilled, in this context because it allows the bakers to work with HCs in the first place.

Small-scale operations, and the importance of them in relation to HCs, also relates to transparency and the control over under which circumstances cereals have been produced and processed into a final food product. This can be exemplified by a statement for the interview with Baker 3, who said that "*my thoughts were always to be small-scale and really have an insight into the whole food chain, and I would maybe lose that if I scaled up the company"*. Similar conceptions were also raised in the interviews with Retailer 1 and Retailer 2. For example, Retailer 2 distinguished the company he works for compared to other larger businesses: "*Our company does not do anything dodgy or cheat with quality labels, we have pure products in comparison to basically all other companies*". From the informants' perspectives, operating at the scale they do allows for greater insight into the production systems, and thus to ensure that quality requirements such as low environmental impact and health benefits are fulfilled. In addition, the importance of being small-scale may also be recognised as connected to the larger discourses on the corporate food regime. Part of the critique of the corporate food regime revolves around the lack of transparency and the lacking information about how food is produced in industrial and globalised food systems (Campbell, 2009). Hence, the small-scale bakeries can be interpreted as a different type of business compared to industrial food companies, representing an alternative to the industrial way of organising food systems. Emphasising this difference may be understood as

a tool for the informants to establish their belonging to a certain group of bakers and retailers (cf. Cohen, 2002; Jenkins, 2014). Their distinction interconnects with how they care about certain values, and represents an alternative to the corporate food regime (ibid). Doing so may therefore enhance their appeal to consumers who share these values. Connections between HCs and the cultural identities of consumers, bakers and retailers can be seen as an aspect as to why people choose to work and buy products made with HCs.

Summarising the discussions on small-scale bakeries/retailers, some of the informants highlighted the importance of being small because it allows them to work with HCs and it gives a greater insight into the production chains. Therefore, being small-scale can be understood as important for ensuring that other quality aspects, such as benefits for health and environment, are fulfilled during the production and processing of food products. Furthermore, it is also a factor for distinguishing a cultural identity, which is opposite to the corporate food regime, and hence opposite to the negative aspects associated with such organisation of food systems. Hence, being small can be seen as important to both bakers/retailers and to their customers. One thing to note is that, as previously mentioned, not all informants mentioned these aspects during the interviews. As also shown in the survey, some consumers prefer to shop at supermarkets probably due to convenience and habits. Accordingly, the quality aspect of being a small bakery/retailer may be more or less important depending on who the consumer is.

5.2.7 The local food systems

As previously mentioned, local production is also a quality aspect that was mentioned as important throughout the interviews. Retailer 3, Retailer 4 and Retailer 5, who work in grocery stores/supermarkets, described local food as an important food trend, and that customers are increasingly asking for local food alternatives in their grocery stores. Attention was focused towards the relationship to producers, or as Retailer 3 put it "*you know who the producer is"*. As explained by Baker 4, local origin is something used as a market strategy:

> A lot of customers think it's fun that the products are produced close to them. We have a picture of the farmer and the coordinates to the field, a story about the whole thing [the crop production and bakery], on the packages. There are different farmers that grow different cereal cultivars, so many customers appreciate to know who they are, and they recognise "oh that is him", "that is there, I know that place". - Baker 4

One reason as to why consumers purchase food from close-by is, for example noted by Retailer 1, because "*you want to support the local economy"*. Promoting the local economy can play an essential part for some consumers as to why they are interested in local foods (Autio *et al.*, 2013). Another aspect that was laid-out during the interviews, particularly by the bakers, Retailer 1 and Retailer 2, was that local

food systems allow for transparency. They used similar arguments for why local production is important as for the small-scale business, previously discussed. Using local food production networks gives insights into the primary production of cereals, or as Retailer 1 put it: "*gives you more control over the production conditions. You recognise the faces of the producers and therefore you know that no workers have been exploited*". Additionally, these informants also highlighted how there is a personal relationship between them and the farmers they purchase cereals from, which is something they also use as a marketing strategy, and talk to customers about. For example, Baker 1 described her conversations with customers:

> There is always a personal relationship behind every product (...) We talk about, and show the relationship between us and what the consumers can do for the farmers when they purchase our bread (...). I think this became an important quality for my customers and something that has increased my trustworthiness, and this has probably contributed to the fact that I have had many loyal customers during this very boring period [the covid-19 pandemic]. Because they have felt that we are making a difference. - Baker 1

Emphasised in the interviews were the connection between local food systems and trustworthiness. By displaying the personal relationships amidst the bakers/retailers and the farmers who grow the cereals, the food systems related to HCs appear more transparent. As mentioned, the lack of transparency in global industrial food systems has been one element of the corporate food regime that has been highly criticised by oppositional discourses (Campbell, 2009). It has also been a central part of declining public trust towards large agri-food companies and global agroindustry (ibid). In other words, lack of transparency can be seen as a factor creating distrust towards conventional food systems (Kjaernes & Torjusen, 2012). Such macro discourses on food systems can likewise be found in the interview material, but also in the survey data. Retailer 2 remarked:

> I believe that people are quite tired of gigantic companies in the world, who have the sole right on seed genetics and such things. And thus they want to support the other, the polar opposite to these huge companies (...). but people are tricked [by food companies] and authorities are bribed all over the world when it comes to these questions. (...) But I believe the market will change, and people will want to know where things are produced, which farmer that has grown it on which field (...) I think that as more and more people become aware consumers, more people will understand that this is the way to go. (...) There is a counterforce and it will grow. -Retailer 2

Additionally, one anonymous survey participant wrote the following statement in the text-box option related to the question about important food qualities: *"I purchase food based on my trust in the farmer and mill. I don't trust the industry, no matter the origin"*. These quotes point towards a connection between transparency and trust. Because local food systems are associated with shorter food chains, and less actors involved, they appear, according to the informants, as more transparent. Personal relationships between the small number of farmers and

bakers/retailers involved in the production of HC foods also contributes to enhancing trustworthiness, since the producers and processors are not anonymous big corporations. The informants and their customers may therefore turn to local food networks because they are considered, from their perspective, to be more trustworthy in generating outcomes like tasty, healthy and environmentally friendly cereals (cf. Abinett, 2003; Giddens, 2009). Hence, the importance of that HCs are locally produced can also be seen as an expression of reflexive modernity, where the informants and their customers negotiate the trust in different food producing actors as a part of ensuring they choose the food that best fulfil their demands for sustainable food (cf. Giddens, 2009).

Taking the results from the survey into consideration, domestic production, or 'from Sweden'', was a more pronounced quality preference compared to 'local production'. The interview data was collected in a more local context compared to the survey data. As many of the informants do operate within a local context, it is possible that extra attention was given to this particular quality aspect during the interviews. Moreover, as previously discussed, it is possible that there are overlaps between how domestic production and local production is perceived (cf. Autio *et al.*, 2013). What 'local' foods comprises is not clearly defined, and can vary between different situations. Some may even consider domestic food production as local, in comparison to global scale food systems (ibid). Therefore the differences in emphasis on 'from Sweden' versus 'local', may be affected by the fact that the survey data and the interview data was collected in different contexts and by the multidimensional understanding of locality.

In sum, local food systems appear as an important quality in relation to HCs. Dimensions like high transparency in food systems, and thus avoidance of certain risks as well as assurance that food is produced in certain ways, can be understood as important in relation to local foods.

6. Conclusion

This thesis has focused on investigating the awareness, preference and importance of different qualities in relation to HC food products. Based on the survey data, it can be concluded that the awareness of HCs and different HC cultivars is relatively high among the specific consumer group that was investigated. In particular, Dinkel was commonly recognised and tasted among the consumers. Bread constitutes the most preferred HC food product, and the most favoured food shopping location can be concluded to be the grocery store/supermarket. “Taste” and “produced in Sweden” were the two most important quality aspects for survey respondents. The greatest determinant for differences within the group was gender. E.g., men recognised and had tasted Öland wheat significantly more than women, and significantly more women thought environmental impact constitutes an important food quality for HCs compared to men. High similarities were found between the different educational backgrounds in terms of awareness and preference. These commonalities may be because all students are studying the agriculture program at the same university.

Interviews with bakers and retailers revealed additional perspectives on food quality. “Taste” was in accordance with the survey data one important quality dimension. Additionally, environmental impact, health, organic, small-scale businesses and local food systems were expressed as important by the informants. Dimensions of these mentioned quality aspects could also be connected to a criticism against, and an avoidance of risk, associated to industrial food production. Finally, HCs also interconnects to cultural identity (re)creation, which can be understood as a food quality aspect within itself. All these aspects can be seen as important in relation to consumer, baker and retailer HC quality perception.

To conclude, important insights in relation to the overall acceptance of HC food products is that the awareness and exposure to different HC cultivars and food products is relatively high. Directing efforts towards making preferred food products, like bread, that fulfil the important quality aspects, like taste, Swedish production, health and sustainable production, are also important to consider for the overall acceptance of HCs in the investigated consumer segments.

This thesis constitutes a part of the research project “Sustainable organic food from heritage cereal - using history to form the future”, which investigates the potential of HCs in organic farming. One theme of the research projects is to

investigate the consumers' preference, liking and acceptance of HC food products. Thus, this thesis has focused on the consumer, baker and retail perspective to provide knowledge and additional insights about consumer acceptance of HCs today. The results and conclusions from this thesis should be complemented by additional research focusing on for example other consumer groups and other baker/retailer groups to get additional understandings about how to reach groups that are less familiar with HCs in order to increase the consumption of these old new cereals.

References

Abbinett, R. (2003). *Culture and identity: Critical theories.* London: Sage Publications.

Angioloni, A.; Collar, C. Nutritional and functional added value of oat, 670 Kamut®, spelt, rye and buckwheat versus common wheat in breadmaking. J. Sci. Food Agric. 2011, 91, 1283–1292.

Ashley, B., Hollows, J., Jones, S. & Taylor, B. (2004). *Food and cultural studies*. London; New York: Routledge.

Autio, M., Collins, R., Wahlen, S. & Anttila, M. (2013). Consuming nostalgia? The appreciation of authenticity in local food production. *International Journal of Consumer Studies,* 37(5), 564-568.

Barry-Ryan, C., Vassallo, M. & Pojic, M. (2021). The consumption of healthy grains: Product, health and wellness trends. In: Pojic, M. & Tiwari, U. (eds). *Innovative processing technologies for healthy grains.* Hoboken: John Wiley & Sons Ltd.

Bauerly, B. (2017). *The agrarian seed of empire: the political economy of agriculture in US state building.* Boston: Brill.

Beck, U. (1992). *Risk society.* Thousand Oaks: SAGE Publications.

Beck-Friis, J., Bruce, Å., Cederholm, T., Danielsson-Tham, M. & Lundström, K. (2013). Matens kvaliteter. *Kungliga Skogs-och Lantrbuksakademiens Tidskrift,* nr. 4. https://www.ksla.se/wp-content/uploads/2013/05/KSLAT-4-2013-Matens-kvaliteter.pdf.

Berni, R., Cantini, C., Romi, M., Hausman, J., Guerriero, G. & Cai, G. (2018). Agrobiotechnology goes wild: Ancient local varieties as sources of bioactives. *International Journal of Molecular Sciences,* 19(8), 2248.

Bordoni, A., Danesi, F., Di Nunzio, M., Taccari, A. & Valli, V. (2017). Ancient wheat and health: a legend or the reality? A review on KAMUT khorasan wheat. *International Journal of Food Sciences and Nutrition,* 68 (3), 278–286. https://doi.org/10.1080/09637486.2016.1247434.

Bourdieu, P. (1984). *Distinction: A social critique of the judgement of taste*. Cambridge: Harvard University Press.

Bosona, T. & Gebresenbet, G. (2018). Swedish consumers' perception of food quality and sustainability in relation to organic food production. *Foods,* 7(54).

Bruschi, V., Teuber, R. & Dolgopolova, I. (2015). Acceptance and willingness to pay for health enhancing bakery products - Empirical evidence for young urban Russian consumers. *Food Quality and Preference,* 46, 79-91.

Burke, P.J. & Stets, J.E. (2009). *Identity theory*. Oxford: Oxford University Press.

Camacho Villa, T.C., Maxted, N., Scholten, M. & Ford-Lloyd, B. (2005). Defining and identifying crop landraces. *Plant Genetic Resources,* 3(3), 373-384.

Campbell, H. (2009). Breaking new ground in food regime theory: corporate environmentalism, ecological feedbacks and the 'food from somewhere' regime? *Agriculture and human values,* 26. https://doi.org/10.1007/s10460-009-9215-8.

Campbell, H. (2006). Consultation, commerce and contemporary agri-food systems: Ethical engagement of new systems of governance under reflexive modernity. *The Integrated Assessment Journal,* 6(2), 117-136.

Campbell, H. & Le Heron, R. (2007). Supermarkets, producers and audit technologies: The constitutive micro-politics of food, legitimacy and governance. In: Lawrence, G. & Burch, L. (eds). *Supermarkets and agri-food supply chains: Transformations in the production and consumption of food.* London: Edward Elgar.

Cheng, A. (2018). Review: Shaping a sustainable food future by rediscovering long-forgotten ancient grains. *Plant Science,* 269, 132-142.

Clapp, J. (2020). Food. 3d edt. Cambridge: Polity Press.

Cohen, A.P. (2002). *Symbolic construction of community*. New York: Routledge; Florence: Taylor & Francis Group.

Colombo, B., West, P., Smith, P., Tubiello, F.N., Gerber, J., Engstrom, P., Urevig, A. & Wollenberg, E. (2018). *How does agriculture change our climate?* Environmental Reports, Food Matters. http://www.environmentreports.com/how-does-agriculture-change/ [2022-05-03]

Creswell, J.W. & Creswell, J.D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches*. 5th edition. Sage publications.

D'Amico, M., Di Vita, G. & Monaco, L. (2016). Exploring environmental consciousness and consumer preferences for organic wines without sulfites. *Journal of Clean Production,* 120, 64-71.

De Leon, A., Burnett, D.J., Rust, B.R., Casperson, S.L., Horn, W.F. & Keim, L. (2020). Liking and acceptability of whole grains increases with a 6-week exposure but preferences for foods varying in taste and fat content are not altered: A randomized controlled trial. *Current Developments in Nutrition,* 4(3), doi: 10.1093/cdn/nzaa023.

Dinu, M., Whittaker, A., Pagliai, G., Benedettelli, S. & Sofi, F. (2018). Ancient wheat species and human health: Biochemical and clinical implications. *The Journal of Nutritional Biochemistry,* 52, 1-9.

Dwivedi, S., Sahrawat, K., Upadhyaya, H. & Ortiz, R. (2013). food, nutrition and agrobiodiversity under global climate change. *Advances in Agronomy,* 120, 1-128.

Ekelund, L., Fernqvist, F., Tjärnemo, H. (2007). Consumer preferences for domestic and organically labeled vegetables in Sweden. *Food Economics - Acta Agricult Scand,* 4, 229-236.

Ekoweb. (2021). *Ekologisk livsmedelsmarknad*. Linköping: Ekoweb. http://www.ekoweb.nu/attachments/67/69.pdf [2022-05-17].

Engdahl, O. & Larsson, B. (2016). *Sociologiska perspektiv*. Lund: Studentlitteratur.

Fjelkegård, L. & Persson, A. (2016). Enkätmetodik. In: Persson, A. (red). *Frågor och Svar: Om frågekonstruktion i enkät- och intervjuundersökningar*. Örebro: Statistiska Centralbyrån (SCB).

Foley, J.A., Ramankutty, N., Brauman, K.A., Cassidy, E.S., Gerber, J.S., Johnston, M., Mueller, N.D., O'Connel, C., Ray, D.K., West, P.C., Balzer, C., Bennet, E.M., Carpenter, S.R., Hill, J., Monfreda, C., Polasky, S., Rockström, J., Sheehan, J., Siebert, S., Tilman, D. & Zaks, D.P.M. (2011). Solutions for a cultivated planet. *Nature*, 478, 337-342.

Gerhardt, K., Wallman, D. & Linkowski, W.A. (2019). *Äldre sorters spannmål och extremvädret 2018 - hur gick det?* SLU Future Food Reports 8. Uppsala: Swedish University of Agricultural Sciences.

Giambanelli, E., Ferioli, F., Koçaoglu, B., Jorjadze, M., Alexieva, I., Darbinyan, N. & D'Antuono, L.F. (2013). A comparative study of bioactive compounds in primitive wheat populations from Italy, Turkey, Georgia, Bulgaria and Armenia. *Journal of the Science of Food and Agriculture*, 93 (14), 3490–3501.

Giddens, A. (2007). *Sociologi*. Lund: Studentlitteratur.

Gruvaeus, A. & Dahlin, J. (2021). Revitalization of food in Sweden - A closer look at the REKO network. *Sustainability*, 13. https://doi.org/10.3390/su131810471

Grunert, K. G. (2007). How consumers perceive food quality. In: Frewer, L. & van Trijp, H. (red.). *Understanding Consumers of Food Products*. Cambridge; Boca Raton: Woodhead Publishing Limited: CRC Press. (Woodhead Publishing in Food Science, Technology and Nutrition).

Hansen, T., Ingerslev Sørensen, M. & Riewerts Eriksen, M. (2018). How values interplay between consumer motivations and values influences organic food identity and behavior. *Food Policy*, 74, 39-52.

Harlan, J.R. (1975). Our vanishing genetic resources. *Science*, 188(4188), 617-621.

Hasselbach, J.L. & Roosen, J. (2015). Motivations behind preferences for local or organic food. *Journal of International Consumer Marketing*, 27(4), 295-206.

Heeringa, S.G., West, B.T. & Berglund P.A. (2017). *Applied data survey analysis*. Chapman & Hall/CRC Statistics in the Social and Behavioral Sciences. New York: Productivity Press.

Hobbs, J.E. (2019). Heterogeneous consumers and differentiated food markets: Implications for quality signaling in food supply chains. *Canadian Journal of Agricultural Economics*, 67(3), 237-249. https://onlinelibrary.wiley.com/doi/full/10.1111/cjag.12202.

Jankielsohn, A. & Miles, C. (2017). How do older wheat cultivars compare to modern wheat cultivars currently on the market in South Africa? *J Hortic Sci Res*, 1(2), 42-47.

Jenkins, R. (2014). *Social identity*. 4th edn, New York: Routledge.

Jordbruksverket. (2008). Begreppet kvalitet inom livsmedelssektorn. (Jordbruksverkets rapport 2008:16). Jönköping: Jordbruksverket. https://www2.jordbruksverket.se/webdav/files/SJV/trycksaker/Pdf_rapporter/ra08_16.pdf.

Judd, V.C. (2000). The price-quality relationship. *Journal of Food Product Marketing,* 6(1), 11-24. https://doi.org/10.1300/J038v06n01_02.

Kjaernes, U. & Torjusen, H. (2012). Beyond the industrial paradigm? Consumers and trust in food. In: Spaargaren, G., Oosterveer, P. & Loeber, A. (reds). *Food practices in transition: Changing food consumption, retail and production in the age of reflexive modernity*. New York: Routledge. 86-106.

Koning, N. (2015). Food security and food crisis. In: Christoplos, I. & Pain, A. (red). New Challenges to Food Security: From climate change to fragile states. Routledge. 15-38.

Konvalina, P., Capouchová, I., Stehno, Z. & Moudrý, J. (2012). Differences in yield parameters of emmer in comparison with old and new varieties of bread wheat. *African Journal of Agricultural Research,* 7, 986-992.

Konvalina, P., Suchý, K., Stehno, Z., Capouchová, I. & Moudrý, J. (2014). Drought tolerance of different wheat species (*Triticum* L.). In: Behnassi, M., Syomiti Muteng'e, M., Ramachandran, G. & Shelat, K. (eds). *Vulnerability of agriculture, water and fisheries to climate change.* Dordrecht: Springer.

Kraus, A., Annunziata, A. & Vecchio, R. (2017). Sociodemographic factors differentiating the consumer and the motivations for functional food consumption. *Journal of the American College of Nutrition,* 36(2), 116-126.

Kvale, S. & Brinkmann, S. (2014). *Den kvalitativa forskningsintervjun*. 3d edn, Lund: Studentlitteratur.

Köster, E.P. & Mojet, J. (2007). Theories of food choice development. In: Frewer, L. & van Trijp, H. (red.). *Understanding Consumers of Food Products*. Cambridge, England; Boca Raton, Florida: Woodhead Publishing Limited: CRC Press. (Woodhead Publishing in Food Science, Technology and Nutrition).

Lannhard Öberg, Å., Franke, U., Bång, M., Carlsson-Ross, C., Mårtensson, A. & Mattsson, K. (2017). *Mervärden i svensk odling.* https://djur.jordbruksverket.se/download/18.cb0cc6e15c33aa17402abb2/1495540925253/Merv%C3%A4rden%20i%20svensk%20odling.pdf [2022-04-08]

Litavniece, L., Silicka, I., Dembovska, I. & Tretjakova, R. (2017). The significance of local food in the consumption of modern consumer. In: Straumite, E. & Galoburda, R. (eds.). *11th Baltic Conference on Food Science and Technology "Food science and technology in a changing world"*, 189-194 [FOODBALT 2017 Conference Proceedings, April 27-28, Jelgava]. DOI: 10.22616/foodbalt.2017.033.

Longin, C.F.H. & Würschum, T. (2016). Back to the future - tapping into ancient grains for food diversity. *Trends in Plant Science,* 21(9), 731-737.

Longin, C.F.H., Ziegler, J., Schweiggert, R., Koehler, P., Carle, R. & Würschum, T. (2016). Comparative Study of Hulled (Einkorn, Emmer, and Spelt) and Naked Wheats (Durum and Bread Wheat): Agronomic Performance and Quality Traits. *Crop Science*, 56 (1), 302–311. https://doi.org/10.2135/cropsci2015.04.0242.

Luetchford, P. (2014). Food and consumption. In: Pratt, J. & Luetchford, P. (eds.). *Food for change: The politics and values of social movements.* London: Pluto Press. 47-70.

Massawe, F., Mayes, S. & Cheng, A. (2016). Crop Diversity: An Unexploited Treasure Trove for Food Security. *Trends in Plant Science*, 21 (5), 365–368. https://doi.org/10.1016/j.tplants.2016.02.006

McMichael, P. (2013). *Food regimes and agrarian questions.* Rugby: Practical Action Publishing, Winnipeg: Fernwood Publishing.

McMichael, P. (2009). A food regime genealogy. *The Journal of Peasant Studies*, 36(1), 139-169.

McMichael, P. (2005). Global development and the corporate food regime. *Research in Rural Sociology and Development*, 11, 269-303.

Meier, C. & Oehen, B. (2021). Consumer preference for healthy minor cereals. *EUCARPIA International Conference on Breeding and seed sector innovations for organic food systems* March 8-10, Latvia. 162-163. https://opensourceseeds.org/sites/default/files/bilder/OpenSourceLizenz/EUCARPIA_2021_Abstract_Kliem.pdf#page=196.

Meemken, E-M. & Qaim, M. (2018). Organic agriculture, food security and the environment. *Annual Review of Resource Economics*, 10, 39-63. https://doi.org/10.1146/annurev-resource-100517-023252.

Meiselman, H.L. & Cardello, A.V. (2013). Food acceptability: Affective methods. In: Trugo, L. & Finglas, P.M. (eds). *Encyclopedia of food science and nutrition.* 2nd ed. Cambridge: Academic Press. 2569-2576.

Migliorini, P., Spagnolo, S., Torri, L., Arnoulet, M., Lazzerini, G. & Ceccarelli, S. (2016). Agronomic and quality characteristics of old, modern and mixture wheat varieties and landraces for organic bread chain in diverse environments of northern Italy. *European Journal of Agronomy*, 79, 131-141.

Moudrý, J., Konvalina, P., Stehno, Z., Capouchová, I. & Moudrý, J. Jr. (2011). Ancient wheat species can extend biodiversity of cultivated crops. *Scientific Research and Essays*, 6(20).

NCSS Statistical Software (n.d.). Cochran's Q-test. https://ncss-wpengine.netdna-ssl.com/wp-content/themes/ncss/pdf/Procedures/NCSS/Cochrans_Q_Test.pdf [2022-04-15].

Newton, A.C., Akar, T., Baresel, J.P., Bebeli, P.J., Bettencourt, E., Bladenopoulos, K.V., Czembor, J.H., Fasoula, D.A., Katsiotis, A., Koutis, K., Koutsika-Sotiriou, M., Kovacs, G., Larsson, H., De Carvalho, M.A.A.P., Rubiales, D., Russell, J., Dos Santos, T.M.M. & Vaz Patto, M.C. (2010). Cereal landraces for sustainable agriculture. A review. *Agronomy for Sustainable Development*, 30 (2). https://doi.org/10.1051/agro/2009032

Nicolosi, A., Lagana, V.R., Laven, D., Marciano, C. & Skoglund, W. (2019). Consumer habits of local foods: Perspectives from northern Sweden. *Sustainability*, 11, doi:10.3390/su11236715.

Opdenakker, R. (2006). Advantages and Disadvantages of Four Interview Techniques in Qualitative Research. Forum Qualitative Sozialforschung (FQS), 7(4).

Orlando, G. (2018). From the risk society to risk practice: organic food, embodiment and modernity in Sicily. *Food, Culture & Society*, 21(2), 144-163.

Packa, D., Zaluski D., Graban, L. & Lajszner, W. (2019). An evaluation of spelt crosses for breeding new varieties of spring spelt. *Agronomy*, 9(4), 167. https://doi.org/10.3390/agronomy9040167.

Paddock, J. (2015). Positioning food cultures: 'Alternative' food as distinctive consumer practice. *Sociology*, 50(6), 1039-1055.

Pekala, A. (2020). *Market analysis of organic foods in the Nordic and Baltic countries*. Copenhagen: Nordic Council of Ministers Publication Unit. TemaNord 2019:540.

Pontonio, E. & Rizzello, C.G. (2019). Minor and ancient cereals: Exploitation of the nutritional potential through the use of selected starter and sourdough fermentation. In: Preedy, V.R. & Watson, R.R. (eds). *Flour and breads and their fortification in health and disease prevention* (Second Edition). Academic Press, 443-452.

Poutanen, K.S., Kårlund, A.O., Gómez-Gallego, C., Johansson, D.P., Scheers, N.M., Marklinder, I.M., Eriksen, A.K., Silventoinen, P.C., Nordlund, E., Sozer, N., Hanhineva, K.J., Kolehmainen, M. & Landberg, R. (2021). Grains - a major source of sustainable protein for health. *Nutrition Reviews*, nuab084. https://doi.org/10.1093/nutrit/nuab084.

Prowse, M. (2010). Integrating reflexivity into livelihoods research. *Progress in Development Studies*, 10(3), 211-231.

Reisch, L., Eberle, U. & Lorek, S. (2013). Sustainable food consumption: an overview of contemporary issues and policies. *Sustainability: Science, Practice and Policy*, 9(2), 7-25. https://doi.org/10.1080/15487733.2013.11908111.

Renmark, A. (2020). Nytt branschindex: Efterfrågan på svensk mat ökar. *Livsmedel i fokus*, September 14th. https://www.livsmedelifokus.se/5413-2/ [2022-04-18]

Robson, C. (2002). *Real world research: A resource for social scientists and practitioner-researchers*. 4th edition. Wiley-Blackwell.

Roessler, E.B., Pangborn, R.M., Sidel, J.L. & Stone, H. (1978). Expanded statistical tables for estimating significance in paired-preference, paired-difference, duo-trio and triangle tests. *Journal of food science*, 43, 940-947.

Rozin, P. (2007). Food choice: an introduction. In: Frewer, L. & van Trijp, H. (red.). *Understanding Consumers of Food Products*. Cambridge, England; Boca Raton, Florida: Woodhead Publishing Limited: CRC Press. (Woodhead Publishing in Food Science, Technology and Nutrition).

Rytkönen, P., Bonow, M., Girard, C. & Tunón, H. (2018). Bringing the consumer back in - The motives, perceptions, and values behind consumers and rural tourists' decisions to buy local and localized artisan food - A Swedish example. *Agriculture*, 8(58), doi:10.3390/agriculture8040058.

Slama, A., Mallek-Maalej, E., Mohamed, H.B., Rhim, T. & Radhouane, L. (2018). A return to the genetic heritage of durum wheat to cope with drought heightened by climate change. *PLoS ONE*, 13(5).

SLU. (2021). *Siffror och fakta om SLU*. https://www.slu.se/om-slu/fakta-visioner-varderingar/siffror-fakta/ [2022-05-11].

Statistics Sweden. (2020). *Food sales 2020*. https://www.scb.se/contentassets/60a6d2ccca624815a518e04e8736b2a9/ha0103_2020a01_sm_ha24sm2101.pdf [2022-05-17].

Statistics Sweden. (2018). *Food consumption and nutritive values, data up to 2018*. https://www.scb.se/contentassets/8af9fcac17634fc197825dfec6e2b0ce/jo1301_2018a01_sm_jo44sm1901.pdf [2022-05-11]

Sturges, J.E. & Hanrahan, K.J. (2004). Comparing telephone and face-to-face qualitative interviewing: a research note. *Qualitative Research* (QR), 4(1), ss. 107-118.

Sørensen, M.P. & Christiansen, A. (2012). *Ulrich Beck: An introduction to the theory of second modernity and the risk society*. New York; London: Routledge

Tal, A. & Gvili, Y. (2022). To protect and support: Why would consumers find foods tastier if these foods help support a desired self-identity. *Psychology & Marketing*, 39(4), 701-714. https://doi.org/10.1002/mar.21614

Tal, A. (2018). Making conventional agriculture environmentally friendly: moving beyond the glorification of organic agriculture and the demonization of conventional agriculture. *Sustainability*, 10(4), 1078. https://doi.org/10.3390/su10041078.

Teuber, R., Dolgopolova, I. & Nordström, J. (2016). Some like it organic, some like it purple and some like it ancient: Consumer preferences and WTP for value-added attributes in whole grain bread. *Food Quality and Preference*, 52, 244-254.

von Oelreich, J. & Milestad, R. (2017). Sustainability transformations in the balance: exploring Swedish initiatives challenging the corporate food regime. *European planning studies*, 25(7), 1129-1146.

Wendin, K., Mustafa, A., Ortman, T. & Gerhardt, K. (2020). Consumer Awareness, Attitudes and Preferences towards Heritage Cereals. *Foods*, 9(742).

Wendin, K. & Olshov, A. (2018). *Äter vi ihjäl oss? – Mattrender på tvärs mot hälsa och hållbarhet.* Malmö: Intelligence Watch.

Wirfält, E., McTaggart, A., Pala, V., Gullberg, B., Frasca, G., Panico, S., Bueno-deMesquita, H.B., Peeters, P.H.M., Engeset, D., Skeie, G., Chirlaque, M.D., Amiano, P., Lundin, E., Mulligan, A., Spencer, E.A., Overvad, K., Tjønneland, A., Clavel-Chapelon, F., Linseisen, J., Nöthlings, U., Polychronopoulos, E., Georga, K., Charrondière, U.R. & Slimani, N. (2002). Food sources of carbohydrates in a European cohort of adults. *Public Health Nutrition*, 5(6B), 1197-1215, doi: 10.1079/PHN2002399.

Yan, Y., Hsam, S.L.K., Yu, J.Z., Jiang, Y., Ohtsuka, I. & Zeller, F.J. (2003). HMW and LMW glutenin alleles among putative tetraploid and hexaploid European spelt wheat (*Triticum spelta* L.) progenitors. *Theoretical and Applied Genetics*, 107, 1321-1330, doi: 10.1007/s00122-003-1315-z

Zamaratskaia, G., Gerhardt, K. & Wendin, K. (2021). Biochemical characteristics and potential applications of ancient cereals - An underexploited opportunity for sustainable production and consumption. *Trends in Food Science and Technology*, 107, 114-123.

Øygard, L. (2008). Studying food tastes among young adults using Bourdieu's theory. *Journal of Consumer Studies and Home Economics*, 24(3), 160-169.

Appendix 1 – Online survey questions

Below follows a presentation of the questions from the online survey. The survey was written and answered in Swedish, but here translated into English.

Background:

1. Gender:
    a. Woman
    b. Man
    c. Do not want to declare
2. Age: _____
3. Educational focus:
    a. Economy
    b. Animals
    c. Rural development
    d. Food
    e. Soil/crops
4. Where are you from?
    a. Big city
    b. Small city
    c. Rural area

Questions on awareness about heritage cereals:

5. Have you ever heard of heritage cereals?
    a. Yes
    b. No
    c. I don’t know
6. Which heritage cereal cultivars have you heard of? *(You may choose multiple answers)*
    a. Einkorn
    b. Emmer
    c. Dinkel
    d. Halland wheat
    e. Kamut
    f. Svedje-rye

g. Öland wheat
h. I don’t know
i. None
j. Other *(name the cultivar)* _____

7. Have you ever tasted one/multiple products that contain heritage cereal?
    a. Yes
    b. I don’t know
    c. No *(You will move on to question 11)*

Questions on experience tasting heritage cereals:

8. Which product/products have you tasted? *(You may choose multiple answers)*
    a. Bread
    b. Muesli
    c. Porridge
    d. Pasta
    e. Rice
    f. Food grains
    g. Cookies
    h. I don’t know
    i. Other *(name the product)* _____

9. Which cultivars have you tasted? *(You may choose multiple answers)*
    a. Einkorn
    b. Emmer
    c. Dinkel
    d. Halland wheat
    e. Kamut
    f. Svedje-rye
    g. Öland wheat
    h. I don’t know
    i. None
    j. Other *(name the cultivar)* _____

10. Where did the product/products that you have tasted come from? *(You may choose multiple answers)*
    a. Cooked/baked at home
    b. Bakery/Speciality store
    c. Supermarket
    d. I don’t know
    e. Other *(name where)* _____

Questions on preferences for qualities and products:

11. What is important for you when/if you were to buy products that are made with heritage cereals? *(You may choose multiple answers)*
    a. Price
    b. Taste
    c. Appearance (i.e. colour, texture)
    d. From a specific brand
    e. From Sweden
    f. Locally produced
    g. Organic
    h. Environmental impact
    i. Nutritional composition/health qualities (i.e. whole grain)
    j. Other *(name characteristics)* _____
12. How much are you willing to pay for products that are made with heritage cereals?
    a. **Same price** as products made with modern cereals
    b. **More** than products made with modern cereals
    c. **Less** than products made with modern cereals
13. Which products that are made with heritage cereals would you like/consider to buy? *(You may choose multiple answers)*
    a. Bread
    b. Cereals/Müsli
    c. Porridge
    d. Pasta
    e. Rice
    f. Food grains
    g. Cookies
    h. I don’t know
    i. Other *(name the product)* _____
14. Where would you prefer to buy products made with heritage cereals? *(You may choose multiple answers)*
    a. Supermarket
    b. Bakery/Speciality store
    c. Farmers market/Reko-ring
    d. Other *(name where)* _____

Appendix 2 – Survey data handling

In total, 154 people completed the online survey. *Q7* was programmed so that participants who chose the answer *"No"* would skip ahead immediately to *Q11*. Thus, only people who responded *"Yes"* or *"I don't know"* answered *Q8-10*. However, for three cases, participants who chose answer *"No"* for *Q7* did respond to *Q8-10,* probably due to a glitch in the online survey. These three cases were excluded from the data on *Q8-10,* since they responded they had never tasted products made with heritage cereals before. The data for *Q8-10* were hence based on the answers of in total 123 participants. See *Table A.* for details.

Table A. Number of participants data used for online survey Q8-10.

Group	Number of participants
Total	123
Women	93
Men	30
Social Science	57
Natural Science	66

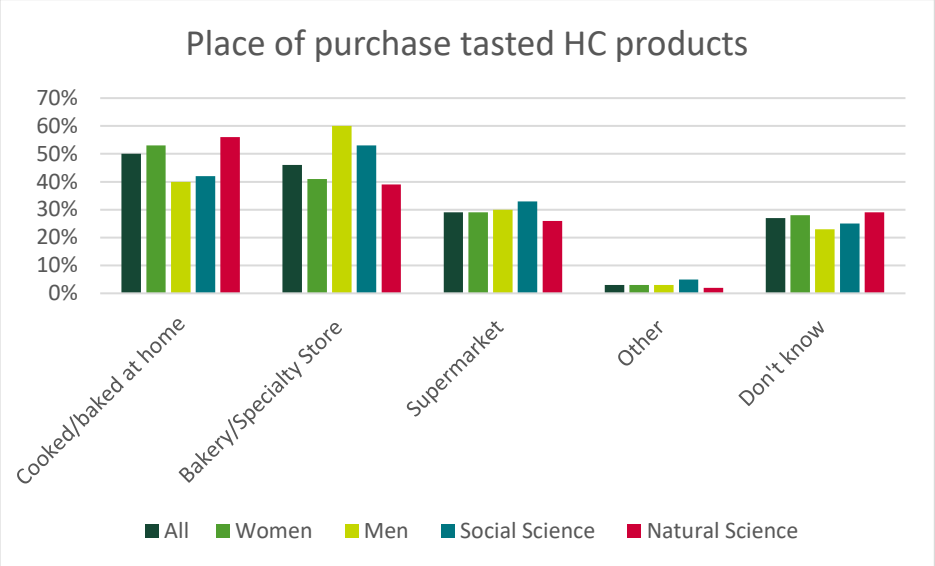
Probably due to a glitch in the online survey, six participants did not respond to *Q14.* Instead of excluding these cases from the entire survey data, these six cases were only excluded from the *Q14* data. Thus, the data for *Q14* were based on the answers from in total 148 participants. See *Table B* for details.

Table B. Number of participants data used for online survey Q14

Group	Number of participants
Total	148
Women	113
Men	35
Social Science	71
Natural Science	77

Appendix 3 – Purchasing locations for HC products that respondents had tasted

Most commonly, the HC products that the respondents had tasted were cooked or baked at home (50%). However, Cochran's Q-test revealed no significant difference between 'cooked or baked at home' and 'bakery or specialty store' (p=0,516). Among women and natural science students, it was significantly more common that the tasted HC products were cooked or baked at home compared to bought at a bakery/specialty store or at a supermarket. Yet, the bakery/specialty store was significantly more popular for men and social science students in comparison to cooked or baked at home and supermarket. Additional places named are presented below.



Place	Number of respondents
Local mill	1
From friends/family	1
REKO-ring	1
Local market	1

Appendix 4 – Cochran's Q-test results (Tables)

Below follows the calculated p-value for the Cochran's Q-test on all the multiple choice questions. Each table is dedicated to a question, and a group (the whole group or one of the sub-groups). This entails that each question have five related tables, presenting the different p-values for the whole group, for women, for men, for social science and finally for natural science.

In each table, significant difference between two response alternatives plotted against each other is marked with **bold.** In other words, all **bold** numbers indicate a p-value that resulted in a significant difference between two plotted alternatives.

Table A. Cochran's Q test – Cultivars heard of by all

	Einkorn	Emmer	Dinkle Spelt	Hallandwheat	Kamut	Svedjerag	Olandwheat	Don't know	None	Other
Einkorn	-	**<0.001**	**0**	0.088	0.088	0.358	**<0.001**	**<0.001**	**0.002**	**<0.001**
Emmer	**<0.001**	-	**<0.001**	**<0.001**	**<0.001**	**<0.001**	0.6	**<0.001**	**<0.001**	**<0.001**
Dinkle Spelt	**0**	**<0.001**	-	**0**	**0**	**0**	**<0.001**	**0**	**0**	**0**
Hallandwheat	0.088	**<0.001**	**0**	-	1	0.431	**<0.001**	**0.009**	0.149	**0.026**
Kamut	0.088	**<0.001**	**0**	1	-	0.431	**<0.001**	**0.009**	0.149	**0.026**
Svedjerag	0.358	**<0.001**	**0**	0.431	0.431	-	**<0.001**	**<0.001**	**0.026**	**0.003**
Olandwheat	**<0.001**	0.6	**<0.001**	**<0.001**	**<0.001**	**<0.001**	-	**0**	**<0.001**	**0**
Don't know	**<0.001**	**<0.001**	**0**	**0.009**	**0.009**	**<0.001**	**0**	-	0.237	0.694
None	**0.002**	**<0.001**	**0**	0.149	0.149	**0.026**	**<0.001**	0.237	-	0.431

Other	**<0.001**	**<0.001**	**0**	**0.026**	**0.026**	**0.003**	**0**	0.694	0.431	-

Table B. Cochran's Q test – Cultivars heard of by women

	Einkorn	Emmer	Dinkle Spelt	Hallandswheat	Kamut	Svedjerag	Olandswheat	Don't know	None	Other
Einkorn		**<0.001**	**0**	0.125	0.168	0.759	**<0.001**	**0.002**	**0.032**	**0.009**
Emmer	**<0.001**		**<0.001**	**<0.001**	**<0.001**	**<0.001**	0.878	**<0.001**	**<0.001**	**<0.001**
Dinkle Spelt	**0**	**<0.001**		**0**	**0**	**0**	**<0.001**	**0**	**0**	**0**
Hallandswheat	0.125	**<0.001**	**0**		0.878	0.22	**<0.001**	0.125	0.54	0.284
Kamut	0.168	**<0.001**	**0**	0.878		0.284	**<0.001**	0.092	0.444	0.22
Svedjerag	0.759	**<0.001**	**0**	0.22	0.284		**<0.001**	**0.006**	**0.006**	**0.022**
Olandswheat	**<0.001**	0.878	**<0.001**	**<0.001**	**<0.001**	**<0.001**		**<0.001**	**<0.001**	**<0.001**
Don't know	**0.002**	**<0.001**	**0**	0.125	0.092	**0.006**	**<0.001**		0.358	0.646
None	**0.032**	**<0.001**	**0**	0.54	0.444	**0.006**	**<0.001**	0.358		0.646
Other	**0.009**	**<0.001**	**0**	0.284	0.22	**0.022**	**<0.001**	0.646	0.646	

Table C. Cochran's Q test – Cultivars heard of by men

	Einkorn	Emmer	Dinkle Spelt	Hallandswheat	Kamut	Svedjerag	Olandswheat	Don't know	None	Other
Einkorn		0.127	**<0.001**	0.445	0.309	0.203	**0.005**	**<0.001**	**0.01**	**<0.001**
Emmer	0.127		**0.002**	**0.022**	**0.011**	**0.005**	0.203	**<0.001**	**<0.001**	**<0.001**
Dinkle Spelt	**<0.001**	**0.002**		**<0.001**	**<0.001**	**<0.001**	0.075	**<0.001**	**<0.001**	**<0.001**

Hallandswheat	0.445	**0.022**	**<0.001**		0.799	0.611	**<0.001**	**0.011**	0.075	**0.011**
Kamut	0.309	**0.011**	**<0.001**	0.799		0.799	**<0.001**	**0.022**	0.127	**0.022**
Svedjerag	0.203	**0.005**	**<0.001**	0.611	0.799		**<0.001**	**0.042**	0.203	**0.042**
Olandswheat	**0.005**	0.203	0.075	**<0.001**	**<0.001**	**<0.001**		**<0.001**	**<0.001**	**<0.001**
Don't know	**<0.001**	**<0.001**	**<0.001**	**0.011**	**0.022**	**0.042**	**<0.001**		0.445	1
None	**0.01**	**<0.001**	**<0.001**	0.075	0.127	0.203	**<0.001**	0.445		0.445
Other	**<0.001**	**<0.001**	**<0.001**	**0.011**	**0.022**	**0.042**	**<0.001**	1	0.445	

Table D. Cochran's Q test – Cultivars heard of by social science

	Einkorn	Emmer	Dinkle Spelt	Hallandswheat	Kamut	Svedjerag	Olandswheat	Don't know	None	Other
Einkorn	-	**0.012**	**<0.001**	0.846	0.333	0.699	**<0.001**	**0.012**	0.081	**0.02**
Emmer	**0.012**	-	**<0.001**	**0.007**	**<0.001**	**0.004**	0.175	**<0.001**	**<0.001**	**<0.001**
Dinkle Spelt	**<0.001**	**<0.001**	-	**<0.001**	**0**	**0**	**<0.001**	**0**	**0**	**0**
Hallandswheat	0.846	**0.007**	**<0.001**	-	0.439	0.846	**<0.001**	**0.02**	0.121	**0.033**
Kamut	0.333	**<0.001**	**0**	0.439	-	0.561	**<0.001**	0.121	0.439	0.175
Svedjerag	0.699	**0.004**	**0**	0.846	0.561	-	**<0.001**	**0.033**	0.175	0.053
Olandswheat	**<0.001**	0.175	**<0.001**	**<0.001**	**<0.001**	**<0.001**	-	**<0.001**	**<0.001**	**<0.001**
Don't know	**0.012**	**<0.001**	**0**	**0.02**	0.121	**0.033**	**<0.001**	-	0.439	0.846
None	0.081	**<0.001**	**0**	0.121	0.439	0.175	**<0.001**	0.439	-	0.561
Other	**0.02**	**<0.001**	**0**	**0.033**	0.175	0.053	**<0.001**	0.846	0.561	-

Table E. Cochran's Q test – Cultivars heard of by natural science

	Einkorn	Emmer	Dinkle Spelt	Hallandswheat	Kamut	Svedjerag	Olandswheat	Don't know	None	Other
Einkorn	-	**0.004**	**< 0.001**	**0.032**	0.153	0.372	**0.02**	**< 0.001**	**0.007**	**< 0.001**
Emmer	**0.004**	-	**< 0.001**	**<0.001**	**< 0.001**	**<0.001**	0.592	**< 0.001**	**< 0.001**	**< 0.001**
Dinkle Spelt	**< 0.001**	**< 0.001**	-	**0**	**0**	**0**	**<0.001**	**0**	**0**	**0**
Hallandswheat	**0.032**	**< 0.001**	**0**	-	0.475	0.211	**<0.001**	0.153	0.592	0.284
Kamut	0.153	**< 0.001**	**0**	0.475	-	0.592	**<0.001**	**0.032**	0.211	0.074
Svedjerag	0.372	**< 0.001**	**0**	0.211	0.592	-	**<0.001**	**0.007**	0.074	**0.02**
Olandswheat	**0.02**	0.592	**< 0.001**	**<0.001**	**< 0.001**	**<0.001**	-	**< 0.001**	**< 0.001**	**< 0.001**
Don't know	**< 0.001**	**< 0.001**	**0**	0.153	**0.032**	**0.007**	**<0.001**	-	0.372	0.721
None	**0.007**	**< 0.001**	**0**	0.592	0.211	0.074	**<0.001**	0.372	-	0.592
Other	**< 0.001**	**< 0.001**	**0**	0.284	0.074	**0.02**	**<0.001**	0.721	0.592	-

Table F. Cochran's Q test – Products tasted by all

	Bread	Muesli	Porridge	Pasta	Rice	Food grains	Cookies	Don't know	Other
Bread	-	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Muesli	**0**	-	0.533	0.755	**0.008**	0.876	0.35	0.436	**<0.001**
Porridge	**0**	0.533	-	0.35	**0.043**	0.876	0.755	0.876	**<0.001**
Pasta	**0**	0.755	0.35	-	**0.003**	0.436	0.213	0.276	**<0.001**
Rice	**0**	**0.008**	**0.043**	**0.003**	-	**0.029**	0.087	0.062	0.087

Food grains	**0**	0.876	0.876	0.436	**0.029**	-	0.64	0.755	**<0.001**
Cookies	**0**	0.35	0.755	0.213	0.087	0.64	-	0.876	**<0.001**
Don't know	**0**	0.436	0.876	0.276	0.062	0.755	0.876	-	**<0.001**
Other	**<0.001**	**<0.001**	**<0.001**	**<0.001**	0.087	**<0.001**	**<0.001**	**<0.001**	-

Table G. Cochran's Q test – Products tasted by women

	Bread	Muesli	Porridge	Pasta	Rice	Food grains	Cookies	Don't know	Other
Bread	-	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Muesli	**0**	-	0.366	0.587	**0.03**	0.856	0.469	0.856	**<0.001**
Porridge	**0**	0.366	-	0.148	0.205	0.469	0.856	0.469	**0.007**
Pasta	**0**	0.587	0.148	-	**0.007**	0.469	0.205	0.469	**0**
Rice	**0**	**0.03**	0.205	**0.007**	-	**0.047**	0.148	**0.047**	0.148
Food grains	**0**	0.856	0.469	0.469	**0.047**	-	0.587	1	**<0.001**
Cookies	**0**	0.469	0.856	0.205	0.148	0.587	-	0.587	**0.004**
Don't know	**0**	0.856	0.469	0.469	**0.047**	1	0.587	-	**<0.001**
Other	**0**	**<0.001**	**0.007**	**0**	0.148	**<0.001**	**0.004**	**<0.001**	-

Table H. Cochran's Q test – Products tasted by men

	Bread	Muesli	Porridge	Pasta	Rice	Food grains	Cookies	Don't know	Other
Bread	-	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Muesli	**<0.001**	-	0.759	0.759	0.126	0.54	0.54	0.221	**0.014**
Porridge	**<0.001**	0.759	-	0.54	0.066	0.358	0.358	0.126	**0.006**

Pasta	**<0.001**	0.759	0.54	-	0.221	0.759	0.759	0.358	**0.032**
Rice	**<0.001**	0.126	0.066	0.221	-	0.358	0.358	0.759	0.358
Food grains	**<0.001**	0.54	0.358	0.759	0.358	-	1	0.54	0.066
Cookies	**<0.001**	0.54	0.358	0.759	0.358	1	-	0.54	0.066
Don't know	**<0.001**	0.221	0.126	0.358	0.759	0.54	0.54	-	0.221
Other	**<0.001**	**0.014**	**0.006**	**0.032**	0.358	0.066	0.066	0.221	-

Table I. Cochran's Q test – Products tasted by social science background

	Bread	Muesli	Porridge	Pasta	Rice	Food grains	Cookies	Don't know	Other
Bread	-	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0**
Muesli	**<0.001**	-	0.824	1	**0.015**	0.657	0.12	0.76	**<0.001**
Porridge	**<0.001**	0.824	-	0.824	**0.026**	0.824	0.824	0.12	**<0.001**
Pasta	**<0.001**	1	0.824	-	**0.015**	0.657	0.12	0.076	**<0.001**
Rice	**<0.001**	**0.015**	**0.026**	**0.015**	-	**0.046**	0.374	0.505	0.12
Food grains	**<0.001**	0.657	0.824	0.657	**0.046**	-	0.267	0.183	**<0.001**
Cookies	**<0.001**	0.12	0.824	0.12	0.374	0.267	-	0.824	**0.015**
Don't know	**<0.001**	0.76	0.12	0.076	0.505	0.183	0.824	-	**0.026**
Other	**0**	**<0.001**	**<0.001**	**<0.001**	0.12	**<0.001**	**0.015**	**0.026**	-

Table J. Cochran's Q test – Products tasted by natural science background

	Bread	Muesli	Porridge	Pasta	Rice	Food grains	Cookies	Don't know	Other
Bread	-	**0**	**0**	**<0.001**	**0**	**<0.001**	**<0.001**	**<0.001**	**0**

Muesli	**0**	-	0.827	0.662	0.19	0.827	0.827	0.512	**0.029**
Porridge	**0**	0.827	-	0.275	0.512	0.662	0.382	0.19	0.126
Pasta	**<0.001**	0.662	0.275	-	0.08	0.512	0.827	0.827	**0.009**
Rice	**0**	0.19	0.512	0.08	-	0.275	0.126	**0.049**	0.382
Food grains	**<0.001**	0.827	0.662	0.512	0.275	-	0.662	0.382	**0.049**
Cookies	**<0.001**	0.827	0.382	0.827	0.126	0.662	-	0.662	**0.016**
Don't know	**<0.001**	0.512	0.19	0.827	**0.049**	0.382	0.662	-	**0.005**
Other	**0**	**0.029**	0.126	**0.009**	0.382	**0.049**	**0.016**	**0.005**	-

Table K. Cochran's Q test – Cultivars tasted by all

	Einkorn	Emmer	Dinkle Spelt	Hallands wheat	Kamut	Oland wheat	Don't know	Other
Einkorn	-	**0.008**	**0**	0.53	0.875	**0.005**	**<0.001**	0.433
Emmer	**0.008**	-	**0**	**<0.001**	**0.005**	0.875	**0.028**	**<0.001**
Dinkle Spelt	**0**	**0**	-	**0**	**0**	**0**	**<0.001**	**0**
Hallands wheat	0.53	**<0.001**	**0**	-	0.638	**<0.001**	**<0.001**	0.875
Kamut	0.875	**0.005**	**0**	0.638	-	**0.003**	**<0.001**	0.53
Olandwheat	**0.005**	0.875	**0**	**<0.001**	**0.003**	-	**0.041**	**<0.001**
Don't know	**<0.001**	**0.028**	**<0.001**	**<0.001**	**<0.001**	**0.041**	-	**<0.001**
Other	0.433	**<0.001**	**0**	0.875	0.53	**<0.001**	**<0.001**	-

Table L. Cochran's Q test – Cultivars tasted by women

	Einkorn	Emmer	Dinkle Spelt	Hallands wheat	Kamut	Oland wheat	Don't know	Other

Einkorn	-	**0.03**	**0**	0.469	0.365	0.07	**<0.001**	0.469
Emmer	**0.03**	-	**<0.001**	**0.004**	**0.004**	0.717	**0.011**	**0.004**
Dinkle Spelt	**0**	**<0.001**	-	**0**	**0**	**<0.001**	**<0.001**	**0**
Hallands wheat	0.469	**0.004**	**0**	-	0.856	**0.011**	**<0.001**	1
Kamut	0.365	**0.004**	**0**	0.856	-	**0.007**	**<0.001**	0.856
Olandwheat	0.07	0.717	**<0.001**	**0.011**	**0.007**	-	**0.004**	**0.011**
Don’t know	**<0.001**	**0.011**	**<0.001**	**<0.001**	**<0.001**	**0.004**	-	**<0.001**
Other	0.469	**0.004**	**0**	1	0.856	**0.011**	**<0.001**	-

Table M. Cochran’s Q test – Cultivars tasted by men

	Einkorn	Emmer	Dinkle Spelt	Hallands wheat	Kamut	Olandwheat	Don’t know	Other
Einkorn	-	0.116	**<0.001**	1	0.209	**0.012**	0.116	0.754
Emmer	0.116	-	**<0.001**	0.116	0.754	0.346	1	0.06
Dinkle Spelt	**<0.001**	**<0.001**	-	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Hallands wheat	1	0.116	**<0.001**	-	0.209	**0.012**	0.116	0.754
Kamut	0.209	0.754	**<0.001**	0.209	-	0.209	0.754	0.116
Olandwheat	**0.012**	0.346	**<0.001**	**0.012**	0.209	-	0.346	**0.005**
Don’t know	0.116	1	**<0.001**	0.116	0.754	0.346	-	0.06
Other	0.754	0.06	**<0.001**	0.754	0.116	**0.005**	0.06	-

Table N. Cochran’s Q test – Cultivars tasted by social science

	Einkorn	Emmer	Dinkle Spelt	Hallands wheat	Kamut	Olandwheat	Don’t know	Other

Einkorn	-	**0.042**	**<0.001**	0.497	0.821	0.07	**0.013**	0.497
Emmer	**0.042**	-	**<0.001**	**0.007**	**0.024**	0.821	0.651	0.651
Dinkle Spelt	**<0.001**	**<0.001**	-	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Hallands wheat	0.497	**0.007**	**<0.001**	-	0.651	**0.013**	**0.002**	1
Kamut	0.821	**0.024**	**<0.001**	0.651	-	**0.042**	**0.007**	0.651
Olandwheat	0.07	0.821	**<0.001**	**0.013**	**0.042**	-	0.497	**0.013**
Don't know	**0.013**	0.651	**<0.001**	**0.002**	**0.007**	0.497	-	**0.002**
Other	0.497	0.651	**<0.001**	1	0.651	**0.013**	**0.002**	-

Table O. Cochran's Q test – Cultivars tasted by natural science

	Einkorn	Emmer	Dinkle Spelt	Hallands wheat	Kamut	Olandwheat	Don't know	Other
Einkorn	-	0.082	**0**	0.828	1	**0.03**	**<0.001**	0.663
Emmer	0.082	-	**<0.001**	**0.05**	0.082	0.663	**0.009**	**0.03**
Dinkle Spelt		**<0.001**	-	**0**	**0**	**<0.001**	**<0.001**	**0**
Hallands wheat	0.828	**0.05**	**0**	-	0.828	**0.017**	**<0.001**	1
Kamut	1	0.082	**0**	0.828	-	**0.03**	**<0.001**	1
Olandwheat	**0.03**	0.663	**<0.001**	**0.017**	**0.03**	-	**0.03**	**0.009**
Don't know	**<0.001**	**0.009**	**<0.001**	**<0.001**	**<0.001**	**0.03**	-	**<0.001**
Other	0.663	**0.03**	**0**	1	1	**0.009**	**<0.001**	-

Table P. Cochran's Q test – Place of purchasing tasted products by all

	Cooked/baked at home	Bakery/specialty store	Supermarket	Don't know	Other

Cooked/baked at home	-	0.516	**<0.001**	**<0.001**	**<0.001**
Bakery/specialty store	0.516	-	**0.009**	**0.003**	**<0.001**
Supermarket	**<0.001**	**0.009**	-	0.697	**<0.001**
Don't know	**<0.001**	**0.003**	0.697	-	**<0.001**
Other	**<0.001**	**<0.001**	**<0.001**	**<0.001**	-

Table Q. Cochran's Q test – Place of purchasing tasted products by women

	Cooked/baked at home	Bakery/specialty store	Supermarket	Don't know	Other
Cooked/baked at home	-	0.098	**<0.001**	**<0.001**	**<0.001**
Bakery/specialty store	0.098	-	0.098	0.071	**<0.001**
Supermarket	**<0.001**	0.098	-	0.88	**<0.001**
Don't know	**<0.001**	0.071	0.88	-	**<0.001**
Other	**<0.001**	**<0.001**	**<0.001**	**<0.001**	-

Table R. Cochran's Q test – Place of purchasing tasted products by men

	Cooked/baked at home	Bakery/specialty store	Supermarket	Don't know	Other
Cooked/baked at home	-	0.121	0.439	0.197	**0.005**
Bakery/specialty store	0.121	-	**0.02**	**0.005**	**<0.001**
Supermarket	0.439	**0.02**	-	0.606	**0.039**
Don't know	0.197	**0.005**	0.606	-	0.121
Other	**0.005**	**<0.001**	**0.039**	0.121	-

Table S. Cochran's Q test – Place of purchasing tasted products by social science

	Cooked/baked at home	Bakery/specialty store	Supermarket	Don't know	Other
Cooked/baked at home	-	0.255	0.343	0.058	**<0.001**
Bakery/specialty store	0.255	-	**0.037**	**0.002**	**<0.001**
Supermarket	0.343	**0.037**	-	0.343	**0.002**
Don't know	0.058	**0.002**	0.343	-	**0.037**
Other	**<0.001**	**<0.001**	**0.002**	**0.037**	-

Table T. Cochran's Q test – Place of purchasing tasted products by natural science

	Cooked/baked at home	Bakery/specialty store	Supermarket	Don't know	Other
Cooked/baked at home	-	**0.05**	**<0.001**	**<0.001**	**<0.001**
Bakery/specialty store	**0.05**	-	0.108	0.212	**<0.001**
Supermarket	**<0.001**	0.108	-	0.721	**0.004**
Don't know	**<0.001**	0.212	0.721	-	**<0.001**
Other	**<0.001**	**<0.001**	**0.004**	**<0.001**	-

Table U. Cochran's Q test – Preference for quality aspects by all

	Price	Taste	Appearance	Specific brand	From Sweden	Locally produced	Organic	Environmental impact	Health	Don't know	Other
Price	-	**<0.001**	**<0.001**	**<0.001**	**<0.001**	0.054	**0.003**	0.336	**0.03**	**<0.001**	**<0.001**
Taste	**<0.001**	-	**0**	**0**	0.118	**<0.001**	**0**	**<0.001**		**0**	**0**
Appearance	**<0.001**	**0**	-	**0.004**	**0**	**<0.001**	0.149	**<0.001**	**<0.001**	**0.016**	**0.022**
Specific Brand	**<0.001**	**0**	**0.004**	-	**0**	**0**	**<0.001**	**<0.001**	**0**	0.63	0.547
From Sweden	**<0.001**	0.118	**0**	**0**	-	**<0.001**	**0**	**0**		**0**	**0**
Locally produced	0.054	**<0.001**	**<0.001**	**0**	**<0.001**	-	**<0.001**	**0.004**	0.81	**0**	**0**
Organic	**0.003**	**0**	0.149	**<0.001**	**0**	**<0.001**	-	**0.041**	**<0.001**	**<0.001**	**<0.001**
Environmental impact	0.336	**<0.001**	**<0.001**	**<0.001**	**0**	**0.004**	**0.041**	-	**0.002**	**<0.001**	**<0.001**

Health	**0.03**	**<0.001**	**<0.001**	**0**	**<0.001**	0.81	**<0.001**	**0.002**	-	**0**	**0**
Don't know	**<0.001**	**0**	**0.016**	0.63	**0**	**0**	**<0.001**	**<0.001**	**0**	-	0.904
Other	**<0.001**	**0**	**0.022**	0.547	**0**	**0**	**<0.001**	**<0.001**	**0**	0.904	-

Table V. Cochran's Q test – Preference for quality aspects by women

	Price	Taste	Appearance	Specific brand	From Sweden	Locally produced	Organic	Environmental impact	Health	Don't know	Other
Price	-	**<0.001**	**<0.001**	**<0.001**	**<0.001**	0.009	**0.028**	0.492	0.02	**<0.001**	**<0.001**
Taste	**<0.001**	-	**0**	**0**	0.131	**0.003**	**<0.001**	**<0.001**		**0**	**0**
Appearance	**<0.001**	**0**	-	**0.013**	**0**	**<0.001**	0.272	**<0.001**	**<0.001**	**0.039**	**0.039**
Specific Brand	**<0.001**	**0**	**0.013**	-	**0**	**0**	**<0.001**	**<0.001**	**0**	0.68	0.68
From Sweden	**<0.001**	0.131	**0**	**0**	-	**<0.001**	**0**	**<0.001**	**<0.001**	**0**	**0**
Locally produced	0.009	**0.003**	**<0.001**	**0**	**<0.001**	-	**<0.001**	0.054	0.738	**<0.001**	**<0.001**
Organic	**0.028**	**<0.001**	0.272	**<0.001**	**0**	**<0.001**	-	**0.004**	**<0.001**	**0.002**	**0.002**
Environmental impact	0.492	**<0.001**	**<0.001**	**<0.001**	**<0.001**	0.054	**0.004**	-	0.099	**<0.001**	**<0.001**

Health	0.02	**<0.001**	**<0.001**	**0**	**<0.001**	0.738	**<0.001**	0.099	-	**<0.001**	**<0.001**
Don't know	**<0.001**	**0**	**0.039**	0.68	**0**	**<0.001**	**0.002**	**<0.001**	**<0.001**	-	1
Other	**<0.001**	**0**	**0.039**	0.68	**0**	**<0.001**	**0.002**	**<0.001**	**<0.001**	1	-

Table W. Cochran's Q test – Preference for quality aspects by men

	Price	Taste	Appearance	Specific brand	From Sweden	Locally produced	Organic	Environmental impact	Health	Don't know	Other
Price	-	0.081	**<0.001**	**<0.001**	**0.025**	0.455	**0.025**	**<0.001**	0.803	**<0.001**	**<0.001**
Taste	0.081	-	**<0.001**	**<0.001**	0.618	**0.013**	**<0.001**	**<0.001**	0.135	**<0.001**	**<0.001**
Appearance	**<0.001**	**<0.001**	-	0.135	**<0.001**	**0.013**	0.319	1	**<0.001**	0.213	0.319
Specific Brand	**<0.001**	**<0.001**	0.135	-	**<0.001**	**<0.001**	**0.013**	0.135	**<0.001**	0.803	0.618
From Sweden	**0.025**	0.618	**<0.001**	**<0.001**	-	**0.003**	**<0.001**	**<0.001**	**0.046**	**<0.001**	**<0.001**
Locally produced	0.455	**0.013**	**0.013**	**<0.001**	**0.003**	-	0.135	**0.013**	0.319	**<0.001**	**<0.001**
Organic	**0.025**	**<0.001**	0.319	**0.013**	**<0.001**	0.135	-	0.319	**0.013**	**0.025**	**0.046**
Environmental impact	**<0.001**	**<0.001**	1	0.135	**<0.001**	**0.013**	0.319	-	**<0.001**	0.213	0.319

Health	0.803	0.135	**<0.001**	**<0.001**	**0.046**	0.319	**0.013**	**<0.001**	-	**<0.001**	**<0.001**
Don't know	**<0.001**	**<0.001**	0.213	0.803	**<0.001**	**<0.001**	**0.025**	0.213	**<0.001**	-	0.803
Other	**<0.001**	**<0.001**	0.319	0.618	**<0.001**	**<0.001**	**0.046**	0.319	**<0.001**	0.803	-

Table X. Cochran's Q test – Preference for quality aspects by social science

	Price	Taste	Appearance	Specific brand	From Sweden	Locally produced	Organic	Environmental impact	Health	Don't know	Other
Price	-	**<0.001**	**<0.001**	**<0.001**	**<0.001**	0.378	0.113	0.378	0.113	**<0.001**	**<0.001**
Taste	**<0.001**	-	**<0.001**	**<0.001**	0.113	**0.005**	**<0.001**	**<0.001**	**0.034**	**0**	**<0.001**
Appearance	**<0.001**	**<0.001**	-	0.113	**0**	**<0.001**	0.078	**0.014**	**<0.001**	0.217	0.217
Specific Brand	**<0.001**	**<0.001**	0.113	-	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	0.724	0.724
From Sweden	**<0.001**	0.113	**0**	**<0.001**	-	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0**	**0**
Locally produced	0.378	**0.005**	**<0.001**	**<0.001**	**<0.001**	-	**0.014**	0.078	0.481	**<0.001**	**<0.001**
Organic	0.113	**<0.001**	0.078	**<0.001**	**<0.001**	**0.014**	-	0.481	**0.002**	**0.003**	**0.003**
Environmental impact	0.378	**<0.001**	**0.014**	**<0.001**	**<0.001**	0.078	0.481	-	0.014	**<0.001**	**<0.001**

Health	0.113	**0.034**	**<0.001**	**<0.001**	**<0.001**	0.481	**0.002**	0.014	-	**<0.001**	**<0.001**
Don't know	**<0.001**	**0**	0.217	0.724	**0**	**<0.001**	**0.003**	**<0.001**	**<0.001**	-	1
Other	**<0.001**	**<0.001**	0.217	0.724	**0**	**<0.001**	**0.003**	**<0.001**	**<0.001**	1	-

Table Y. Cochran's Q test – Preference for quality aspects by natural science

	Price	Taste	Appearance	Specific brand	From Sweden	Locally produced	Organic	Environmental impact	Health	Don't know	Other
Price	-	**<0.001**	**0.003**	**<0.001**	**<0.001**	0.07	**0.008**	0.621	0.138	**<0.001**	**<0.001**
Taste	**<0.001**	-	**<0.001**	**0**	0.51	**0.008**	**<0.001**	**<0.001**	**0.003**	**0**	**0**
Appearance	**0.003**	**<0.001**	-	**0.014**	**<0.001**	**<0.001**	0.742	**0.014**	**<0.001**	**0.032**	**0.048**
Specific Brand	**<0.001**	**0**	**0.014**	-	**0**	**<0.001**	**0.005**	**<0.001**	**<0.001**	0.742	0.621
From Sweden	**<0.001**	0.51	**<0.001**	**0**	-	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0**	**0**
Locally produced	0.07	**0.008**	**<0.001**	**<0.001**	**<0.001**	-	**<0.001**	**0.021**	0.742	**<0.001**	**<0.001**
Organic	**0.008**	**<0.001**	0.742	**0.005**	**<0.001**	**<0.001**	-	**0.032**	**<0.001**	**0.014**	**0.021**
Environmental impact	0.621	**<0.001**	**0.014**	**<0.001**	**<0.001**	**0.021**	**0.032**	-	**0.048**	**<0.001**	**<0.001**

Health	0.138	**0.003**	**<0.001**	**<0.001**	**<0.001**	0.742	**<0.001**	**0.048**	-	**<0.001**	**<0.001**
Don't know	**<0.001**	**0**	**0.032**	0.742	**0**	**<0.001**	**0.014**	**<0.001**	**<0.001**	-	0.869
Other	**<0.001**	**0**	**0.048**	0.621	**0**	**<0.001**	**0.021**	**<0.001**		0.869	-

Table X. Cochran's Q test – Preference for products by all

	Bread	Muesli	Porridge	Pasta	Rice	Food grains	Cookies	Don't know	Other
Bread	-	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0**	**0**
Muesli	**<0.001**	-	**0.023**	0.119	**0.004**	1	0.231	**0**	**0**
Porridge	**<0.001**	**0.023**	-	**<0.001**	0.549	**0.023**	0.281	**0**	**0**
Pasta	**<0.001**	0.119	**<0.001**	-	**<0.001**	0.119	**0.006**	**0**	**0**
Rice	**<0.001**	**0.004**	0.549	**<0.001**	-	**0.004**	0.093	**0**	**0**
Food grains	**<0.001**	1	**0.023**	0.119	**0.004**	-	0.231	**0**	**0**
Cookies	**<0.001**	0.231	0.281	**0.006**	0.093	0.231	-	**0**	**0**
Don't know	**0**	**0**	**0**	**0**	**0**	**0**	**0**	-	0.632
Other	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0.632	-

Table Aa. Cochran's Q test – Preference for products by women

	Bread	Muesli	Porridge	Pasta	Rice	Food grains	Cookies	Don't know	Other
Bread	-	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0**	**0**
Muesli	**<0.001**	-	**0.027**	0.406	**0.027**	0.678	0.58	**0**	**0**

Porridge	**<0.001**	**0.027**	-	**0.002**	1	**0.009**	0.097	**<0.001**	**<0.001**
Pasta	**<0.001**	0.406	**0.002**	-	**0.002**	0.678	0.166	**0**	**0**
Rice	**<0.001**	**0.027**	1	**0.002**	-	**0.009**	0.097	**<0.001**	**<0.001**
Food grains	**<0.001**	0.678	**0.009**	0.678	**0.009**	-	0.332	**0**	**0**
Cookies	**<0.001**	0.58	0.097	0.166	0.097	0.332	-	**0**	**0**
Don't know	**0**	**0**	**<0.001**	**0**	**<0.001**	**0**	**0**	-	0.58
Other	**0**	**0**	**<0.001**	**0**	**<0.001**	**0**	**0**	0.58	-

Table Ba. Cochran's Q test – Preference for products by men

	Bread	Muesli	Porridge	Pasta	Rice	Food grains	Cookies	Don't know	Other
Bread	-	**0.031**	**0.004**	0.632	**<0.001**	**0.004**	**<0.001**	**<0.001**	**<0.001**
Muesli	**0.031**	-	0.472	0.093	0.055	0.472	0.15	**<0.001**	**<0.001**
Porridge	**0.004**	0.472	-	**0.016**	0.231	1	0.472	**<0.001**	**<0.001**
Pasta	0.632	0.093	**0.016**	-	**<0.001**	**0.016**	**0.002**	**<0.001**	**<0.001**
Rice	**<0.001**	0.055	0.231	**<0.001**	-	0.231	0.632	**<0.001**	**<0.001**
Food grains	**0.004**	0.472	1	**0.016**	0.231	-	0.472	**<0.001**	**<0.001**
Cookies	**<0.001**	0.15	0.472	**0.002**	0.632	0.472	-	**<0.001**	**<0.001**
Don't know	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	-	1
Other	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	1	-

Table Ca. Cochran's Q test – Preference for products by social science

	Bread	Muesli	Porridge	Pasta	Rice	Food grains	Cookies	Don't know	Other

Bread	-	**0.005**	**<0.001**	0.162	**<0.001**	**0.009**	**<0.001**	**0**	**0**
Muesli	**0.005**	-	0.055	0.162	0.081	0.861	0.116	**0**	**0**
Porridge	**<0.001**	0.055	-	**<0.001**	0.861	**0.036**	0.727	**<0.001**	**<0.001**
Pasta	0.162	0.162	**<0.001**	-	**0.002**	0.221	0.003	**0**	**0**
Rice	**<0.001**	0.081	0.861	**0.002**	-	0.055	0.861	**<0.001**	**<0.001**
Food grains	**0.009**	0.861	**0.036**	0.221	0.055	-	0.081	**0**	**0**
Cookies	**<0.001**	0.116	0.727	0.003	0.861	0.081	-	**<0.001**	**<0.001**
Don't know	**0**	**0**	**<0.001**	**0**	**<0.001**	**0**	**<0.001**	-	0.727
Other	**0**	**0**	**<0.001**	**0**	**<0.001**	**0**	**<0.001**	0.727	-

Table Da. Cochran's Q test – Preference for products by natural science

	Bread	Muesli	Porridge	Pasta	Rice	Food grains	Cookies	Don't know	Other
Bread	-	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0**	**0**
Muesli	**<0.001**	-	0.187	0.41	**0.021**	0.869	0.869	**<0.001**	**<0.001**
Porridge	**<0.001**	0.187	-	**0.032**		0.248	0.248	**<0.001**	**<0.001**
Pasta	**<0.001**	0.41	**0.032**	-	**0.002**	0.322	0.322	**0**	**0**
Rice	**<0.001**	**0.021**		**0.002**	-	**0.032**	**0.032**	**<0.001**	**<0.001**
Food grains	**<0.001**	0.869	0.248	0.322	**0.032**	-	1	**0**	**<0.001**
Cookies	**<0.001**	0.869	0.248	0.322	**0.032**	1	-	**<0.001**	**<0.001**
Don't know	**0**	**<0.001**	**<0.001**	**0**	**<0.001**	**<0.001**	**<0.001**	-	0.742
Other	**0**	**<0.001**	**<0.001**	**0**	**<0.001**	**<0.001**	**<0.001**	0.742	-

Table Ea. Cochran's Q test – Preference for place of purchasing heritage ceraeal food products by all

	Supermarket	Bakery/specialty store	Farmers' market/Reko-ring	Other
Supermarket	-	**<0.001**	**<0.001**	**0**
Bakery/specialty store	**<0.001**	-	0.91	**0**
Farmers' market/Reko-ring	**<0.001**	0.91	-	**0**
Other	**0**	**0**	**0**	-

Table Fa. Cochran's Q test – Preference for place of purchasing heritage ceraeal food products by women

	Supermarket	Bakery/specialty store	Farmers' market/Reko-ring	Other
Supermarket	-	**<0.001**	**<0.001**	**0**
Bakery/specialty store	**<0.001**	-	0.897	**0**
Farmers' market/Reko-ring	**<0.001**	0.897	-	**0**
Other	**0**	**0**	**0**	-

Table Ga. Cochran's Q test – Preference for place of purchasing heritage ceraeal food products by men

	Supermarket	Bakery/specialty store	Farmers' market/Reko-ring	Other
Supermarket	-	**0.036**	**0.036**	**0**
Bakery/specialty store	**0.036**	-	1	**0**
Farmers' market/Reko-ring	**0.036**	1	-	**0**
Other	**0**	**0**	**0**	-

Table Ha. Cochran's Q test – Preference for place of purchasing heritage ceraeal food products by social science

	Supermarket	Bakery/specialty store	Farmers' market/Reko-ring	Other

Supermarket	-	0.006	0.002	**0**
Bakery/specialty store	0.006	-	0.747	**0**
Farmers' market/Reko-ring	0.002	0.747	-	**0**
Other	**0**	**0**	**0**	-

Table Ia. Cochran's Q test – Preference for place of purchasing heritage ceraeal food products by natural science

	Supermarket	Bakery/specialty store	Farmers' market/Reko-ring	Other
Supermarket	-	**0**	**0**	**0**
Bakery/specialty store	**0**	-	0.637	**0**
Farmers' market/Reko-ring	**0**	0.637	-	**0**
Other	**0**	**0**	**0**	-

Appendix 5 – Results from two-tailed preference tests (Tables)

Here follows the results from the two-tailed preference test using Table 3 in Roessler *et al.* 1978, p. 941. Significant differences are indicated by **Bold,** which means that **bold numbers** are significantly larger when the groups are compared.

Table Ja. Two-tailed preference test – The awareness of HCs, gender comparison

Response	Women	Men
Yes	76	89
No	**19**	5
Don't know	5	5

Table Ka. Two-tailed preference test – The awareness of HCs, educational background comparison

Response	Social Science	Natural Science
Yes	82	77
No	11	20
Don't know	7	4

Table La. Two-tailed preference test – The awareness of HC cultivars, gender comparison

Response	Women	Men
Einkorn	22	34
Emmer	42	50
Dinkle Spelt	81	82
Hallandwheat	14	26
Kamut	15	24
Svedjerag	21	21
Olandwheat	41	63
Don't know	5	0
None	10	8
Other	**8**	0

Table Ma. Two-tailed preference test – The awareness of HC cultivars, educational background comparison

Response	Social Science	Natural Science
Einkorn	22	28
Emmer	40	48
Dinkle Spelt	78	84
Hallandwheat	21	12
Kamut	15	19
Svedjerag	19	22
Olandwheat	49	44
Don’t know	4	4
None	10	10
Other	5	6

Table Oa. Two-tailed preference test – Ever tasted HCs?, gender comparison

Response	Women	Men
Yes	41	55
No	39	21
Don’t know	20	24

Table Pa. Two-tailed preference test – Ever tasted HCs?, educational background comparison

Response	Social Science	Natural Science
Yes	44	46
No	34	19
Don’t know	22	36

Table Qa. Two-tailed preference test – Food products that had been tasted, gender comparison

Response	Women	Men
Bread	74	80
Breakfast cereals/muesli	26	30
Porridge	20	33
Pasta	29	27
Rice	13	13
Food grains	25	23
Cookies	22	23
Don’t know	25	17
Other	4	3

Table Ra. Two-tailed preference test – Food products that had been tasted, educational background comparison

Response	Social Science	Natural Science
Bread	75	76
Breakfast cereals/muesli	33	21
Porridge	32	17
Pasta	33	24
Rice	14	12
Food grains	30	20
Cookies	21	23
Don’t know	19	26
Other	2	6

Table Sa. Two-tailed preference test – Cultivars that had been tasted, gender comparison

Response	Women	Men
Einkorn	7	7
Emmer	20	23
Dinkel	66	70
Halland wheat	3	7
Kamut	2	**20**
Öland wheat	18	**33**
Don’t know	35	23
Other	3	3

Table Ta. Two-tailed preference test – Cultivars that had been tasted, educational background comparison

Response	Social Science	Natural Science
Einkorn	11	5
Emmer	26	17
Dinkel	70	65
Halland wheat	5	3
Kamut	9	5
Öland wheat	25	20
Don’t know	30	35
Other	5	1

Table Ua. Two-tailed preference test –Where the tasted products came from, gender comparison

Response	Women	Men
Baked at home	53	40

Bakery/specialty store	41	60
Grocery store	29	30
Don’t know	28	23
Other	3	3

Table Va. Two-tailed preference test –Where the tasted products came from, educational background comparison

Response	Social Science	Natural Science
Baked at home	42	56
Bakery/specialty store	53	39
Grocery store	33	26
Don’t know	25	29
Other	5	2

Table Wa. Two-tailed preference test –Important qualities, gender comparison

Response	Women	Men
Price	38	50
Taste	73	68
Appearance	17	16
From specific brand	2	0
From Sweden	83	74
Locally produced	54	42
Organic	24	26
Environmental impact	**42**	16
Health	53	53
Don’t know	4	3
Other	4	5

Table Xa. Two-tailed preference test –Important qualities, educational background comparison

Response	Social Science	Natural Science
Price	40	42
Taste	68	75
Appearance	14	20
Specific brand	1	1
From Sweden	81	80
Locally produced	47	56
Organic	27	22
Environmental impact	33	38
Health	52	53
Don’t know	4	4

Other	4	5

Table Ya. Two-tailed preference test –Willingness to pay, gender comparison

Response	Women	Men
Same price as products made with MCs	32	37
More compared to products made with MCs	60	50
Less compared to products made with MCs	0	3
Don’t know	8	11

Table Za. Two-tailed preference test –Willingness to pay, educational background comparison

Response	Social Science	Natural Science
Same price as products made with MCs	32	35
More compared to products made with MCs	56	59
Less compared to products made with MCs	1	0
Don’t know	11	6

Table Ab. Two-tailed preference test – Preferred food products made with HCs, gender comparison

Response	Women	Men
Bread	93	92
Breakfast cereals/muesli	64	68
Porridge	50	61
Pasta	69	87
Rice	50	47
Food grains	66	61
Cookies	60	53
Don’t know	5	3
Other	2	3

Table Bb. Two-tailed preference test – Preferred food products made with HCs, educational background comparison

Response	Social Science	Natural Science
Bread	92	94

Breakfast cereals/muesli	70	69
Porridge	55	51
Pasta	81	67
Rice	56	43
Food grains	72	59
Cookies	58	53
Don’t know	4	5
Other	1	2

Table Cb. Two-tailed preference test – Preferred food shopping locations, gender comparison

Response	Women	Men
Grocery store	89	86
Bakery/specialty store	58	60
Farmers’ market	59	51

Table Db. Two-tailed preference test – Preferred food shopping locations, educational background comparison

Response	Social Science	Natural Science
Grocery store	87	90
Bakery/specialty store	63	55
Farmers’ market	61	58

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