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## **Different types of climate labels for food products**

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## **Abstract**

In this study a classification of different types of climate labels are presented.

The overall aim of this paper is to investigate the effects on emissions, consumers, producers and retailers of the introduction of two of these labeling types; a production based or a product based climate label, for food products in Sweden.

Results of a consumer survey are presented that shows a high willingness of consumers to pay extra for less GHG emitting products. Half of the surveys introduced a product label for the respondent and half introduced a percentage label.

The willingness to pay extra was higher for the percentage label than for the product label.

Consumers were also asked if they were willing to make different changes in their dietary choices to limit the GHG emissions of their personal consumption. When presented with how much GHG emissions would be reduced for different choices there was a high willingness to change eating behavior. Information on the GHG emissions of different food products would be available to consumers with a product label but not with a percentage label.

**Keywords:** Climate label, Carbon label. Willingness to pay, Behavioral change, Consumer survey, GHG emissions of food.

Front page	1
Abstract	2
Keywords	2
Content	3
List of acronyms	6
List of Tables	6
List of Graphs	6
List of figures	7
<b>1. Introduction</b>	<b>8</b>
1.1 Aim of study	8
<b>2. Background</b>	<b>10</b>
2.1 Food consumption and GHG emissions in Sweden	10
2.2 Where do the GHG emissions from Swedish food consumption come from?	11
2.2.1 Domestic emissions	11
2.2.2 Emissions from imported food, feed and fertilizers	11
2.2.3. Emissions from transports, processing, packaging and sales of food products	12
2.3 Climate Labelling	13
2.3.1 The food mileage initiatives	13
2.3.2 Co2e approach to label food products	14
2.3.2.1 Product labels	14
2.3.2.2 Production label and percentage label	16
2.3.2.3 Carbon offset label	17
2.3.2.4 “Colour-coded” label	18
<b>3 Methods</b>	<b>19</b>
3.1 The survey	19
3.2 Population and sample	19
3.3 The design and the stores sampled	20
3.4 The date and time of collection	21
3.5 Methods of analyzes	21
<b>4 Results</b>	<b>22</b>
4.1 Background data	22
4.2 respondent’s environmental profile	23
4.2.1 Question 2 “How often do you normally buy products with environmental labels (Krav, Svanen, Bra miljöval, Rättvisemärkt)”	23
4.2.2 Question 3 “How worried are you personally by the threat of climate change (the greenhouse effect)?”	24
4.2.3 Question 4 “Would it be a good idea with an environmental label showing which products and services are produced with low emissions of green house gases?”	24
4.2.4 Question 5 “Would you consider buying more climate friendly products to reduce your impact on the climate?”	25

4.2.5 Question 6: “Do you think that a climate- or environmental label is as trustworthy if it is put forward and is controlled by the producer (in stead of an independent certifier such as KRAV)?”	25
4.2.6 Question 7: “Can you as a consumer influence producers to make them display the emissions of green house gases their products have caused?”	26
4.3 Section on willingness to pay more for products with reduced GHG emissions	26
4.3.1 Question 8 version X and Y: “Salad A and salad B are exactly the same in taste and quality. Salad A cost 30 kr/kg. How much would you consider paying for salad B?”	27
4.3.2 Question 9 version X and Y: “Milk A and milk B are exactly the same in taste and quality. Milk A cost 7 kr/l. How much would you consider paying for milk B?”	28
4.3.3 Question 10 version X and Y: “Meat A and meat B are exactly the same in taste and quality. Meat A cost 139 kr/kg. How much would you consider paying for meat B?”	29
4.4 What are the characteristics of the consumers that are willing to pay more for products with reduced GHG emissions?	30
4.4.1 Willingness to pay for less GHG emitting products and age	31
4.4.2 Is willingness to pay extra for products with lower GHG emissions the same for men and women?	31
4.4.3 Is willingness to pay independent of educational background?	31
4.4.4 Is willingness to pay the same for different income groups?	31
4.4.5 Is willingness to pay for a climate label higher for the people buying products with environmental labels or not.	32
4.4.6 Is willingness to pay for a climate label higher for the people that are more worried about climate change or not?	32
4.5 Section on willingness to change behavior to reduce GHG emissions from food consumption.	32
4.5.1 Question 12 “If you chose tap water instead of bottled mineral water your emissions of Co2 are reduced with 40 g of Co2/glas. To reduce your impact on climate would you consider choosing tap water instead of bottled water?”	33
4.5.2 Question 13 “If you chose potatoes instead of rice your emissions of Co2 are reduced with 400 g of Co2/portion. To reduce your impact on climate would you consider choosing potatoes instead of rice?”	33
4.5.3 Question 14 “If you chose pork instead of beef your emissions of Co2 are reduced with 1300 g of Co2/portion. To reduce your impact on climate would you consider choosing pork instead of beef?”	34
4.5.4 Question 15 “If you chose chicken instead of beef your emissions of Co2 are reduced with 1600 g of Co2/portion. To reduce your impact on climate would you consider choosing chicken instead of beef?”	34
4.5.5 Question 16 “If you chose beans instead of beef your emissions of Co2 are reduced with 1900 g of Co2/portion. To reduce your impact on climate would you consider choosing beans instead of beef?”	34
4.6 What are the characteristics of respondents who are willing to change behavior in order to lower emissions of GHG from food?	34

4.6.1 Difference in willingness to change behavior among age groups	34
4.6.2 Difference in willingness to change behavior between men and Women	35
4.6.3 Difference in willingness to change behavior among income Groups	35
4.6.4 Difference in willingness to change behavior among educational backgrounds	35
4.6.5 Connection between behavioral change and eco-labels	35
4.6.6 Connection between behavioral change and worries of climate change	36
4.7 Question 11. “What information do you think a climate label for food should contain?”	36
4.7.1 Is willingness to pay higher for a product label than for a percentage label?	37
<b>5 Comparisons with previous studies</b>	<b>38</b>
5.1 Comparisons with previous studies on who buys environmentally labelled products	38
5.2 Comparisons with previous studies on how worried about climate change respondents are	38
5.3 Comparisons with previous studies on attitudes towards climate labelling	39
5.4 Comparisons with previous studies on willingness to pay more for climate labelled products	40
5.5 Comparisons with previous studies on which type of label respondents prefer	41
<b>6 Discussion</b>	<b>42</b>
6.1 Results of the survey	42
6.2 Other measures to limit GHG emissions from food production	43
6.3 Product or production label?	43
6.4 Rational choice, information and altruistic motives	44
6.5 Is reducing consumption of highly GHG emitting food products possible?	45
6.6 The rebound effect	46
<b>7 Conclusions</b>	<b>47</b>
<b>8 References</b>	<b>48</b>
<b>Appendix 1: Surveys</b>	
<b>Appendix 2: Tables</b>	
<b>Appendix 3: Sampled stores</b>	
<b>Appendix 4: Calculations and sources for surveys</b>	

## List of Acronyms

GHG: Green house gasses. Gasses that affect the reflection of heat from the atmosphere.

CO<sub>2</sub>e: Carbon dioxide equivalents. GHG expressed as equivalents of Carbon dioxide in climate impact 100 years from now.

LCA: Life Cycle Assessment. A method to asses environmental impact during a products whole life cycle.

PH: Activity of hydrogen ions in a liquid  $-\log_{10}\{H^+\}$

ISO: International Standards Organization

UK: United Kingdom

US: United States or fully spelled out United States of America

USA: United States of America

SLU: Statens Lantbruks Universitet, State Agricultural University

## List of tables

Table 3.1 the collection of surveys	20
Tabel 5.1 Attitudes towards a climate label, Svenskt Sigills results	40
Table 5.2 Comparison of willingness to pay between this study SLU and Svenskt Sigill	41
Table 5.3 Comparison of preferred type of label between this study and Svenskt Sigill.	41

## List of Graphs

Graph 2.1 GHG emissions resulting from private consumption in Sweden	10
Graph 4.1 Age of respondents, years	22
Graph 4.2 Gender of respondents	22
Graph 4.3 Family status of respondents	22
Graph 4.4 Education status of respondents	23
Graph 4.5 Income of respondents, SEK 2008	23
Graph 4.6 How often do respondents choose products with environmental labels?	23
Graph 4.7 How worried are respondents by the threat of climate change?	24
Graph 4.8 Respondents attitudes towards a climate label?	25
Graph 4.9 Would respondents consider buying more climate friendly products?	25
Graph 4.10 Is a climate label trustworthy if it is put forward and is controlled by the producer?	26
Graph 4.11 Can respondents as consumers influence producers	

to make them display the emissions of green house gases their products have caused?	26
Graph 4.12 Consumers willingness to pay more for 25% less GHG emitting products.	27
Graph 4.13 Consumers willingness to change behaviour in order to decrease emissions of GHG.	33
Graph 4.14 Respondents preferred type of label version X	36
Graph 5.1 Comparison between this study and SLU study; buying environmentally labelled products.	38
Graph 5.2 Comparison between this study and Demoskop study; worries of climate change.	39
Graph 5.3 Comparison between this study and Naturvårdsverket stud; attitudes towards climate label.	40

## List of Figures

Figure 2.1 Food mileage labels. UK supermarket chain Waitrose Local- and regional food labels(waitrose.com) and Us based label 99miles (99miles.org)	14
Figure 2.2 The UK based Carbon Trust label ( <a href="http://carbon-label.com">carbon-label.com</a> 3) and climate label on Sapporo bottle ( <a href="http://wordpress.com">wordpress.com</a> )	15
Figure 2.3 Korean Cool labels ( <a href="http://pcf-projekt.de">pcf-projekt.de</a> ) and The French supermarket chain Casinos climate label ( <a href="http://groupe-casino.fr">groupe-casino.fr</a> )	16
Figure 2.4 Canadian initiatives Carbonlabels.org label ( <a href="http://carbonlabels.org">carbonlabels.org</a> ) and Carboncounted.com label. ( <a href="http://sempreavantinz.co.nz">sempreavantinz.co.nz</a> )	16
Figure 2.5 Swiss climate label Climatop ( <a href="http://climatop.ch">climatop.ch</a> ) and Thailand Greenhouse Gas Management Organisation labels ( <a href="http://bangkokpost.com">bangkokpost.com</a> )	17
Figure 2.6 New Zealand label CarboNZero. ( <a href="http://premiumwines.com">premiumwines.com</a> ), three variety of US based Climate Clean label. ( <a href="http://thisisclimateclean.com">thisisclimateclean.com</a> ) and US organisation Carbonfund.org's Carbonfree label ( <a href="http://carbonfund.org">carbonfund.org</a> )	18
Figure 2.7 The scaled part of French supermarket chain Casinos climate label ( <a href="http://groupe-casino.fr">groupe-casino.fr</a> ) and the US Climate Conscious label ( <a href="http://climateconservancy.org">climateconservancy.org</a> )	18
Picture 4.1 Product label on salad	28
Figure 4.2 Percentage label on salad	28
Figure 4.3 Product label on milk package	29
Figure 4.4 Percentage label on milk package	29
Figure 4.5 Product label on beef package	30
Figure 4.6 Percentage label on beef package	30
Figure 4.7 Percentage and product label	36

# 1. Introduction

The Swedish eco-label organization Krav and Swedish conventional growers' quality label Svenskt Sigill are planning to introduce a climate label for food products in Sweden. In contrast to most other climate labeling initiatives around the world the label will be of a production type. This means that the organizations will certify products that live up to certain demands in their production, processing and packaging. The demands will be set as "best available technique" from the point of reducing green house gas, GHG, emissions. The organizations are now, 2009, in the process of specifying the rules that will be applied (klimatmarkningen.se). In the surveys a percentage label, showing a percentage reduction of GHG is used. This type of label share many features with the production label.

In other places of the world climate labeling of food have mostly taken the form of a product label. This type of label contains a figure of the amount of GHG emissions that have been emitted during the production, processing packaging and transport of a product. The consumer is supposed to make buying decisions considering this figure alongside other features of the product such as price and quality.

Both types of labels have advantages and disadvantages. This study tries to assess these labels if introduced for food products in Sweden. In doing so a consumer survey was performed among 310 costumers in South West Scanian supermarkets.

Although GHG emissions and climate change is only one of several environmental problems dealt with by sustainability science alongside with problems of social and economic sustainability this study concentrates on GHG emissions only.

## 1.1 Aim of study

The point of departure of this study is a formalised discussion of climate labelling that ***Determine what a climate label is and categorises different types of climate labels.*** This is done in section 2.3.

The overall aim of the study is to investigate:

***- What effects on GHG emissions, consumer behaviour and producers will introducing, either a product or production based, climate label for food in Sweden have?***

However this aim is a little bit broad and it will not be possible to completely fulfil this aim. It will be discussed but definite answers will not be presented.

Instead a number of specific research questions that can be answered have been formulated. This study concentrates mostly on the consumer side of the problem. The reason for this is that the consumer's willingness to pay extra for improved products or to willingness to change behaviour in order to limit GHG emissions is believed to be central for the success of a labelling scheme. The first specified research question are therefore:

***1. How strong is the willingness to pay extra for products with lower emissions with a percentage or production based climate label among consumers?***

***2. What are the characteristics of the consumers willing to pay extra for products with lower emissions?***

A percentage label is used in the survey instead of a production label. This is because this alternative was first suggested by Krav and Svenskt Sigill. This was changed during the work period of this study. A percentage label is easier for respondents to understand and therefore more useful in a survey that quickly has to introduce a new concept to respondents. The percentage label basically communicates the same type of message to consumers as a production label.

For the production label an additional effect of the label is supposedly behavioural change.

***3. What is the potential for behavioural change among consumers in order to decrease GHG emissions?***

***4. What are the characteristics of the consumers that are willing to change behaviour in order to decrease GHG emissions?***

These questions are answered in sections 4.3, 4.4, 4.5 and 4.6.

In investigating these research questions the hope is of a better understanding of the overall aim and gaining the ability to answer if a product or production label would be better?

## 2. Background

In order to make an accurate background for discussing climate labelling of food this chapter tries to describe the relative importance of GHG emissions resulting from food consumption in Sweden. A short description of the sources of these emissions is also included.

A definition of what the criteria's for a climate label are is made. To compare and discuss different types of climate labels these types are classified and described.

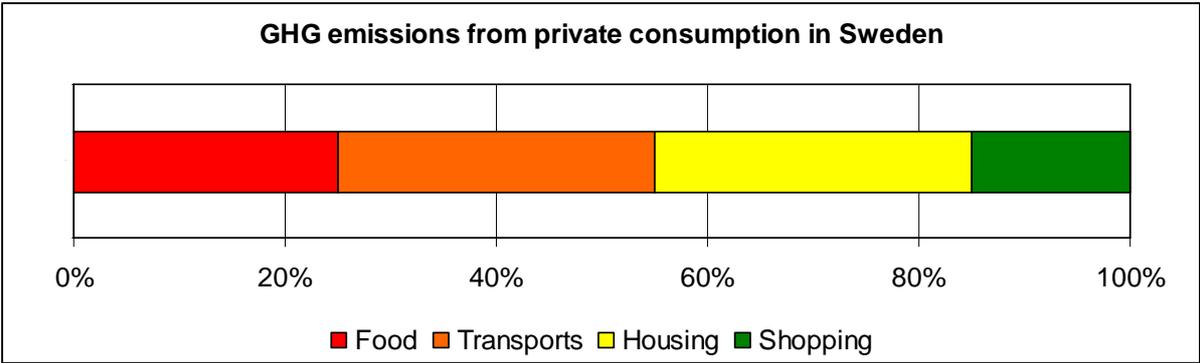
### 2.1 Food consumption and GHG emissions in Sweden

Food consumption is responsible for a large part of Sweden's green house gas emissions.

The official emissions statistics of Sweden amounted to around 5,6 tons of carbon dioxide equivalents, CO<sub>2</sub>e, per person and year in 2007 (Naturvårdsverket 1 2009) . A report by Naturvårdsverket also estimated the emissions as results of consumption within Sweden to 95 million tonnes CO<sub>2</sub>e in 2003 which translates to 10,6 tons of CO<sub>2</sub>e per capita. (Naturvårdsverket 1 2008). The question of which figure most accurately describes Swedish emissions depends on what is being discussed. As this paper is about consumption, emissions resulting from consumption, seem more relevant in this context.

Of the 95 million tons CO<sub>2</sub>e a year resulting from Swedish consumption 20% is a result of public spending while the remaining 80% is a result of private spending. Public spending is calculated as direct spending by state, district or local government organisations. Money transferred to individuals is not included. (Naturvårdsverket 1 2008).

Private spending can be divided into four main groups; housing, travelling, food and shopping. Housing and travels are the largest parts and amount to around 30% each of green house gasses, GHG, emissions resulting from private spending. The third largest part is food that amount to around 25%, in this category restaurant visits is also included. The smallest part is shopping, or buying all other types of clothes gadgets etc. This amounts to 15% of GHG emissions resulting from private spending. (Naturvårdsverket 1 2008).



*Graph 2.1 GHG emissions resulting from private consumption in Sweden*

Simple calculation then gives that eating habits are responsible for emissions of 2.1 tones of CO<sub>2</sub>e a person and year in Sweden. This is roughly the same figure as the total yearly global per capita emissions. Since these emissions according to leading scientists have to be drastically reduced in order to mitigate global warming (IPPC 2007) measures to reduce the Swedish emissions from food consumption seems to be called for

Of the emissions resulting from food consumption in Sweden meat products is responsible for the largest share, around 21%, closely followed by dairy products with around 19%. The figures are underestimated as emissions from deforestation resulting from growing soya beans used for feed are excluded from the calculations (Naturvårdsverket 2008).

## **2.2 Where do the GHG emissions from Swedish food consumption come from?**

Swedish food consumption is responsible for 19 million tonnes of CO<sub>2</sub>e emissions a year. (Naturvårdsverket 2008).

These emissions originate from national food production, processing and transports. In addition to the national sources there is also a large import of, food, feed and fertilizers that have caused emissions of GHG.

### **2.2.1 Domestic emissions**

Swedish food production emits large amounts of GHG. The emissions are estimated to be around 14 million tonnes CO<sub>2</sub>e a year (Jordbruksverket 2004:1). The main emissions are made up of methane and nitrous oxide. These gasses represent nine million tonnes of CO<sub>2</sub>e a year. Four million tonnes CO<sub>2</sub>e originates from growing crops on farm land with high carbon contents and chalking farmlands. The process of chalking farmland involves spreading calcium carbonate in order to raise the PH level of soils. (Jordbruksverket 2004:1)

Methane is emitted primarily from the digestive system of ruminants, mainly cattle, and these emissions amount to around three million tonnes CO<sub>2</sub>e a year. The other main source of methane emissions is manure handling that causes methane emissions of 350 000 tonnes CO<sub>2</sub>e a year. (Jordbruksverket 2004:1)

Nitrous oxide emitted from farmlands amount to five million tonnes CO<sub>2</sub>e a year. Emissions of Nitrous oxide increase when nitrogen fertilizers are added to soils. Nitrous oxide emissions from handling manure amounts to 600 000 tonnes of CO<sub>2</sub>e a year. (Jordbruksverket 2004:1)

Only one million tonne of CO<sub>2</sub>e originates from the fossil fuels used in the on farm production. (Jordbruksverket 2004:1)

### **2.2.2 Emissions from imported food, feed and fertilizers**

A large part of food consumed in Sweden is imported. For example in 2007 more than half of the beef consumed in Sweden were imported. (Jordbruksverket 2008:20).

Large quantities of animal feed are also imported. The largest products by volumes imported each year are; 290 000 tonnes extracted soybeans and other soy products, 230 000 tonnes rape seed by-products, 160 000 tonnes Sugar beet pulp and other by-products from sugar industry and 120 000 tonnes palm kernel expel. (Jordbruksverket 2008:6). Together with the domestically produced feed this is used in the Swedish production of 125 000 tonnes of cattle, 270 000 tonnes of pigs and 3000 000 tonnes of milk. (Jordbruksverket 2009:3)

The production of the imported food and feed products has had similar sources of GHG emissions as the Swedish produced food. The size of the emissions for comparable products

might though differ. However in the cases of import of beef, soybean products, palm oil and residues from palm kernels and some other food and feed products it can be suspected that the production has contributed to deforestation. Deforestation adds large but hard to estimate amounts of GHG.

In Brazil deforestation of the Amazon causes carbon losses equal to 1.6 billion tonnes CO<sub>2</sub>e yearly (Fernside 2005). The two main drivers of this deforestation is soybean and cattle production (Nepstad et al. 2006). Brazil is the main exporter of soy protein to Sweden. Converting one hectare of Brazilian rainforest to soy bean plantation releases 737 tonnes of CO<sub>2</sub>e during a 50 year period. Converting one hectare of Brazilian savannah into soy bean plantation releases 85 tonnes of CO<sub>2</sub>e during a 50 year period (Fargione et al. 2008). Swedish imports of soy protein of 290 000 tonnes a year uses 181 000 ha of land (Möllersten 2008).

Conversion of one hectare tropical forests to palm oil plantation releases 702 tonnes of CO<sub>2</sub>e during a 50 year period, conversion one hectare of peat land forests to palm oil plantation releases 6000 tonnes of CO<sub>2</sub>e over a 120 year period. 27% of new land converted to oil palm plantation is taking place on peat land forests (Fargione et al. 2008). Conversion of forests to palm oil plantation is currently at the rate of 2000 ha a year in South East Asia (Danielsen et. al. 2009) adding around 4,3 million tonnes of CO<sub>2</sub>e to the atmosphere each year. The Swedish imports of 110 000 tonnes of palm oil a year uses 26 000 ha of plantation (Möllersten 2008).

The main export country of beef with deforestation problems is Brazil. Meat imports from Brazil to Sweden have stopped due to EU regulations on food security since February 2008. (DN 080130)

In Sweden use of nitrogen fertilizers amounts to 167 000 tonnes of nitrogen a year. This is mostly imported. (Jordbruksverket 2008:4) Nitrogen fertilizers are commonly manufactured in a process using large quantities of natural gas. In addition to large emissions of carbon dioxide the process, in out dated facilities, also emits large amounts of nitrous oxide and methane. Average European GHG emissions for production of ammonia, the most used base for nitrogen fertilizers, are 2, 33 kilos CO<sub>2</sub>e per kilo of nitrogen. (Wood, Cowie 2004) Using this figure the production side of Sweden's nitrogen fertilizer consumption is responsible for around 400 000 tonnes of CO<sub>2</sub>e a year. In the usage stage it is also a large contributor to nitrous oxide emitted from farmlands (se 2.2.1).

### **2.2.3. Emissions from transports, processing, packaging and sales of food products**

In addition to the GHG emissions in the production of food there are also emissions from the transports, processing, packaging and sales of food products.

In trying to assess the share of transports in GHG emissions of food consumption an approximation have been done based on available data.

Total emissions of busses, lorries and light weight lorries in Sweden are around 7 million tonnes CO<sub>2</sub>e a year. (Naturvårdsverket 3, 2009) Of this around 15% seems to be transports of food and agricultural imputes. (SIKA 2009). Emissions from imports and exports by air and sea amount to 3,6 million tonnes CO<sub>2</sub>e a year. (Naturvårdsverket.3 2009) Around 13% of these transports seem to be of food items. (SIKA 2009). A crude calculation of the GHG emissions that transports of Swedish consumed food is the origin of is around 1,5 million

tonnes of CO<sub>2</sub>e a year. This is less than 8% of the total emissions from the Swedish food consumption. This figure is an approximation but could be used for ball parking.

Processing and packaging of food products also have GHG emissions. Swedish food industry reports emissions of around 172 000 tonnes of CO<sub>2</sub>e a year. (Naturvårdsverket 2 2008) This is relatively low compared to the production phase. Emissions resulting from packaging and food sales are also relatively small and are not estimated here.

## **2.3 Climate Labelling**

Numerous large and small food manufacturers and retailers around the world are working with initiatives to reduce their GHG emissions. Most often this is done within the paradigm of ecological modernisation with a clear goal of saving money. In many cases the investigations done and measures taken in these efforts are also marketed towards consumers. (Paulavets 2008) In few cases this work has been formalised to an actual labelling scheme. What is then a labelling scheme? In this study the definition used that in order to be a labelling scheme there has to be:

- Marketing towards consumers with labels on the product packages.
- Some type of standards or rules that has to be fulfilled in order for a product to be labelled
- That the credibility of the label is certified by another organisation than the producer. This could be government organisations, specific certifying organisations, business organisations or supermarket chains. Basically this is the same definition that is categorized as an environmental label of the type 1 by the international standards organisation, ISO (Horne 2009).

To be a climate label the labelling scheme have to address the problems of climate change as one of their main rationale.

The characteristics of the different types of organisations issuing the labelling schemes also deserve attention but this will not be discussed in this study.

To describe what is happening in the field of climate labelling different types of initiatives are described below.

### **2.3.1 The food mileage initiatives**

An early initiative to bring down the GHG emissions of food consumption was based within the concept of food mileage. This idea and its connection to the climate change debate lies in the belief that transportation is a main source of GHG when it comes to food production. The concept also deals with other environmental problems caused by food transports as well as food safety and food quality issues. From the start the initiatives main argument has though been to bring down GHG emissions by cutting food miles. (Paulavets 2008)

The food mileage concept was first launched in the UK with the food mileage report (Paxton 1994). By measuring the distance the food has travelled a food mileage figure is constructed.

There has been fierce critic against the validity of the food mileage idea. It has been accused of not taking in account the type of transport, not taking into account the efficiency of the transports and being protectionist (Paulavets 2008). It has also been accused of being harmful to the exports of developing countries (Brenton et al. 2009).

From a GHG point of view the food mileage concept is also very doubtful. As mentioned in section 2.2 transportation is only responsible for around 8% of GHG emissions during the life cycle of an average food product. In fact there are several examples where it has been shown that food products imported from distant countries are in fact far superior to native production from a GHG perspective. There are several such examples described. (Saunders et al. 2006 Lagerberg Fogelberg Carlsson-Kanyama 2006, Carlsson-Kanyama 1998).

Examples of food mileage labels are presented in picture 2.1



*Figure 2.1 Food mileage labels. UK supermarket chain Waitrose Local- and regional food labels(waitrose.com) and Us based label 99miles (99miles.org)*

### **2.3.2 Co2e approach to label food products**

There seems to be a growing agreement that GHG emissions of food are best measured by looking at CO<sub>2</sub>e emissions and not other indicators. Most types of initiatives use some type of a life cycle assessment to do this. Life Cycle Assessment, LCA, is a method of looking at a product's environmental impact during its entire life span from extraction of raw materials to disposal. (Roy et al. 2009) The research and calculations required behind LCAs are costly and contain a high level of uncertainty.

#### **2.3.2.1 Product labels**

Product labels are labels that put a figure on the CO<sub>2</sub>e emitted from a product. This figure can be expressed in different ways. It can be expressed as the actual emissions of the specific product or the emissions of for example a kilo of the specific product. The figure presented is usually the result of some type of LCA study. However a LCA study always has boundaries and these as well as the calculation methods can vary a lot. Another problem is that the data collected in many cases are very uncertain and tend to vary a lot. There are currently several national and international projects trying to come up with common guide lines of how to calculate the figure of CO<sub>2</sub>e for different products (carbon-label.com 1. sik.se).

The advantage of the product label approach is that it gives the consumer a non biased, comparable and relevant figure of climate impact of a product. This enables the consumer to choose not only between more or less emitting products within the same product segment but also to choose lower emitting alternatives between product categories.

The main critic is that against this type of label is that a figure is meaningless when not relating to anything. It is also said that consumers can not understand this type of information. A survey at Tesco, the leading UK supermarket chain that introduced a trial with climate product labels in 2008, also shows that consumers have a low understanding of the

information given by the climate label. (Buisnessgreen.com 2008) On the other hand the information presented in a product label is supposed to be compared to equivalent information of other products. Although Tesco announced in 2007 that they would climate label all their approximately 70 000 products (Boardman 2008). Tesco still is just labelling only 20 products. Of these seven are food products. Comparisons between so few products are naturally difficult. 20 products are also too few to give the consumers reason to investigate and try to learn how the label works. Only a large scale, real life trial could give a full answer to if consumers can handle this type of label or not.

Another critic of this type of label is that the information might yet be too uncertain to start presenting a figure for consumers. (Boardman 2008)

There seems to be a low interest from producers to join existing product labelling schemes. The carbon trust is the organisation that labels the 20 products that Tesco has labelled, and also Walker crisps and Innocent smoothies. The Carbon Trust has had several large producers signing up for letting the Carbon trust do LCAs of their products. Examples of such producers are, Coca Cola UK, Cadbury Sweppes UK, Müller Dairy UK, Scottish & Newcastle UK, British Sugar and PepsiCo USA (carbon-label.com 2). Neither of these has though chosen to market the results through a product label. In fact no new companies have signed up to use the label since the mentioned companies did.

In 2008 the Swedish leading supermarket chain Ica made GHG LCAs of 100 of their own brand products (SP.se 2009). Ica has chosen not to reveal the results of these LCAs.

Leading chicken producer Kronfågel as well as 5 grain products from Ceralia has also done LCAs on their products. They have published the results on their homepages but are not marketing them on product packages. (Lantmannen.com 1 Lantmannen.com 2)

One theory of why producers are hesitant to join product labelling schemes might be that they are not seen as commercially viable. Low GHG emitting food products are in general less costly than high emitting. By making cheap food products more asked for sales value would go down. In order to increase turnover rates and profit margins increasing sales value is a main business goal among producers and retailers of food.

Below are a few examples of climate labels of the product type.

working with  
the Carbon Trust



**Figure 2.2** The UK based Carbon Trust label ([carbon-label.com](http://carbon-label.com) 3) and climate label on Sapporo bottle ([wordpress.com](http://wordpress.com))



Figure 2.3 Korean CooL labels ([pcf-projekt.de](http://pcf-projekt.de)) and The French supermarket chain Casinos climate label ([groupe-casino.fr](http://groupe-casino.fr))

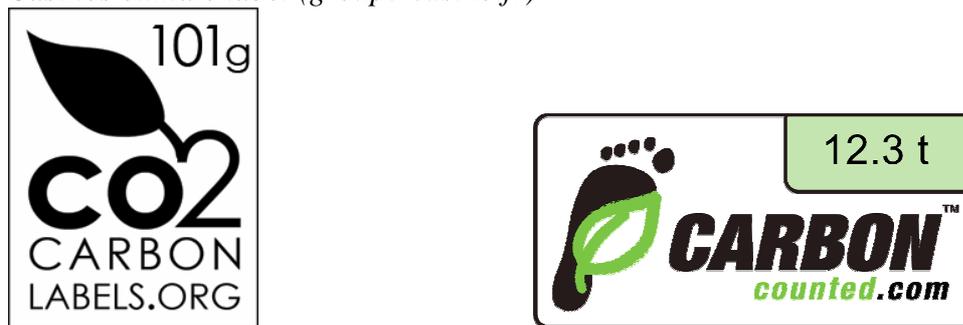


Figure 2.4 Canadian initiatives Carbonlabels.org label ([carbonlabels.org](http://carbonlabels.org)) and Carboncounted.com label. ([sempreavantinz.co.nz](http://sempreavantinz.co.nz))

### 2.3.2.2 Production label and percentage label

A production label is a label certifying conditions for the production of a product that is in some respect “better” than conventional production. In the case of carbon labelling this could be done by certifying that the production is emitting less GHG than conventional production. The labelling scheme that will be introduced by Krav and Svenskt Sigill is using a best available technique approach setting up a series of rules for production that will make GHG emissions lower. ([klimatmarkningen.se](http://klimatmarkningen.se)) The production approach is the same type that is already used by most existing environmental- fair trade- and eco labelling schemes. In this case it will be used for reducing GHG emissions.

An advantage of this type of label is the low transaction cost as a set of rules can be achieved without having to perform a full LCA of every product that is to be labelled.

There is no existing example of a climate production label.

A percentage label is one that labels products that reduce emissions of GHG to a certain percentage compared to conventional production. Some type of LCAs has to be performed in order to assure that emissions have really been reduced to a sufficient degree. In communicating with consumers a percentage label is very similar to the production label and they share several advantages and disadvantages.

Below are examples of climate labels using the percentage approach:



**Figure 2.5** Swiss climate label *Climatop* ([climatop.ch](http://climatop.ch)) and Thailand Greenhouse Gas Management Organisation labels ([bangkokpost.com](http://bangkokpost.com))

Advantage of these types of labels is that they appear easy for consumers to understand

Another advantage for the production and percentage labels is that they are commercially viable. In contrast to the product label a production or percentage label increase sales values of labelled products. This might make it possible to increase turnover rates and profit margins for producers and retailers.

The critique against production and percentage labels are that they do not enable consumers to compare emissions between different product categories.

Another critique is that in order for consumers to have something to compare with it preferably is less than a majority of all products in a category that is labelled. Otherwise the whole marketing idea of selling a better product falls. In the case of Svanen the optimal market share is thought to be 30%. (Nilsson 2005) There is no reason to believe that a higher market share should be optimal for a climate label of the production or percentage type. This means that the majority of production will not be affected by the improvements made to fulfil the demands of the labelling scheme.

In this study a production label is mainly discussed but a percentage label used in surveys. This might seem confused but in communicating towards consumers both types of labels work very similar. They show products that have lowered GHG emissions.

### 2.3.2.3 Carbon offset label

Carbon offset initiatives offer the alternative for companies to evaluate their GHG emissions and then offset them by various types of carbon offset projects. Usually to full fill the demands of the label an LCA of a product has to be done and then some emissions have to be lowered. All remaining emissions have to be offset by buying shares of carbon offsetting projects. The offsetting projects seem often seem to be the main activity of the companies and organisation working in the field of carbon offset labels. ([thisisclimateclean.com](http://thisisclimateclean.com). [carbonfund.org](http://carbonfund.org). [carbonzero.co.nz](http://carbonzero.co.nz))

Positive things about carbon offset labels are that the impact of labelled products on GHG emissions could hardly be lower. It also presents very strong marketing opportunities for participating producers.

On the negative side is that this type of label never can become anything more than a marginal phenomena involving high price products. For lower priced products the effect on price would be to strong. If many producers joined the price of shares in offsetting projects would also go up.

One can also question if carbon offsetting is a good way to fight GHG emissions. The individual offsetting projects can also become criticised.



**Figure 2.6** New Zealand label *CarboNZero*. ([premiumwines.com](http://premiumwines.com)), **three varieties of US based Climate Clean label**. ([thisisclimateclean.com](http://thisisclimateclean.com)) and **US organisation Carbonfund.org's Carbonfree label** ([carbonfund.org](http://carbonfund.org))

#### 2.3.2.4 “Colour-coded” label

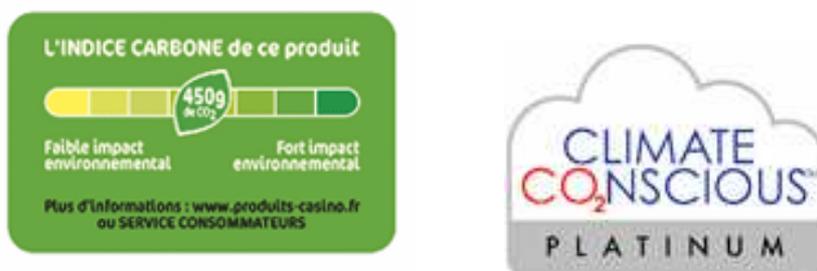
Another strategy for climate labelling is to try and create some type of grading of how good a product is from a climate perspective. This could be communicated to consumers for example by an easy to understand “colour code” of environmental performance.

The problem is how to decide on what grounds a product is good respectively a bad from a climate perspective. When it comes to food items products have very different nutritional content so a simple grading according to emissions would not work. A steak could not be compared with a carrot. Somehow products would have to be categorized before they are colour coded.

The main advantage of the colour code label is that it is easy for consumers to understand. At the same time it makes comparisons between different product types within the same category possible.

The main weakness of this scheme is how to come up with the categories (Boardman 2008). This could be done in numerous ways and each possible option could be criticised. It could also be questioned if comparisons between categories should be made or not. How should they in that case be done?

Two examples of colour coded labels are presented below of which one is the casino label that also contain a product labelling element.



**Figure 2.7** The scaled part of French supermarket chain *Casinos climate label* ([groupe-casino.fr](http://groupe-casino.fr)) and the **US Climate Conscious label** ([climateconservancy.org](http://climateconservancy.org))

### **3 Methods**

The survey and methods of analyses is briefly described in this section.

#### **3.1 The survey**

The survey used for this investigation tries to give approximations of two different variables and to further examine the nature of these. The variables are willingness to pay extra for products that emit 25% less green house gas, GHG, and willingness to change eating behaviour so that less GHG is emitted if given more information.

The respondents are also asked witch type of label they would prefer.

The survey is divided into four different sections. The first one deals mainly with information that is suspected to be determinants of willingness to pay extra for less emitting products and willingness to change eating behaviour.

The second section deals with respondent's willingness to pay for 25% less GHG emitting products. Three different products are tested; salad, milk and beef.

There are two versions of the survey, one, referred to as the Y version, presented a percentage label in the second section. In this version respondents were asked how much extra they are prepared to pay for products labelled with stickers saying they are 25% less GHG emitting.

In the other version, the X version, respondents were also asked how much more they are prepared to pay for products that are 25% less GHG emitting. In this version both products are labelled with stickers that represent emissions in kg of Co<sub>2</sub>e per kg of product.

The third section deals with willingness to change behaviour in order to reduce personal consumption related carbon emissions. The options for change investigated are from bottled water to tap water, from rice to potatoes, from beef to pork, from beef to chicken and from beef to beans.

The two versions of the studies are attached in appendix 1.

#### **3.2 Population and sample**

The population of interest for this study is Swedish food consumers. This group is not really the entire Swedish population but more the Swedish population that has influence on food purchases. This group is approximated to be the ones found in food stores shopping although there might be people who seldom shop for food but nevertheless have high influence of decision on what to eat.

Although the survey have been collected in a geographically limited area in South-western Scania the results will supposedly be comparable to the national population as two of the questions in the first section have been used with almost the same wording in national surveys. One question has also been used with the same wording in a consumer survey in the Uppsala area.

The thought behind this is that comparisons of the results will reveal biases due to low rate of response and the local sampling

A large enough sample size for meaningful analysis, 310 samples, was collected.

In this type of survey any type of random sampling of consumers would have been impossible. When shopping for food most people feel that they don't have time to answer a survey. The incentive for people in general to answer surveys is low unless some form of compensation is offered.

When collecting this survey respondents initially were offered carrot sticks as a reward to answer the survey. As this was not much appreciated these were later changed to Dumle kolor, a popular candy. In a few stores there was no possibility to offer anything eatable. In two of these cases, Willys Malmö and Coop Malmö femman lotter, a lottery ticket to the approximate value of 0,5 € was offered instead which greatly increased the rate of respondents. Although this might have changed the composition of the sample there was no immediately recognizable change in the results from these stores.

All in all the response rate was very low. It was meaningless to measure response rate as the number of costumers that, when asked, did not want to participate, was greatly outnumbered by those ones choosing another route around the store to avoid being asked. The answering rate was clearly very different from store to store and could be approximated to between a few percent and up to 20%. Again the three questions copied from other studies are useful to try and assess the bias in the results the low response rate has lead to.

### 3.3 The design and the stores sampled

310 surveys were collected in 5 cities and from 3 of the major supermarket chains. The reason for the large amount of sampled stores and cities were not primarily to be able to look for differences between these but to get as large as possible variety of respondents.

In all shops but one all or a few more surveys than planned were collected. The distribution of the samples on the different shops is shown by table 4.2.

	Lund	Malmö	Staffanstorp	Eslöv	Löddeköpinge	Sum
Ica	22	21	19	20	21	103
Willys	22	20	21	0	42	105
coop	20	20	20	42	0	102
Sum	64	61	60	62	63	310

*Table 3.1 the collection of surveys*

The Ica supermarket chain is Sweden's largest chain with a market chare of 50% (dlf.se). Ica is a cooperative of store owners. The chain consists of both large and smaller shops and do not have any specific low price profile stores.

Coop is the second largest with a market chare if 21% (dlf.se). Coop is cooperatively owned by consumers. The chain have stores in different sizes from local to giant and stores also have different prize profiles with Coop Extra profiled as low price stores. Axfood, the owner of supermarket chains Willys and Hemköp have a market share of 16% (dlf.se). The chain sampled in this survey, Willys, have a low price profile.

Appendix 2 contains more detailed information and descriptions of the sampled stores.

### **3.4 The date and time of collection**

The data was collected during the spring of 2009 between the 12th of February and 7th of March. To get as representative a sample as possible the overall goal was to collect mainly during the best shopping hours. Most people shop for food after they finished work and on early evenings. For this reason the goal was to sample most stores during this time of the day. This was not done in a systematic way. In the final result the costumers doing their shopping on day time and early afternoons seems to be slightly overrepresented.

### **3.5 Methods of analyzes**

The data has been analyzed using only non parametric tests. The advantage of this is that none of the assumptions that are prerequisites of parametric tests had to be done. The marginal loss in power of the tests is considered a minor disadvantage in comparison of doing assumptions that might not hold. The most appropriate non parametric tests have been applied. (Sieglar 1956)

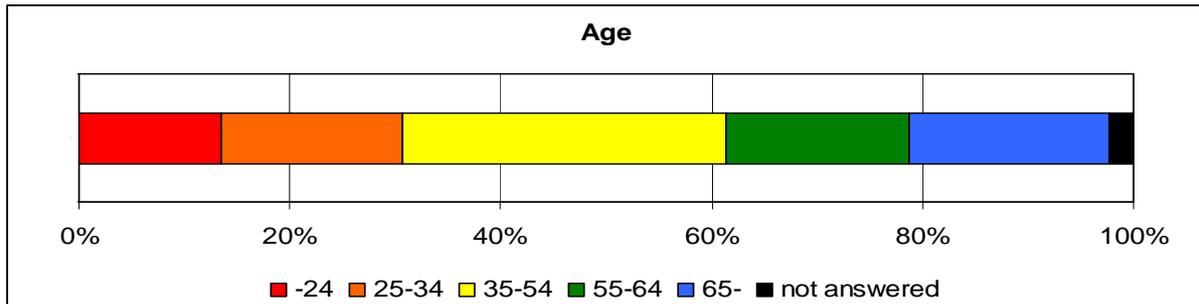
## 4 Results

In section 4 the basic results of the survey will shortly be presented.

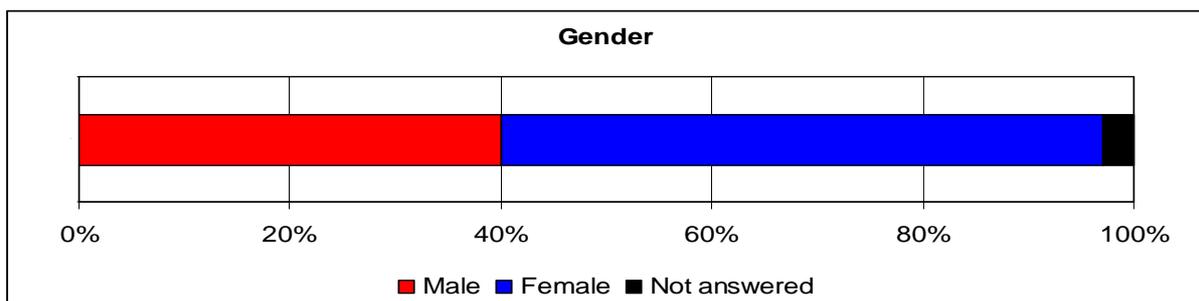
For full results from the survey tables are presented in appendix 3

### 4.1 Background data

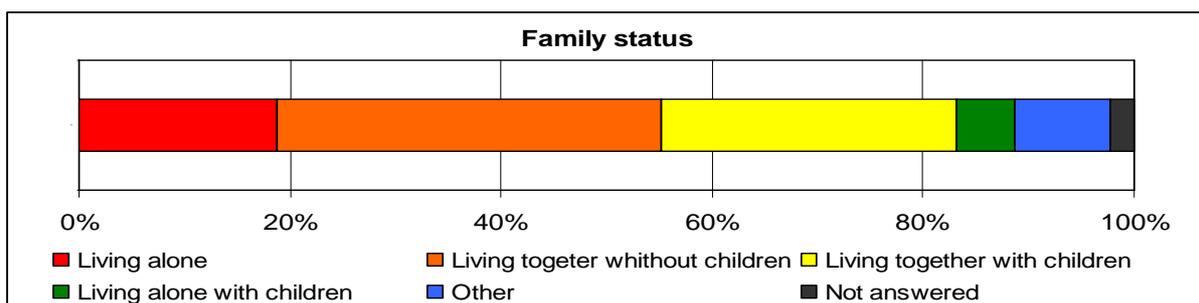
Although these are the last section of the survey the results for background data is briefly presented first. The questions 17-21 are different demographic and economic background variables.



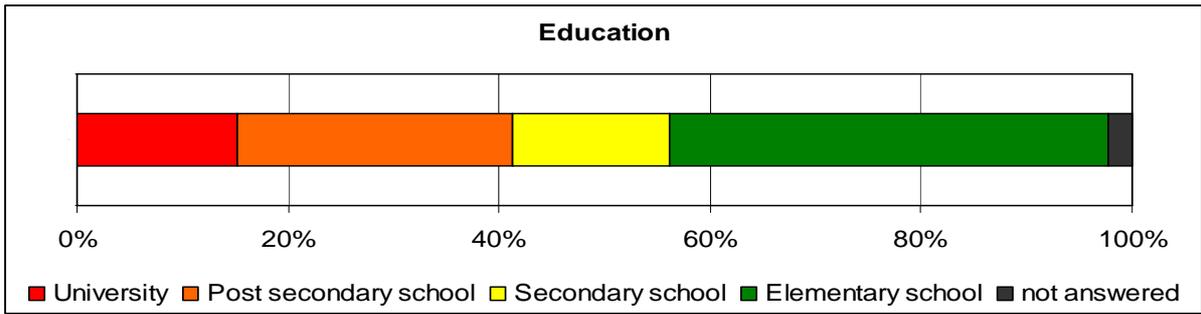
*Graph 4.1 Age of respondents, years*



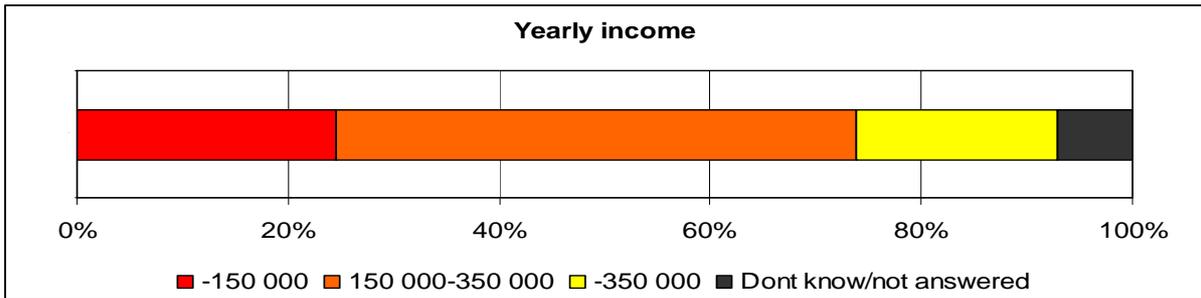
*Graph 4.2 Gender of respondents*



*Graph 4.3 Family status of respondents*



**Graph 4.4 Education status of respondents**



**Graph 4.5 Income of respondents, SEK 2008**

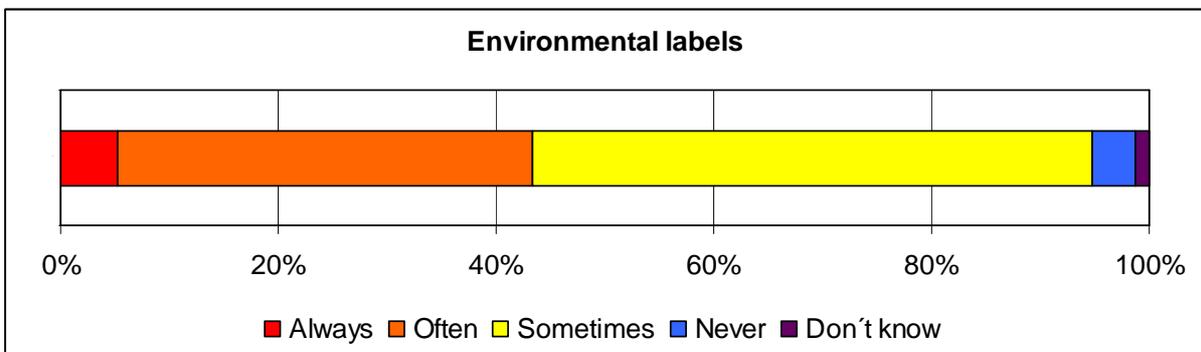
## 4.2 respondent’s environmental profile

This section contains results of questions that are suspected to influence willingness to pay more for less GHG emitting products and willingness to change behaviour to lower GHG emissions

### 4.2.1 Question 2 “How often do you normally buy products with environmental labels (Krav, Svanen, Bra miljöval, Rättvisemärkt)”

In order for comparisons to be possible this question is copied from a consumer survey about climate labelling performed as a thesis work at SLU in Uppsala in 2007. (Toivonen 2007). The answers of this question are supposed to measure how often the consumer buys environmentally labelled products.

38% of the respondents answers that they often buy environmentally labelled products. The answering alternative “sometimes” has been chosen by 51% of respondents.



**Graph 4.6 How often do respondents choose products with environmental labels?**

As the question on who buys environmentally labelled products is discussed later tests was run to see what groups were significantly more inclined to do so.

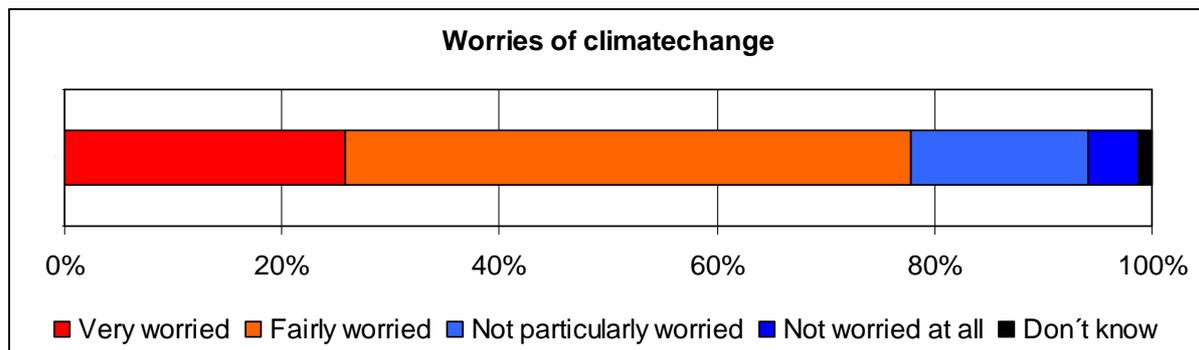
Age showed not to be of significant importance ( $\chi^2 = 5,67$   $df=4$ ). Women were significantly more inclined to buy environmentally labelled products than men ( $z = 2,05$   $p<0,0404$ ) as well as university educated ( $\chi^2 = 18,08$   $df=3$ ,  $p<0,001$ ). Income did not show to have any significant effect on buying environmentally labelled products ( $\chi^2 = 1,84$   $df=2$ ).

Women and university educated people are more inclined to buy environmentally labelled products

#### 4.2.2 Question 3 “How worried are you personally by the threat of climate change (the greenhouse effect)?”

In order for comparisons to be possible this question is copied from an E-mail and phone survey about climate labelling performed by Demoskop in 2007. (Demoskop 2007). The question measures how strong worries the respondents experience in respect to the treats of climate change. These worries are supposedly the motivation for any action taken by respondents.

26% of respondents have replied that they are feeling “very worried” about climate change. 52% of respondents have chosen the alternative “fairly worried”. 16% are “not particularly worried” and 5% are not worried at all.

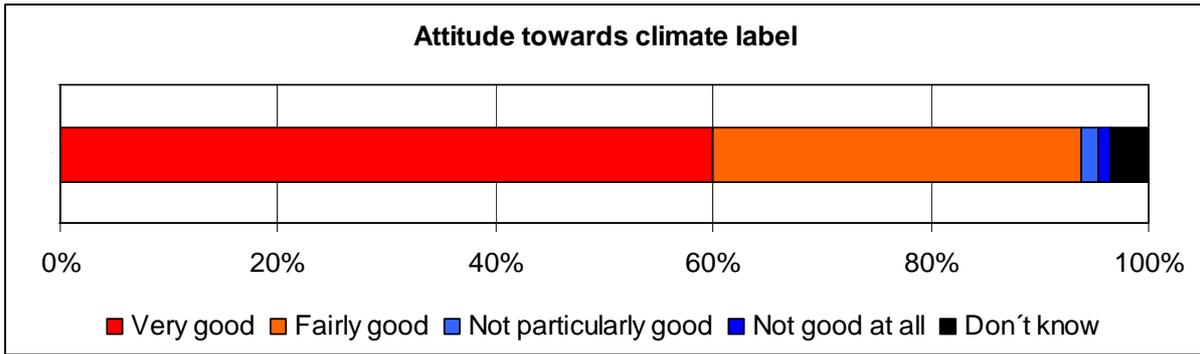


Graph 4.7 How worried are respondents by the threat of climate change?

#### 4.2.3 Question 4 “Would it be a good idea with an environmental label showing which products and services are produced with low emissions of green house gases?”

In order for comparisons to be possible this question is copied from a telephone survey about the public’s attitudes towards climate change performed by ARS for Naturvårdsverket in 2008 (Naturvårdsverket 3 2008).

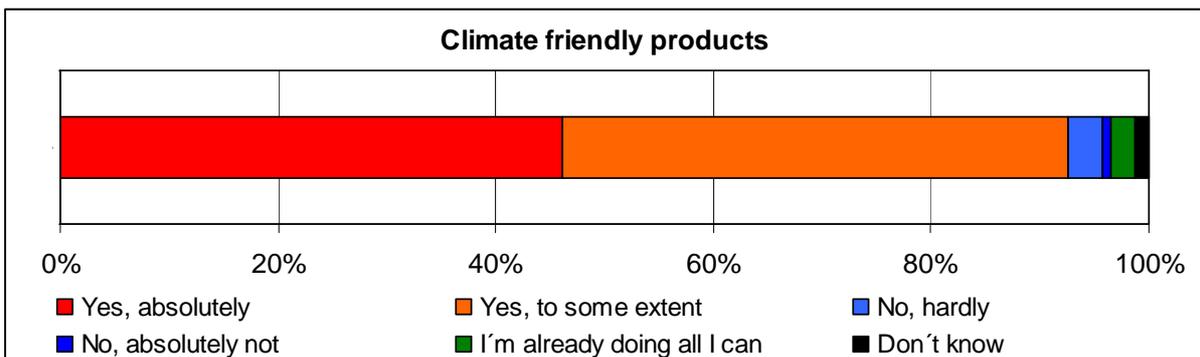
It seems like consumers think such a labelling scheme is a “very good” idea. At least to the 60% of respondents who have chosen this alternative. In addition 34% of respondents think it is a “fairly good” idea.



**Graph 4.8 Respondents attitudes towards a climate label?**

**4.2.4 Question 5 “Would you consider buying more climate friendly products to reduce your impact on the climate?”**

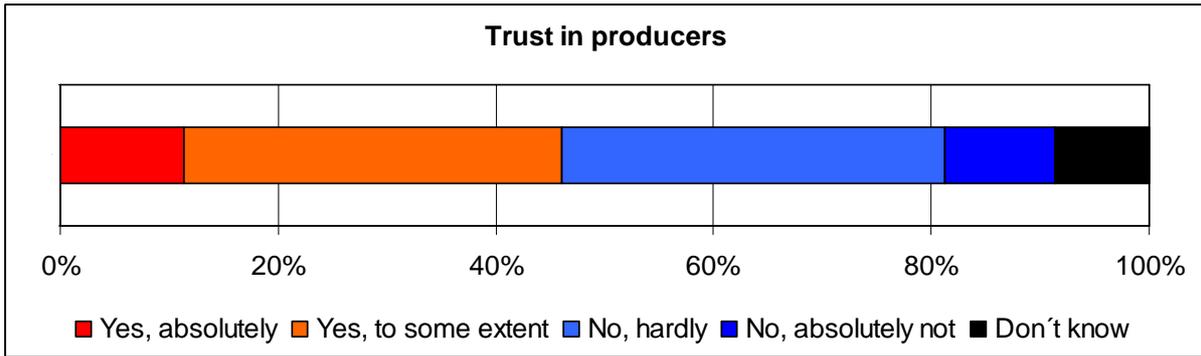
Question measures the interest of the consumer’s in changing consumption behaviour. The willingness to change consumption behaviour seems quite high. 46% answers “yes, absolutely” while another 46% are more hesitant and chose the answering alternative “Yes, to some extent”.



**Graph 4.9 Would respondents consider buying more climate friendly products?**

**4.2.5 Question 6: “Do you think that a climate- or environmental label is as trustworthy if it is put forward and is controlled by the producer (in stead of an independent certifier such as KRAV)?”**

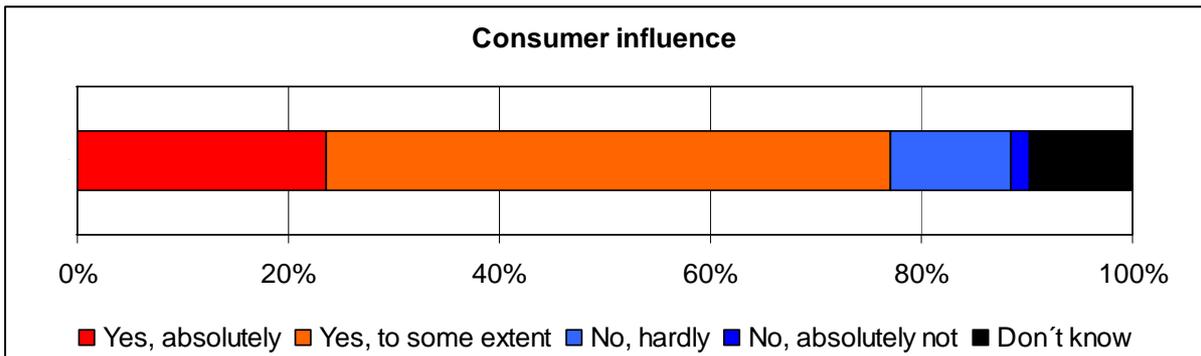
This question is meant to measure the respondents trust in producers as certifiers of an environmental label. Both the answering alternatives “Yes, to some extent” and “No, hardly” have been chosen by 35% of respondents.



**Graph 4.10** *Is a climate label trustworthy if it is put forward and is controlled by the producer?*

**4.2.6 Question 7: “Can you as a consumer influence producers to make them display the emissions of green house gases their products have caused?”**

This question is meant to measure the respondent’s views of their consumer influence. 24% of respondents have good faith in their consumer influence and have answered this question with “Yes, absolutely”. The answering alternative “Yes, to some extent” has been chosen by 54% of respondents.



**Graph 4.11** *Can respondents as consumers influence producers to make them display the emissions of green house gases their products have caused?*

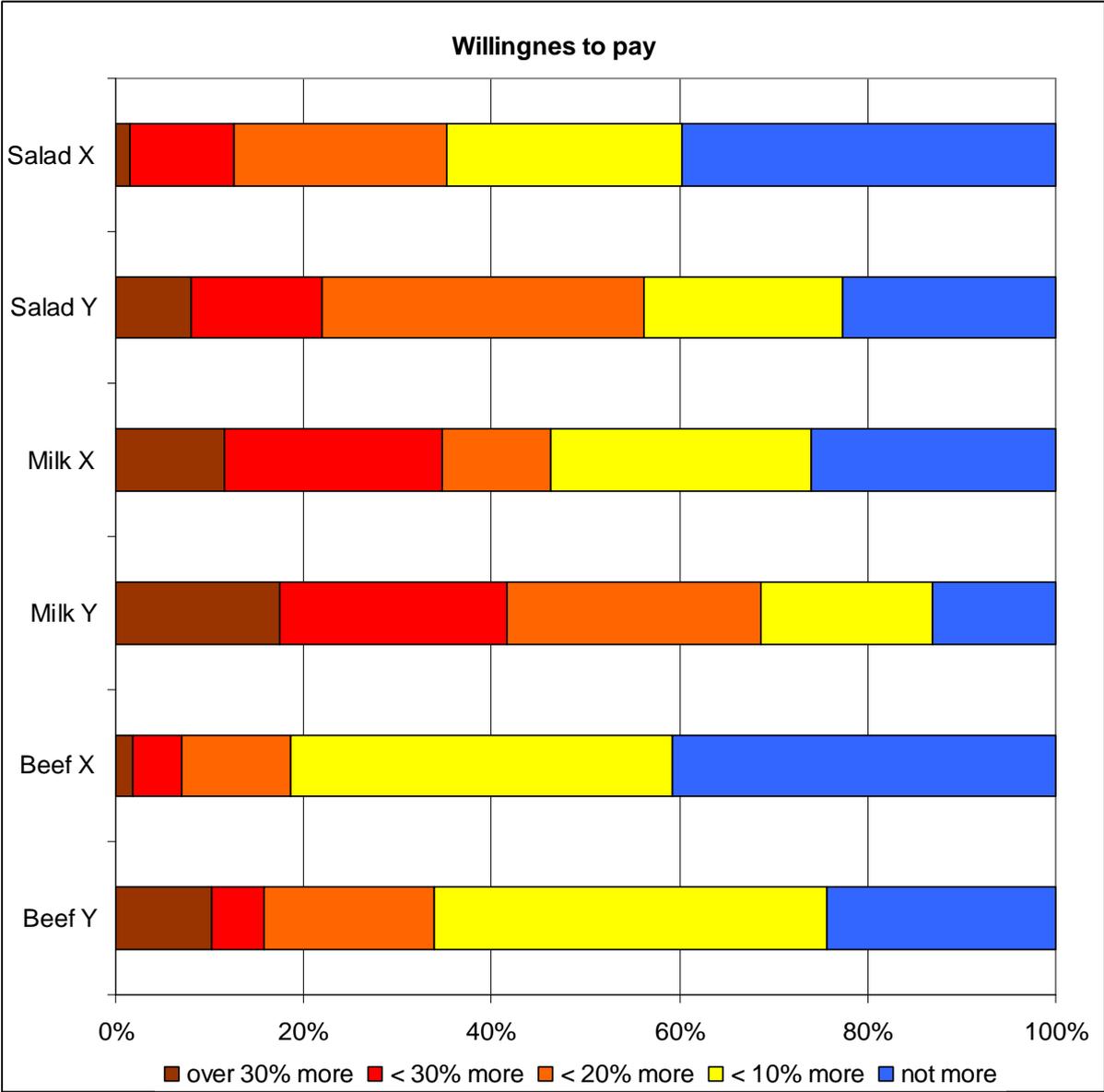
**4.3 Section on willingness to pay more for products with reduced GHG emissions**

This section of the questionnaire was divided so that every other respondent have answered the X version of the questionnaire and every other have filled in the Y version. The versions are different in that the X version presents identical products labelled with a climate product label. Respondent is informed in an introducing text that this is a possible way to label products and asks whether they are willing to pay more for a less emitting product.

The Y version of the survey presents a percentage based label with one product without any label and another with a label saying the production of this product has emitted 25% less Co2e. Respondent is informed in an introducing text that this is a possible way to label food products and asks whether they are willing to pay more for a product with such a label. Further more in the X version of the survey these questions are placed after the section on willingness to change behaviour. The section on willingness to change behaviour contains additional information that respondents filling in the X version might use filling in this section.

The reductions in emissions displayed on the product labels of the X version are 25%. This correspond to the 25% reduction in the Y sections production labels. This survey uses real examples of products and real prices as well as a brief explanation of the label that they are asked to pay extra for. Neither of this has been done in previous studies. Because of this design the results are more solid than those from previous studies.

The results from these questions are illustrated in graph 4.12. Respondents that did not answer, did not know what to answer or did not use the product asked to substitute are not accounted for in the graph. Se appendix 3 for complete results in tables.



Graph 4.12 Consumers willingness to pay more for 25% less GHG emitting products.

**4.3.1 Question 8 version X and Y: “Salad A and salad B are exactly the same in taste and quality. Salad A cost 30 kr/kg. How much would you consider paying for salad B?”**

In the X version of the question the salad is marked with a product label showing how much Co2e/kg Salad has been emitted. Salad B’s emissions are 25% lower than salad A’s.



Salad A.



Salad B.

**Figure 4.1 Product label on salad**

36% of the respondents who buy salad are not willing to pay more for the less emitting salad. 23% are willing to pay up to 10% more and 20% are willing to pay up to 20% more. 10% are willing to pay up to 30%.

In the Y version of the question salad A is unmarked and salad B is marked with a label saying emissions of Co<sub>2</sub>e have been reduced by 25%.



Salad A



Salad B

**Figure 4.2 Percentage label on salad**

20% of the respondents who buy salad are not willing to pay more for the less emitting salad. 19% are willing to pay up to 10% more and 31% are willing to pay up to 20% more. 13% are willing to pay up to 30%.

**4.3.2 Question 9 version X and Y: “Milk A and milk B are exactly the same in taste and quality. Milk A cost 7 kr/l. How much would you consider paying for milk B?”**

In the X version of the question the milk carton is marked with a product label showing how much Co<sub>2</sub>e/l milk have been emitted. Milk B’s emissions are 25% lower than milk A’s.



**Milk A.**

**Figure 4.3 Product label on milk package**



**Milk B.**

Of the consumers admitting to buy milk 25% are not willing to pay more for the less emitting variant of this product. 26% are willing to pay up to 10%. 11% are willing to pay up to 20% more and 22% are willing to pay up to 30% more.

In the Y version of the question milk A is unmarked and milk B is marked with a label saying emissions of Co2e have been reduced by 25%.



**Mjöl A.**

**Figure 4.4 Percentage label on milk package**



**Mjöl B.**

Of the consumers admitting to buy milk only 12% are not willing to pay more for the less emitting variant of this product. 16% are willing to pay up to 10% more. 24% are willing to pay up to 20% more. 22% are willing to pay up to 30% more. 16% are willing to pay more than 30% extra for the 25% less GHG emitting milk.

#### **4.3.3 Question 10 version X and Y: “Meat A and meat B are exactly the same in taste and quality. Meat A cost 139 kr/kg. How much would you consider paying for meat B?”**

In the X version of the question the meat package is marked with a product label showing how much Co2e/kg meat have been emitted. Meat B’s emissions are 25% lower than milk A’s.



Meat A



Meat B

Figure 4.5 Product label on beef package

Of the consumers admitting to buy beef 37% are not willing to pay more for the less emitting variant of this product. Another 37% are willing to pay up to 10% more. 10% are willing to pay up to 20% more.

In the Y version of the question meat A is unmarked and meat B is marked with a label saying emissions of Co2e have been reduced by 25%.



Meat A



Meat B

Figure 4.6 Percentage label on beef package

Of the consumers admitting to buy beef 23% are not willing to pay more for the less emitting variant of this product. 39% are willing to pay up to 10% more. 17% are willing to pay up to 20% more and 5% are willing to pay up to 30% more. 10% are willing to pay more than 30% more for the 25% less GHG emitting beef.

#### 4.4 What are the characteristics of the consumers that are willing to pay more for products with reduced GHG emissions?

In order to analyse the results of willingness to pay more for products causing 25% less GHG emissions the results of the three tested products are tested against different variables.

An index of willingness to pay is also created to test the overall willingness to pay. The index is created by adding the results from question 8 to 10. The answering alternative “not more” was given 1 points, the alternative “not more than 10%” was given 2 points, the alternative

“not more than 20%” was given 3 points, the alternative “not more than 30%” was given 4 points and the alternative “more than 30%” was given 5 points. The points from the questions 8, 9 and 10 were then added together creating an index of willingness to pay with 15 indicating the highest willingness to pay more for 25% less GHG emitting products and 3 being the lowest willingness. Those who did not answer all questions or answered “don’t know” or those that don’t buy one or more of the products tested in one or more of the questions have been excluded from the index. This left 214 “full” answers to be analysed by a willingness to pay index.

#### **4.4.1 Willingness to pay for less GHG emitting products and age**

To see if willingness to pay extra for products with lower GHG emissions is dependent on age Kruskal-Wallis tests were used.

There was weak support for the theory that some age groups would have a higher willingness to pay extra for products with lower GHG emissions. (Sallad;  $\chi^2=5,13$ ,  $df=4$ . Milk;  $\chi^2=9,33$ ,  $df=4$ ,  $p<0,1$ . Beef;  $\chi^2=5,71$ ,  $df=4$ . Index;  $\chi^2=8,06$ ,  $df=4$ ,  $p<0,1$ )

#### **4.4.2 Is willingness to pay extra for products with lower GHG emissions the same for men and women?**

To see if women are prepared to pay extra for products with lower GHG emissions Mann-Whitney U-tests were used.

The test found no support for the theory that women would have a higher willingness to pay extra for products with lower GHG emissions. (Sallad;  $z=0,184$ . Milk;  $z=0,443$ . Beef;  $z=0$ . Index;  $z=0,287$ )

#### **4.4.3 Is willingness to pay independent of educational background?**

To see if willingness to pay more for products with lower GHG emissions are dependent of educational background a Kruskal-Wallis test was used.

The test found significant differences in willingness to pay extra for products with lower GHG emissions depending on income groups for salad, beef and for the index but not for milk. (Sallad;  $\chi^2=15,94$ ,  $df=3$ .  $p<0,01$ . Milk;  $\chi^2=1,78$ ,  $df=3$ . Beef;  $\chi^2=8,09$ ,  $df=43$ ,  $p<0,05$ . Index;  $\chi^2=8,06$ ,  $df=3$ ,  $p<0,02$ )

There seems to be a strong connection between educational background and willingness to pay more for products with lower GHG emissions. However for milk the relationship does not hold. The suspicion is that an ongoing debate around which brand of milk to buy, Arla or Skånemejerier, has reached lower educated people in a way that the debate about climate change have not.

#### **4.4.4 Is willingness to pay the same for different income groups?**

To see if higher income groups are prepared to pay extra for products with lower GHG emissions a Kruskal-Wallis test was used.

Tests showed no significant difference to willingness to pay extra for products with lower GHG emissions depending on income group for salad and milk but it did for beef and for the index. The results differ and are inconclusive. (Salad;  $\chi^2=3,04$ ,  $df=2$ . Milk;  $\chi^2=2,36$ ,  $df=2$ . Beef;  $\chi^2=13,39$ ,  $df=2$ ,  $p<0,001$ . Index;  $\chi^2=7,77$ ,  $df=2$ ,  $p<0,05$ )

The connection between high income and higher willingness to pay for less emitting products is not as strong as expected. It seems like the connection between high income and higher willingness to pay is more valid for expensive food items like high quality beef.

#### **4.4.5 Is willingness to pay for a climate label higher for the people buying products with environmental labels or not.**

To see if people who already buy environmentally labelled products are prepared to pay extra for products with lower GHG emissions Kruskal-Wallis tests were used.

There is a significant difference in willingness to pay extra for products with lower GHG emissions depending on if respondents buy environmentally labelled products. Willingness to pay extra for products with 25% lower GHG emissions are higher for those who already buy environmentally labelled products. (Salad;  $\chi^2=9,18$ ,  $df=3$ .  $p<0,05$ . Milk;  $\chi^2=14,84$ ,  $df=3$ ,  $p<0,01$ . Beef;  $\chi^2=17,36$ ,  $df=3$ ,  $p<0,001$ . Index;  $\chi^2=14,61$ ,  $df=3$ ,  $p<0,01$ )

#### **4.4.6 Is willingness to pay for a climate label higher for the people that are more worried about climate change or not?**

To see if people who are more worried about climate change are more willing to pay extra for products with lower GHG emissions Kruskal-Wallis tests were used.

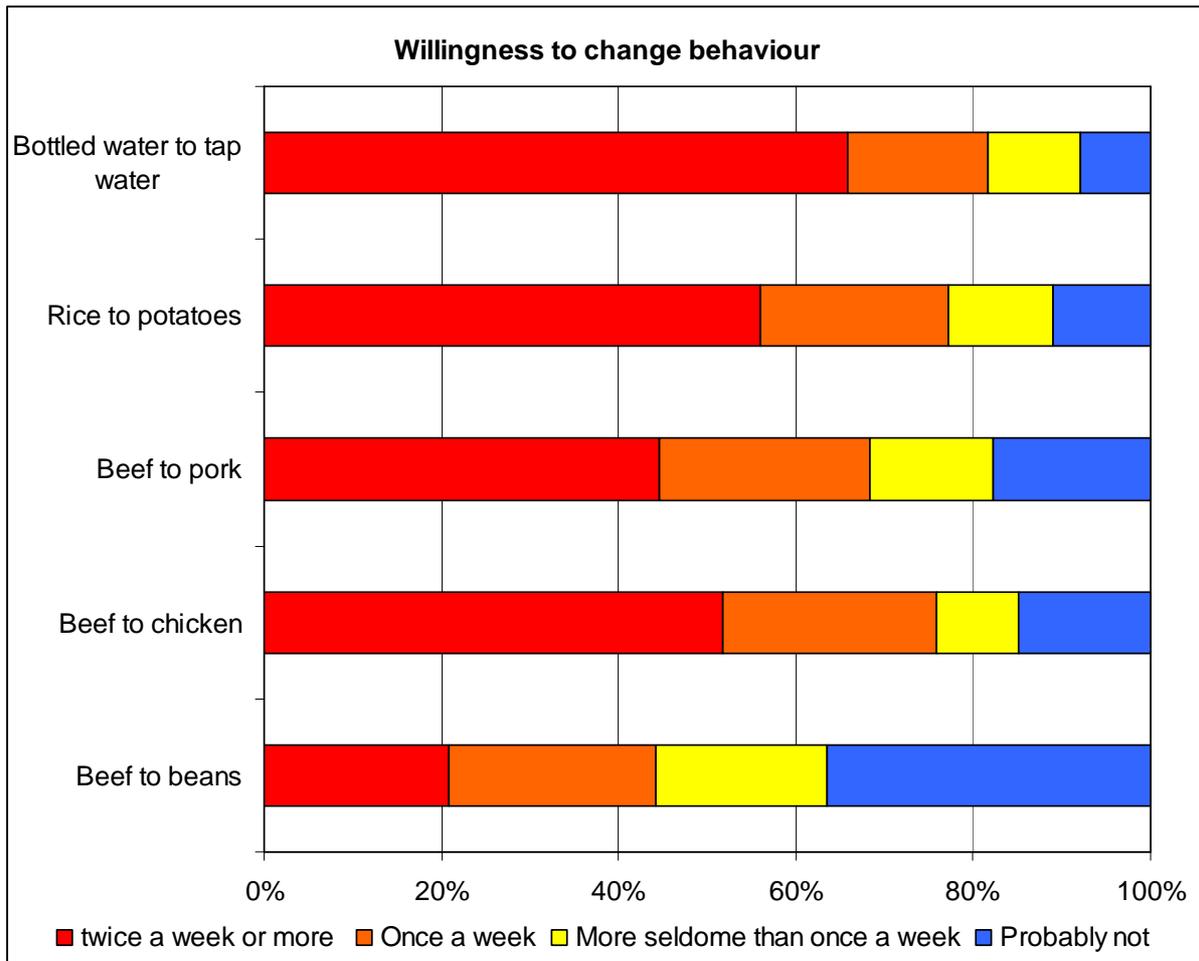
People that are more worried about climate change also have a significantly higher willingness to pay extra for products with lower GHG emissions. (Salad;  $\chi^2=25,59$ ,  $df=3$ .  $p<0,001$ . Milk;  $\chi^2=19,65$ ,  $df=3$ ,  $p<0,001$ . Beef;  $\chi^2=17,8$ ,  $df=3$ ,  $p<0,001$ . Index;  $\chi^2=25,46$ ,  $df=3$ ,  $p<0,001$ )

### **4.5 Section on willingness to change behavior to reduce GHG emissions from food consumption.**

The second main objective with the survey is to measure respondent's willingness to change their eating habits in response to information on the emissions from different types of food. This is information that could have come from a product label but not from a production label. In the survey the information is presented in a more simplified form as savings of CO<sub>2</sub>e per portion if you chose one product instead of another. As the information is given more easy to relate to than an actual production label the results are not directly translatable to the results that would have come from a production label.

An introduction text gives a figure of 170 g Co<sub>2</sub>e emissions for driving a car 1 km for comparison.

The results are illustrated in graph 4.13. Respondents that did not answer, did not know what to answer or did not use the product asked to substitute are not accounted for in the graph. See appendix 3 for complete results in tables.



**Graph 4.13 Consumers willingness to change behaviour in order to decrease emissions of GHG.**

**4.5.1 Question 12 “If you chose tap water instead of bottled mineral water your emissions of Co2 are reduced with 40 g of Co2/glas. To reduce your impact on climate would you consider choosing tap water instead of bottled water?”**

Most respondents, 60%, answered that they did not drink bottled water. Among those who did 63% answered that they would consider changing to tap water twice a week to limit their personal contribution to climate change. Only 8% would not consider changing behaviour.

**4.5.2 Question 13 “If you chose potatoes instead of rise your emissions of Co2 are reduced with 400 g of Co2/portion. To reduce your impact on climate would you consider choosing potatoes instead of rice?”**

Among those respondents who ate rice 55% answered that they would consider changing to potatoes twice a week to limit their personal contribution to climate change. Another 21% would change once a week. 11% would not consider changing there current rice eating behaviour.

#### **4.5.3 Question 14 “If you chose pork instead of beef your emissions of Co2 are reduced with 1300 g of Co2/portion. To reduce your impact on climate would you consider choosing pork instead of beef?”**

Among those who answered that they ate beef 43% answered that they would consider changing to pork meat twice a week to limit their personal contribution to climate change. Another 23% would change once a week. 17% would not consider changing behaviour.

#### **4.5.4 Question 15 “If you chose chicken instead of beef your emissions of Co2 are reduced with 1600 g of Co2/portion. To reduce your impact on climate would you consider choosing chicken instead of beef?”**

Among those respondents who consume beef 51% answered that they would consider changing to chicken twice a week to limit their personal contribution to climate change. Another 24% would change once a week. 14% would not consider changing behaviour.

#### **4.5.5 Question 16 “If you chose beans instead of beef your emissions of Co2 are reduced with 1900 g of Co2/portion. To reduce your impact on climate would you consider choosing beans instead of beef?”**

In the beef eating group 22% answered that they would consider changing beef for beans twice a week to limit their personal contribution to climate change. Another 23% would change once a week while 19% would consider changing more seldom. 35% would not consider changing their behaviour in this way.

### **4.6 What are the characteristics of respondents who are willing to change behavior in order to lower emissions of GHG from food?**

In order to analyse the results of willingness to change eating behaviour to limit personal GHG emissions the results of the suggested changes are tested against different variables.

An index of willingness to change is created to test the overall willingness to change. The index is created by adding the results from question 13 to 16 together. Question 12 is excluded as too many respondents answered that they did not drink bottled water. In creating the index the answering alternative “Twice a week or more often“ was given 1 points, alternative “once a week” was given 2 points, alternative “more seldom than once a week” was assigned 3 points and alternative “no, probably not” 4 points. The assigned numbers from the questions 13, 14, 15 and 16 were then summed creating an index from 4 to 16 where 4 was considered the highest willingness to change behaviour and 16 the lowest. The once who have not answered all questions or answered “don’t know” or those that don’t buy one or more of the products up for change have been excluded leaving 212 “full” answers to be analysed by a willingness to change index.

#### **4.6.1 Difference in willingness to change behavior among age groups**

To see if different age groups are more or less willing to change behaviour in order to lower personal GHG emissions Kruskal-Wallis tests were used.

There were no significant differences between age groups for any of the behavioural change alternatives or for the index. (Bottled water to tap water;  $\chi^2=5,18$ ,  $df=4$ . Rice to potatoes;

$\chi^2=2,17$ ,  $df=4$ . Beef to pork;  $\chi^2=2,11$ ,  $df=4$ . Beef to chicken;  $\chi^2=0,92$ ,  $df=4$ . Beef to beans;  $\chi^2=2,87$ ,  $df=4$ . Index  $\chi^2=2,9$   $df=4$ )

#### **4.6.2 Difference in willingness to change behavior between men and women**

To see if women are more willing to change behaviour in order to lower personal GHG emissions Mann-Whitney U-tests were used.

Women were significantly more inclined for changing beef to chicken and for changing beef to beans. Women were almost significantly more inclined for changing Bottled water to tap water, exchanging rice to potatoes and for the index. (Bottled water to tap water;  $z=1,43$ ,  $p<0,0764$ . Rice to potatoes;  $z=1,31$ ,  $p<0,0934$ . Beef to pork;  $p=1,20$ ,  $p<0,1151$ . Beef to chicken;  $z=3,49$ ,  $p<0,0003$ . Beef to beans;  $z=1,99$ ,  $p<0,023$ . Index  $z=1,43$   $p<0,0764$ )

It seems that men are less willing to change their meat eating behaviour than women. Otherwise there is weak evidence that women should be more willing to change than men.

#### **4.6.3 Difference in willingness to change behavior among income groups**

To see if different income groups are more or less willing to change behaviour in order to lower personal GHG emissions Kruskal-Wallis tests were used.

No significant connection between income and any of the behavioural change alternatives or for the index was found. (Bottled water to tap water;  $\chi^2=0,62$ ,  $df=2$ . Rice to potatoes;  $\chi^2=5,5$ ,  $df=2$ ,  $p<0,1$ . Beef to pork;  $\chi^2=1,25$ ,  $df=2$ . Beef to chicken;  $\chi^2=0,79$ ,  $df=2$ . Beef to beans;  $\chi^2=0,24$ ,  $df=2$ . Index  $\chi^2=0,06$   $df=2$ )

#### **4.6.4 difference in willingness to change behavior among educational backgrounds**

To see if groups with different educational background are more or less willing to change behaviour in order to lower personal GHG emissions Kruskal-Wallis tests were used.

No significant connection between educational background and willingness to change behaviour was found. (Bottled water to tap water;  $\chi^2=0,73$ ,  $df=3$ . Rice to potatoes;  $\chi^2=2,39$ ,  $df=3$ . Beef to pork;  $\chi^2=1,71$ ,  $df=3$ . Beef to chicken;  $\chi^2=0,44$ ,  $df=3$ . Beef to beans;  $\chi^2=3,51$ ,  $df=3$ . Index  $\chi^2=1,86$   $df=3$ )

#### **4.6.5 Connection between behavioral change and eco-labels**

To see if respondents who buy eco labelled products are more willing to change behaviour in order to lower personal GHG emissions Kruskal-Wallis tests were used.

The willingness to change behaviour was not found to be significantly larger for those who bought more environmentally labelled products except for changing from beef to beans. (Bottled water to tap water;  $\chi^2=3,39$ ,  $df=3$ . Rice to potatoes;  $\chi^2=1$ ,  $df=3$ . Beef to pork;  $\chi^2=3,99$ ,  $df=3$ . Beef to chicken;  $\chi^2=5,01$ ,  $df=3$ . Beef to beans;  $\chi^2=12,91$ ,  $df=3$   $p<0,01$ . index  $\chi^2=6,24$ ,  $df=3$ )

#### **4.6.6 Connection between behavioral change and worries of climate change**

To see if respondents who are more worried about the effects of climate change are also more willing to change behaviour in order to lower personal GHG emissions Kruskal-Wallis tests were used.

A significant increase in the willingness to change behaviour in order to lower personal GHG emissions was found for the index and all other available alternatives except changing beef to beans which was found almost significant depending on respondents worries for climate change (Bottled water to tap water;  $\chi^2=10,68$ ,  $df=3$   $p<0,02$ . Rice to potatoes;  $\chi^2=16,47$ ,  $df=3$   $p<0,001$ . Beef to pork;  $\chi^2=10,78$ ,  $df=3$   $p<0,02$ . Beef to chicken;  $\chi^2=8,93$ ,  $df=3$   $p<0,05$ . Beef to beans;  $\chi^2=6,9$ ,  $df=3$   $p<0,1$ . index  $\chi^2=15,35$ ,  $df=3$   $p<0,01$ )

**4.7 Question 11. “What information do you think a climate label for food should contain?”**

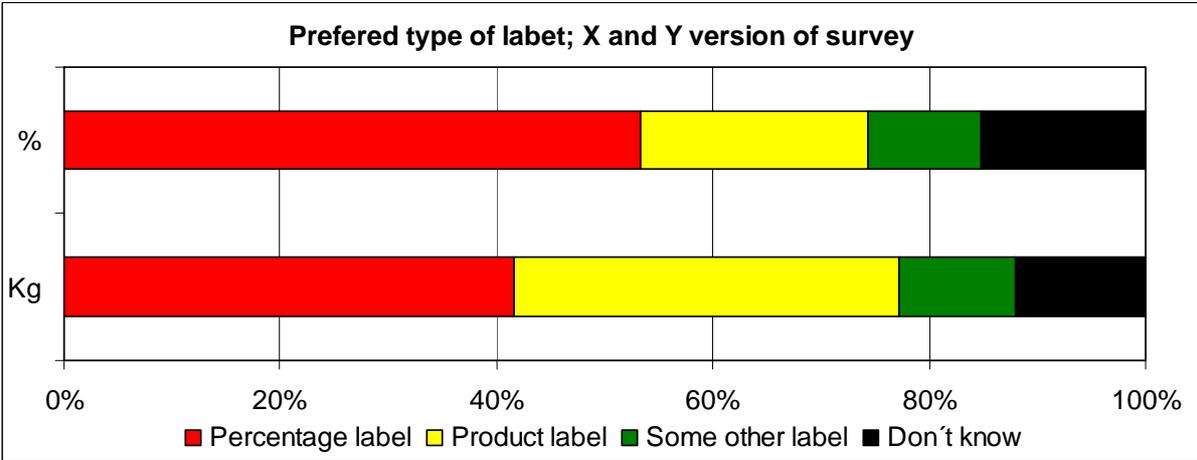


**Picture A.**

**Picture B.**

*Figure 4.7 Percentage and product label*

With the options, “like picture A showing that the product has emitted 25% less Co2e than normal production”, “like picture B showing the emissions of green house gases per produced kilo of product”, “Some other, better alternative” and “don’t know”.



**Graph 4.14 Respondents preferred type of label version X**

Although the question was identical in the X and Y versions of the questionnaire the results differ considerably.

In both versions the percentage label alternative was most popular 42% in the X version and 53% in the Y version chose this alternative. The product label alternative was chosen by 35% of respondents in the X version and by 21% in the Y version. A relatively high percentage of respondents did not know what to answer. In the X version this fraction amounted to 12% of respondents and in the Y version to 15%.

#### **4.7.1 Is willingness to pay higher for a product label than for a percentage label?**

To see if willingness to pay depending on if the 25% reduction in GHG emissions caused by the products is higher if presented with a percentage label instead of a product label a chi-square test was used.

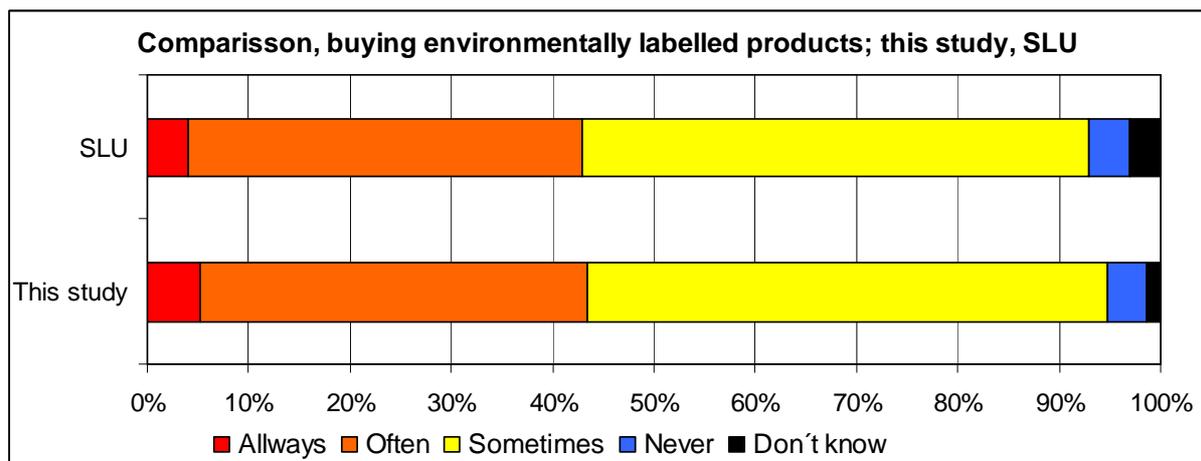
Willingness to pay was higher for the percentage label for all the three tested products in the survey and for the index. Results were significant at the 1% level for all tested products and for the index (Salad;  $\chi^2 = 15,99$ ,  $df=4$ ,  $p<0,01$ . Milk;  $\chi^2 = 18,2$   $df=4$ ,  $p<0,01$ . Beef;  $\chi^2 = 17,34$   $df=4$ ,  $p<0,01$ . Index;  $\chi^2 = 16,88$ ,  $df=5$ ,  $p<0,01$ .)

## 5 Comparisons with previous studies

In order to assess biases suspected to be caused by local sampling and low rate of response the results from this study is compared with the findings of previous studies.

### 5.1 Comparisons with previous studies on who buys environmentally labelled products

Questions 2 have been used with the exact same wording in a consumer survey about climate labelling performed as a thesis work at SLU in Uppsala. (Toivonen 2007). A graph comparing the results shows that the respondents in Uppsala have answered the question in a very similar way.



*Graph 5.1 Comparison between this study and SLU study; buying environmentally labelled products.*

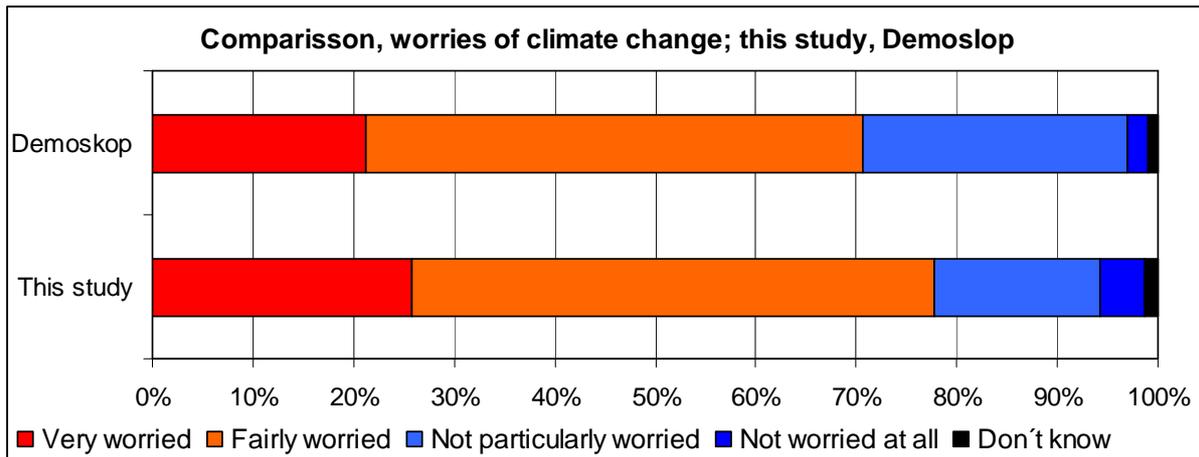
To see if there is any significant difference between the distributions the samples have been drawn from a Mann-Whitney U-test have been used.

There is no significant support for the theory that the samples are drawn from populations with different distributions ( $z = 0,18$ )

There is no data available on the distribution of answers for the different genders in the SLU survey. In the SLU study 45% men and 55% women participated compared to this study with 41% men and 59% women. A connection between gender and buying environmentally labeled products have been tested and found significant (see 4.2.1).

### 5.2 Comparisons with previous studies on how worried about climate change respondents are.

Question 3 has been used in a combined telephone and E-mail survey performed by Demoskop in 2007 with 2492 respondents (Demoskop 2007). There is no available information on answering rate of this survey. The study was performed on a national basis. A graph of the results of the surveys shows similar results with the respondents in this survey seeming slightly more worried.



**Graph 5.2 Comparison between this study and Demoskop study; worries of climate change.**

There is data available on the distribution of answers for the different genders in the demoskop survey. The proportions of participating men and women are though not available. The sample size of the survey is so large that this is not a problem. A fifty-fifty distribution of gender has been assumed for the Demoskop survey. The connection between gender and attitude towards climate labeling has been tested and found significant for this study.

To see if there is any significant difference between the distributions the samples have been drawn from among the men and women Mann-Withney U-tests have been used.

There is no significant support for the theory that the samples are drawn from populations with different distributions among the men ( $z = 0,441$ )

There is an almost significant support for the theory that the samples are drawn from populations with different distributions among the women ( $z = 1,94$   $p=0,0524$ )

A significance of 10% among the women gives reason to suspect that the samples may come from populations with different distributions.

### 5.3 Comparisons with previous studies on attitudes towards climate labelling

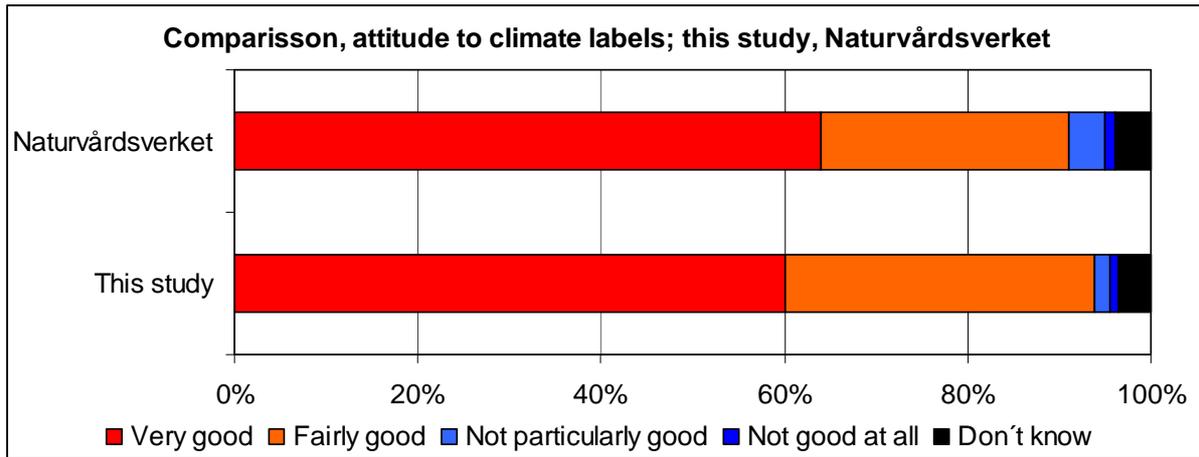
Question 4 has been used in a telephone survey performed by ARS for Naturvårdsverket in 2008 with 1000 respondents and an answering rate of 66% (Naturvårdsverket 3 2008). The study was performed nationally. The question has been changed from Naturvårdsverkets original:

“Would it be a good or bad idea with an environmental label showing which products and services are produced with low emissions of green house gases?”

To:

“Would it be a good idea with an environmental label showing which products and services are produced with low emissions of green house gases?”

Giving it a slightly more positive bias but also making it more grammatically correct and shorter. A graph of the results of the surveys shows similar results.



**Graph 5.3 Comparison between this study and Naturvårdsverket stud; attitudes towards climate label.**

There is full demographical data available for the Naturvårdsverket study so that a comparison can be performed separately for the different genders.

To see if there is any significant difference between the distributions the samples have been drawn from among the men and women Mann-Withney U-tests have been used.

There is no significant support for the theory that the samples are drawn from populations with different distributions among the men or the women. (Men;  $z=0,627$ . Women;  $z=0,0705$ )

A similar question have also been asked in a study ordered by Svenskt Sigill from ARS, containing answers from 1005 respondents and with an answering rate of 62%. (Svensktsigill.se) In this survey the question was phrased "Would it be good or bad to label products on the basis of their climate impact" The answers are shown in table 5.28.

Very good	Fairly good	Neutral	Fairly bad	Very bad	Don't know	Sum
38 %	45 %	13 %	3 %	1 %	0	100 %

**Tabel 5.1 Attitudes towards a climate label, Svenskt Sigills results**

In this study the respondents seem more negative to a climate label than in the studies previously presented.

#### **5.4 Comparisons with previous studies on willingness to pay more for climate labelled products.**

Willingness to pay more for climate labelled products has been examined before in a few Swedish surveys. In the SLU study the question; "Some measures to decrease climate impact of food increase the costs for producers. How much more are you prepared to pay for climate labelled food? "

In the Svenskt Sigill study the question was asked; "how much would you be willing to pay for a product that is better for the climate?" The original price of the hypothetical product was set to 50 kr. The results from these studies are shown below and are compared with the results of this study.

	Not more	< 10% more	< 20% more	< 30 % more	> 30%	Don't know	Sum
<b>SLU</b>	<b>12 %</b>	<b>41 %</b>	<b>24 %</b>	<b>6 %</b>	<b>Not an alternative</b>	<b>17 %</b>	<b>100 %</b>
<b>Svenskt Sigill</b>	<b>2 %</b>	<b>39 %</b>	<b>34 %</b>	<b>8 %</b>	<b>13 %</b>	<b>4 %</b>	<b>100 %</b>
Salad Kg Co2e	33 %	21 %	19 %	9 %	1 %	9 %	100 %
Salad 25%	20 %	19 %	30 %	12 %	7 %	6 %	100 %
Milk Kg Co2e	23 %	25 %	10 %	21 %	10 %	4 %	100 %
Milk 25%	12 %	16 %	24 %	21 %	15 %	3 %	100 %
Beef Kg Co2e	30 %	30 %	8 %	4 %	1 %	7 %	100 %
Beef 25%	20 %	34 %	15 %	5 %	8 %	6 %	100 %

***Table 5.2 Comparison of willingness to pay between this study SLU and Svenskt Sigill.***

The comparison shows that when looking at specified goods, real prices and explaining the content of the label, a few percent consumers seem to be willing to pay more for the improved products. The majority of consumers though seem to have a lower willingness to pay and it is clear that the percentage who doesn't want to pay more at all increases when looking at specified goods, real prices and explaining the content of the label.

### **5.5 Comparisons with previous studies on which type of label respondents prefer**

The Svenskt Sigill survey asks respondents whether they would prefer a percentage or production label. They also have another answering alternative that only the best products in each group should be climate labelled. The results as presented in table 5.3 are somewhat similar to the results of this survey. Note that the results for the product and percentage label in the Svenskt Sigill study is in-between the results from the X and Y versions of this survey

	Percentage label	Product label	“only the best in each category”	Some other way	Don't know	Sum
Svenskt Sigill	43	28	23	Not available	6	100
Survey X-version	40	34	Not available	10	12	100
Survey Y-version	52	21	Not available	10	15	100

***5.3 Comparison of preferred type of label between this study and Svenskt Sigill.***

## 6 Discussion

In this section the results of the study is discussed.

### 6.1 Results of the survey

There are some problems with how to interpret the respondent's answers to the questions. These problems are discussed in this section

This survey has been performed locally and answering rate has been extremely low. As a result severe skewness of the results could have been expected. The comparisons with previous studies, using the same questions, performed in 5.1, 5.2 and 5.3 shows that this has not been the case. There is no perfect match with the other surveys and even an almost significant difference for women between this survey and the Demoskop survey. The results is however similar enough to make this survey useful for drawing conclusions for Swedish consumers although it has been performed locally with a very low response rate.

Question 2 incorporates several environmental labels with very different market shares. Krav, the Swedish label of ecological food have a very small market share. It was only 2,2% of the sales value of food in Sweden in 2007 (GP 2008). On the other hand Svanen and Bra miljöval, that labels several products sold in supermarkets such as detergents and toilet paper, have much larger market shares. The respondents therefore might perceive the question very different depending on which label they are referring to. Also the Fairtradede label, rättvisemärkt, is included although it is not an environmental label. There might be doubts to what the result is actually showing.

The answers to the question if respondents think a climate label is a good idea (question 4) indicate a strong public interest in a labelling scheme. There is though no background information on how such a label should be constructed or what the price of labelled products would be. The results might therefore be questioned as we do not know how respondents have interpreted the question.

When it comes to the questions 8-10 on willingness to pay for less emitting products as well as the questions 12-16 about behavioural change it is a well known phenomena that respondents in this type of valiative questions gives answers that is not completely in accordance with how they would actually behave in a real life situation. This is because respondents tend to, consciously or unconsciously, give answers in accordance with what they think they are supposed to answer. This also goes for question 2, if respondents by environmentally labelled products and question 5, if respondents are willing to buy more climate friendly products.

For the questions 12-16, on willingness to change behaviour in order to lower emissions of GHG, the introduction text use the biased word "klimatsmart", climate smart, for choosing lower emitting products. The word was used to gain understanding of the question but a biasing effect on the answers might be present. The question to change behaviour is formulated in a loose way as "would you consider" instead of a more strict "will you". This is important as a stricter formulation of the question would probably lead to fewer respondents willing to change behaviour. During fieldwork a few comments by respondents lead to suspicions that some respondents misunderstood the question to be about present eating habits.

## **6.2 Other measures to limit GHG emissions from food production**

Other measures than a climate label could be considered for bringing down GHG emissions from food production. One example is taxing food in accordance to its GHG emissions, a carbon tax on food. As uncertainty of figures and points of emissions are high this might not be very successful (Sterner 2003). Other policy measures such as legal restrictions might have some impact but these types of measures have difficulties to cover complex issues such as this one (Sterner 2003).

## **6.3 Product or production label?**

Of the different climate labelling options presented in section 2.3 the alternatives production and product label are discussed here.

A production label like the one planned to be introduced by Krav and Svenskt Sigill will have some effect on emissions from parts of the production of food. As the willingness of consumers to pay more for this type of label seems quite strong there is incentive for producers to realize the planned label. The market share of such a label would optimally be 30% of Swedish food sales. (see 2.3.2.2) For the products with the highest emissions, that of beef and dairy products, the effect will be very small as measures of production with lower emissions are lacking (Jordbruksverket 2004:1). For the products that already have showed large cuts in GHG emissions, i.e. plant house grown vegetables (Möller-Nielsen 2008), the emissions reduction is not a result of the up coming labelling scheme but of a general process of ecological modernisation. (Lantz et al. 2006). Combining the information above, the conclusion would be that the impact on emissions by the introduction of a product label will have low effect on emissions even if the labelling scheme is a success. A production label is not likely to have any effect at all on the consumer's behaviour as it contains no information that consumers could base informed choices of what type of product to buy.

A product label on the other hand might have a lower effect on production improvements due to the lower willingness to pay more for less emitting products with this labelling scheme. (see 4.7.1) The product label does however contain the information that consumers might base informed decisions for behavioural change on. Results from this study indicate that the possibilities for this type of reductions due to behavioural changes are large. This is because emissions from food items measured have a span from 0.4 kg Co<sub>2</sub>e/kg edible product to 30 kg Co<sub>2</sub>e/kg edible product (Carlsson-Kanyama, Gonzales 2009). Consumers, according to the survey seem very willing to change behaviour in order to limit GHG emissions when provided with more information. However the results are uncertain as the questions asked do not put consumers in real-life decision positions and do not use a product label in the questions.

In the discussion about eco-labels it is often recognized that specific groups of people are more inclined to choose labeled products. These groups are generally characterized as women, young, well educated and high income (Klintman et al. 2008). In this study this groups characteristics are found for women and well educated (see 4.2.1).

In the case of climate labeling this survey shows that there is a connection between people that already buy environmentally labeled products and the ones that would be interested in paying extra for less GHG emitting products. (See 4.4.5)

The study also identifies university educated and high income earners to be more interested in paying more for less GHG emitting products. (see 4.4.3 and 4.4.4)

It seems like a percentage or production type of climate label could be successful among the same groups that already buy environmentally labeled products.

In the case of GHG emissions less emitting products are generally cheaper when comparing between product groups. Because of this consumers can use a product label as an information source for lowering their GHG emissions without increasing costs. Does this mean that other groups of consumers would be interested in such a label?

The willingness to change behaviour to lower personal GHG emissions seems to be independent of age, income and educational background. In addition there is no significant connection between buying environmentally labeled products and being willing to change behavior. (See 4.6.1, 4.6.3, 4.6.4 and 4.6.5)

Willingness to change behavior in order to lower emissions of GHG from food consumption is not limited to the groups that traditionally buy environmentally labeled products. On the contrary the willingness to do so seems to be evenly distributed among people with different age, educational background and income. To some extent women seems more interested than men (see 4.6.2).

#### **6.4 Rational choice, information and altruistic motives**

In the classical economic definition rational choice theory implies assumptions such as perfect information by all actors and excludes all altruistic motives. (Scott 2000) This strict definition makes rational choice useless when discussing environmental labels as both imperfect information and altruism are basic features of how these labels influence consumer behaviour. An environmental label is supposed to provide the consumer with information that he or she did not possess. This information enables the consumer to make decisions based on altruistic motives. If the consumer does not consider altruistic motives when making decisions and perfect information already was available the label does not make any sense.

Some sociologists however have expanded rational choice theory and means that it can also include situations of imperfect information and altruistic motives as part of the decision function (Heckathorn 1997). This expanded version makes rational choice interesting for discussing environmental labelling.

The term political consumption is sometimes used for the altruistic motives. It refers to the behaviour where consumers pay extra for products only because of altruistic motives. It could also be that a consumer actively avoids certain products out of altruistic reasons. The extra payment or utility loss of avoided product is accepted only as an act to reach some other goal than personal utility. These goals might include, in the example of eco-labeled products increased animal rights and environmental goals. In the rational choice version the altruistic goals of saving the environment and being kind to animals are then incorporated into the utilization decision and makes the consumers with strong enough such motives chose eco-labeled products.

Research shows that other aspects of choosing eco-labelled products are more important for consumer's decision to buy environmentally labelled products than altruistic motives of

political consumption (Grolleau et al. 2009). Examples of such factors are that ecological products are believed to be better for your health and that they are believed to taste better. (Klintman et al. 2008) When it comes to any type of climate label it is hard to imagine such other factors. In contrast to Eco-labels it seems like a climate-labels would have to rely solely on the pure altruistic motives of political consumption. Is this is enough to make a climate label attractive enough in the eye of consumers?

In a world where consumers have to optimize utility with access to limited information more information will benefit consumers. It will make decisions better as it increases the outcome of utility maximisation. This however is conditioned by the assumption that the information is correct. Wrong information or disinformation might seriously decrease the outcome of utility maximisation if perceived as true.

In climate labelling a production label such as the one planned by Krav and Svenskt Sigill might in many respects present consumers with inferior information. For example a product that have made large cuts in GHG emissions will be labelled exactly the same way as a product that have done minor cuts. Also, the label might be considered misleading as products with very high GHG emissions still can be labelled with the “positive” climate label.

The information provided by a product label would in contrast be a source of relevant information presented at the package in the actual place of optimization, the store. If consumers are acting in accordance with rational choice this type of information would be perfectly understood by consumers and internalised in the utility function determining what products to buy.

However the question can be raised if rational choices really describe everyday grocery shopping in a good way. Rational choice theory have been criticised for not taking into account several factors that give rise to systematic irrationality. Examples of such factors are psychiatric disorder, level of intelligence, Social class identities, Age, imprisonment, unemployment and drug use. (Yang, Lester 2008). Other critic focus on the very grounds of rational choice and mean that decisions are not made using rational choices but rather for other motives such as tradition, habit, emotion or affection. (Scott 2000). This survey gives reason to doubt the rationality of consumer choices as respondent’s willingness to pay extra for less GHG emitting food products was very different dependent on if a percentage label or a production label was presented. Both labels essentially were showing the exact same information (see 4.7.1)

If the theory of rational choice is not valid for everyday shopping decisions of food a product label would not necessarily be a good source of information guiding consumers. Other types of labels such as a production label or a “colour coded” label might then be better. Another solution would be to use other channels of communication to inform consumers.

## **6.5 Is reducing consumption of highly GHG emitting food products possible?**

The results of the survey show that people are willing to do large changes in their eating habits in order to lower the carbon emissions from their personal consumption given more information. It does however not tell us if a product type of climate-label would be a good way to transfer this information. This could be a topic idea for further research.

Large shifts in eating behaviour have occurred in the past. Meat consumption in Sweden has been rising rapidly. Total meat consumption has gone up from 58,3 kg per person and year in 1980 to 83,5 kg per person and year in 2005. This is an increase of 43%. Consumption of the most GHG emitting type of meat, beef, has increased even more. Consumption of beef has almost doubled in Sweden since 1980. The consumption has risen from 5,2 kg per person and year in 1980 to 9,9 kg per person and year in 2005. This is an increase of 90%. (Jordbruksverket 2008:1). Past consumption changes have generally been towards more expensive food products. This has been a result of increased prosperity and lowered relative prices of food. A consumption change towards less emitting and generally less expensive food has never happened before.

The results from the survey show that there is a high willingness to change if given more information. Could more information in the form of a climate label of a product type or other forms of information about the climate impact of food products make a difference? The trend towards consuming more expensive and GHG emitting food seems to be hard to turn as long as incomes keep rising. On the other hand the large changes in eating behaviour described above shows large margins for potential future changes. For these changes to be towards less GHG emitting food consumers must be both better informed about the climate impact of their eating behaviour and also willing to change behaviour. This willingness to change behaviour must show not just when answering surveys but also in real life dinner decisions.

## **6.6 The rebound effect**

If there is a behavioral change towards less GHG emitting food this food would also be less costly. This means consumers would get to spend more money on something else that typically also emits GHG. In comparison to the share of private spending 20%, the emissions from food consumption in Sweden is slightly higher, 25%. (Naturvårdsverket 1 2008) If the extra money saved from avoiding the most emitting food products would be spend on average “other” consumption, emissions of GHG would be lowered partly by avoiding the most emitting products and partly by spending money on something else than food.

However if a production label made people spend more money on food products, as they would buy the more expensive climate labeled products, less money would be available for other types consumption. The emissions from “other” consumption would go down. From the perspective of lowering GHG emissions this might be one of the strongest advantages for the production label

## 7 Conclusions

The question if a product or production label is to prefer boils down to the same divide that characterize many other sustainability discussions. Is better technology going to be enough or do we have to change our behavior?

This study has confirmed that there is a strong willingness by Swedish consumers to pay more for less GHG emitting food products.

This willingness is stronger for a percentage label than for a product label.

The same categories of people that currently buy environmentally labeled products will probably be the group that will buy also the new production type climate labeled products planned to be introduced by Svenskt Sigill and Krav.

It is also shown that there is a strong willingness to change eating behavior in order to lower GHG emissions caused by food consumption if given more information. This information can be transferred to consumers via a product label but not via a production label.

There is a connection between being worried about climate change and willingness to change behavior. Otherwise there does not seem to be any specific category of people that are more willing to change their eating behavior in order to lower GHG emissions. Women are slightly more willing to change than men but they are also more worried about climate change.

A production label for lower emitting food products as planned by Svenskt Sigill and Krav will have limited effect on GHG emissions. This is due to three reasons:

- The options for reducing GHG emissions in the two most important sectors within food production, meat and dairy production, is very small. These sectors are responsible for 40% of the food sectors emissions.
- The most substantial decreases in GHG emissions within the food production area would be done anyway for cost saving reasons.
- An optimal market share for a production label would only be 30% of the market.

In order for significant change in GHG emissions from food production to occur, people need to change eating behavior. Contrary to popular opinion, this study has shown that there is a high willingness among consumers to change behavior, when provided with more information.

A climate label of the product type is one option for informing consumers about food products GHG emissions. However this study does not show if a product label would be used and understood by consumers. Other types of information might be more efficient in order to change consumer behaviour.

For producers of low emitting varieties of food such as, beans, root vegetables, chicken, local fruit etc. the results of this study shows excellent opportunities for expanding sales. Providing consumers with correct and trust worthy information of the relative advantage of these products when it comes to GHG emissions could be excellent marketing of these low emitting products.

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## Mat och Klimat

Jag gör en undersökning om livsmedel och klimatpåverkan till min magisteruppsats. Uppsatsen är den avslutande delkursen på magisterkursen LUMES (Lund University International Master´s Programme in Environmental Studies and Sustainability science) en utbildning i miljö och hållbar utveckling.

Jag uppskattar om du vill ta dig tid att svara på frågorna.

### 2. Hur ofta brukar du köpa miljömärkta produkter (Krav, Svanen, Bra miljöval, Rättvisemärkt)?

- Alltid
- Ofta
- Ibland
- Aldrig
- Tveksam, vet ej

### 3. Hur oroad är du personligen av klimatförändringarna (växthuseffekten)?

- Mycket oroad
- Ganska oroad
- Inte särskilt oroad
- Inte oroad alls
- Tveksam, vet ej

### 4. Vore det bra med en miljömärkning så att du kan se vilka varor och tjänster som är producerade med låga utsläpp av växthusgaser?

- Mycket bra
- Ganska bra
- Inte särskilt bra
- Inte alls bra
- Tveksam, vet ej

### 5. Skulle du kunna tänka dig att köpa mer klimativänliga produkter för att minska din påverkan på klimatet?

- Ja, absolut
- Ja, i viss mån
- Nej, knappast
- Nej, absolut inte
- Jag gör redan allt jag kan
- Tveksam, vet ej

### 6. Tycker du att en klimat- eller miljömärkning är trovärdig om den är framtaget och kontrolleras av tillverkaren? (I motsats till en oberoende märkning, som KRAV)

- Ja, absolut
- Ja, i viss mån
- Nej, knappast
- Nej, absolut inte
- Tveksam, vet ej

### 7. Kan du, genom dina val som konsument, påverka tillverkarna så att de redovisar vilka utsläpp av växthusgaser deras varor gett upphov till?

- Ja, absolut
- Ja, i viss mån
- Nej, knappast
- Nej, absolut inte
- Tveksam, vet ej

Det finns planer på att införa en klimatkänning av mat. Ett alternativ är att matvaror som gett upphov till minst 25% lägre koldioxid utsläpp än normalt märks. Om en sådan märkning fanns, skulle du betala mer för varor med denna märkning och i så fall hur mycket mer?



Salladshuvud A



Salladshuvud B

8. Salladshuvud A och B är exakt lika i smak och kvalitet. Salladshuvud A kostar 30 kr/kg. Hur mycket skulle du kunna tänka dig att betala för salladshuvud B?

- Jag köper aldrig sallad
- Inte mer än 30 kr/kg
- Inte mer än 33 kr/kg
- Inte mer än 36 kr/kg
- Inte mer än 39 kr/kg
- Mer än 39 kr/kg
- Tveksam, vet ej



Mjöl A.



Mjöl B.

9. Mjöl A och mjöl B är exakt samma i smak och kvalitet. Mjöl A kostar 7 kr/l. Hur mycket skulle du kunna tänka dig att betala för mjöl B?

- Jag köper aldrig mjölk
- Inte mer än 7 kr/l
- Inte mer än 8 kr/l

- Inte mer än 8,50 kr/l
- Inte mer än 9 kr/l
- Mer än 9 kr/l

Tveksam, vet ej



**Lövbiff A**



**Lövbiff B**

**10. Lövbiff A och lövbiff B är exakt samma i smak och kvalitet. Lövbiff A kostar 129 kr/kg. Hur mycket skulle du kunna tänka dig att betala för lövbiff B?**

- Jag köper aldrig nötkött
- Inte mer än 129 kr/kg
- Inte mer än 139 kr/kg
- Inte mer än 155 kr/kg
- Mer än 155 kr/kg

Tveksam, vet ej



**Bild A.**



**Bild B.**

**11. Vilken information tycker du att en klimatmärkning av mat ska innehålla?**

- Som bild A. Den ska visa vilka varor som ger upphov till minst 25 % mindre växthusgaser än normalt.
- Som bild B. Den ska visa hur mycket växthusgaser en vara gett upphov till.
- Den ska vara utformad på något annat sätt.
- Tveksam, vet ej

**Genom att välja klimatsmarta matvaror kan man minska utsläppen av växthusgaser man själv ger upphov till. I frågorna nedan anges hur mycket utsläppen av koldioxid (CO<sub>2</sub>) minskar per portion när man gör olika klimatsmarta val.**

**Som jämförelse till siffrorna kan sägas att en bil släpper ut ungefär 170 g koldioxid (CO<sub>2</sub>) per kilometer.**

**Utifrån dina nuvarande kostvanor, hur ofta skulle du kunna tänka dig att göra följande klimatsmarta val?**

**12. Om du väljer kranvatten istället för mineralvatten på flaska minskar dina utsläpp av koldioxid med 40 g per glas. För att minska din påverkan på klimatet skulle du kunna tänka dig att välja kranvatten istället för mineralvatten?**

- Jag dricker inte mineralvatten på flaska
- Ja, 2 eller fler gånger i veckan
- Ja, ungefär 1 gång i veckan
- Ja, men mer sällan än 1 gång i veckan
- Nej, troligen inte
- Tveksam, vet ej

**13. Om du väljer potatis istället för ris minskar dina utsläpp av koldioxid med 400 g per portion. För att minska din påverkan på klimatet skulle du kunna tänka dig att välja potatis istället för ris?**

- Jag äter inte ris
- Ja, 2 eller fler gånger i veckan
- Ja, ungefär 1 gång i veckan
- Ja, men mer sällan än 1 gång i veckan
- Nej, troligen inte
- Tveksam, vet ej

**14. Om du väljer fläskkött istället för nötkött minskar dina utsläpp av koldioxid med 1300 g per portion. För att minska din påverkan på klimatet skulle du kunna tänka dig att välja fläskkött istället för nötkött?**

- Jag äter inte nötkött
- Ja, 2 eller fler gånger i veckan
- Ja, ungefär 1 gång i veckan
- Ja, men mer sällan än 1 gång i veckan
- Nej, troligen inte
- Tveksam, vet ej

**15. Om du väljer kyckling istället för nötkött minskar dina utsläpp av koldioxid med 1600 g per portion. För att minska din påverkan på klimatet skulle du kunna tänka dig att välja kyckling istället för nötkött?**

- Jag äter inte nötkött
- Ja, 2 eller fler gånger i veckan
- Ja, ungefär 1 gång i veckan

- Ja, men mer sällan än 1 gång i veckan
- Nej, troligen inte
- Tveksam, vet ej

**16. Om du väljer ärtor och bönor istället för nötkött minskar dina utsläpp av koldioxid med 1900 g per portion. För att minska din påverkan på klimatet skulle du kunna tänka dig att välja ärtor och bönor istället för nötkött?**

- Jag äter inte nötkött
- Ja, 2 eller fler gånger i veckan
- Ja, ungefär 1 gång i veckan
- Ja, men mer sällan än 1 gång i veckan
- Nej, troligen inte
- Tveksam, vet ej

**17. Hur gammal är du?**

- 24
- 25–34
- 35–54
- 55–64
- 65–

**18. Är du man eller kvinna?**

- Man
- Kvinna

**19. Hur ser din familjesituation ut?**

- Bor själv utan hemmavarande barn
- Gift/sambo utan hemmavarande barn
- Gift/sambo med barn
- Ensamstående med barn
- Annan familjesituation

**20. Vilka utbildningar har du avslutat?**

- Grundskola
- Gymnasium
- Eftergymnasial utbildning (ej universitet eller högskola)
- Eftergymnasial utbildning (universitet eller högskola)

**21. Vilken var din bruttoinkomst (lön före skatt) 2008?**

- Under 150 000 kr
- 150 000–300 000
- Över 350 000
- Tveksam, vet ej

**Tack för att du har tagit dig tid att svara på dessa frågor!**

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- Inte alls bra
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- Tveksam, vet ej

**Genom att välja klimatsmarta matvaror kan man minska utsläppen av växthusgaser man själv ger upphov till. I frågorna nedan anges hur mycket utsläppen av koldioxid (CO<sub>2</sub>) minskar per portion när man gör olika klimatsmarta val.**

**Som jämförelse till siffrorna kan sägas att en bil släpper ut ungefär 170 g koldioxid (CO<sub>2</sub>) per kilometer.**

**Utifrån dina nuvarande kostvanor, hur ofta skulle du kunna tänka dig att göra följande klimatsmarta val?**

**12. Om du väljer kranvatten istället för mineralvatten på flaska minskar dina utsläpp av koldioxid med 40 g per glas. För att minska din påverkan på klimatet skulle du kunna tänka dig att välja kranvatten istället för mineralvatten?**

- Jag dricker inte mineralvatten på flaska
- Ja, 2 eller fler gånger i veckan
- Ja, ungefär 1 gång i veckan
- Ja, men mer sällan än 1 gång i veckan
- Nej, troligen inte
- Tveksam, vet ej

**13. Om du väljer potatis istället för ris minskar dina utsläpp av koldioxid med 400 g per portion. För att minska din påverkan på klimatet skulle du kunna tänka dig att välja potatis istället för ris?**

- Jag äter inte ris
- Ja, 2 eller fler gånger i veckan
- Ja, ungefär 1 gång i veckan
- Ja, men mer sällan än 1 gång i veckan
- Nej, troligen inte
- Tveksam, vet ej

**14. Om du väljer fläskkött istället för nötkött minskar dina utsläpp av koldioxid med 1300 g per portion. För att minska din påverkan på klimatet skulle du kunna tänka dig att välja fläskkött istället för nötkött?**

- Jag äter inte nötkött
- Ja, 2 eller fler gånger i veckan
- Ja, ungefär 1 gång i veckan
- Ja, men mer sällan än 1 gång i veckan
- Nej, troligen inte
- Tveksam, vet ej

**15. Om du väljer kyckling istället för nötkött minskar dina utsläpp av koldioxid med 1600 g per portion. För att minska din påverkan på klimatet skulle du kunna tänka dig att välja kyckling istället för nötkött?**

- Jag äter inte nötkött
- Ja, 2 eller fler gånger i veckan
- Ja, ungefär 1 gång i veckan
- Ja, men mer sällan än 1 gång i veckan
- Nej, troligen inte
- Tveksam, vet ej

**16. Om du väljer ärtor och bönor istället för nötkött minskar dina utsläpp av koldioxid med 1900 g per portion. För att minska din påverkan på klimatet skulle du kunna tänka dig att välja ärtor och bönor istället för nötkött?**

- Jag äter inte nötkött
- Ja, 2 eller fler gånger i veckan
- Ja, ungefär 1 gång i veckan
- Ja, men mer sällan än 1 gång i veckan
- Nej, troligen inte
- Tveksam, vet ej

Det finns planer på att införa en klimatmärkning av mat. Ett alternativ är att matvaror märks med hur många kilo koldioxid (CO<sub>2</sub>) de gett upphov till under transport och produktion. Om en sådan märkning fanns, skulle du betala mer för varor med lägre utsläpp och i så fall hur mycket mer?



Salladshuvud A.



Salladshuvud B.

8. Salladshuvud A och B är exakt lika i smak och kvalitet. Salladshuvud A kostar 30 kr/kg. Hur mycket skulle du kunna tänka dig att betala för Salladshuvud B?

- Jag köper aldrig sallad
- Inte mer än 30 kr/kg
- Inte mer än 33 kr/kg
- Inte mer än 36 kr/kg
- Inte mer än 39 kr/kg
- Mer än 39 kr/kg
- Tveksam, vet ej



Mjöl A.



Mjöl B.

9. Mjöl A och mjöl B är exakt samma i smak och kvalitet. Mjöl A kostar 7 kr/l. Hur mycket skulle du kunna tänka dig att betala för mjöl B?

- Jag köper aldrig mjölk
- Inte mer än 7 kr/l
- Inte mer än 8 kr/l
- Inte mer än 8,50 kr/l
- Inte mer än 9 kr/l
- Mer än 9 kr/l
- Tveksam, vet ej



**Lövbiff A**



**Lövbiff B**

**10. Lövbiff A och lövbiff B är exakt samma i smak och kvalitet. Lövbiff A kostar 139 kr/kg. Hur mycket skulle du kunna tänka dig att betala för lövbiff B?**

- Jag köper aldrig nötkött
- Inte mer än 139 kr/kg
- Inte mer än 153 kr/kg
- Inte mer än 167 kr/kg
- Inte mer än 181 kr/kg
- Mer än 181 kr/kg
- Tveksam, vet ej



**Bild A.**



**Bild B.**

**11. Vilken information tycker du att en klimatomärkning av mat ska innehålla?**

- Som bild A. Den ska visa vilka varor som ger upphov till minst 25 % mindre växthusgaser än normalt.
- Som bild B. Den ska visa hur mycket växthusgaser en vara gett upphov till.
- Den ska vara utformad på något annat sätt.
- Tveksam, vet ej

**17. Hur gammal är du?**

- 24
- 25–34
- 35–54
- 55–64
- 65–

**18. Är du man eller kvinna?**

- Man
- Kvinna

**19. Hur ser din familjesituation ut?**

- Bor själv utan hemmavarande barn
- Gift/sambo utan hemmavarande barn
- Gift/sambo med barn
- Ensamstående med barn
- Annan familjesituation

**20. Vilka utbildningar har du avslutat?**

- Grundskola
- Gymnasium
- Eftergymnasial utbildning (ej universitet eller högskola)
- Eftergymnasial utbildning (universitet eller högskola)

**21. Vilken var din bruttoinkomst (lön före skatt) 2008?**

- Under 150 000 kr
- 150 000–350 000
- Över 350 000
- Tveksam, vet ej

**Tack för att du har tagit dig tid att svara på dessa frågor!**

## Appendix 2

### Tables

Not answered	– 24	25 – 34	35 – 54	55 – 64	65 –	Sum
7	42	53	95	54	59	310
2 %	14 %	17 %	31 %	17 %	19 %	100 %

**Table 4.1. Age of respondents, years**

Not answered	Male	Female	Sum
9	124	177	310
3 %	40 %	57 %	100 %

**Table 4.2. Gender of respondents**

Not answered	Living alone	Married or living together without Children	Married or living together with Children	Living alone With children	Other	Sum
7	58	113	87	17	28	310
2 %	19 %	36 %	28 %	5 %	9 %	100 %

**Table 4.3. Family status of respondents**

Not answered	Elementary school	Secondary School	Post Secondary school, not university	Post Secondary school, university	Sum
7	47	81	46	129	310
2 %	15 %	26 %	15 %	42 %	100 %

**Table 4.4. Education status of respondents**

Not answered	- 150 000	150 000 – 350 000	- 350 000	Don't know	Sum
9	76	153	59	13	310
3 %	25 %	49 %	19 %	4 %	100 %

**Table 4.5. Income of respondents, SEK 2008**

**Table 4.6. How often do respondents choose products with environmental labels?**

Have not answered	1	0.3 %
Always	16	5 %
Often	118	38 %
Sometimes	159	51 %
Never	12	4 %
Don't know	4	1 %
Sum	310	100,00

**Table 4.8. How worried are respondents by the threat of climate change?**

Not answered	0	0 %
Very worried	80	26 %
Fairly worried	161	52 %
Not particularly worried	51	16 %
Not worried at all	14	5 %
Don't know	4	1 %
Sum	310	100 %

**Table 4.9. Would respondents like a climate label?**

Not answered	0	0 %
Very good	186	60 %
Fairly good	105	34 %
Not particularly good	5	2 %
Not good at all	3	1 %
Don't know	11	4 %
Sum	310	100 %

**Table 4.10. Would respondents consider buying more climate friendly products?**

Not answered	0	0 %
Yes, absolutely	143	46 %
Yes, to some extent	144	46 %
No, hardly	10	3 %
No, absolutely not	2	1 %
I'm already doing all I can	7	2 %
Don't know	4	1 %

**Graph and table 4.11. Is a climate label trustworthy if it is put forward and is controlled by the producer?**

Not answered	0	0 %
Yes, absolutely	35	11 %
Yes, to some extent	108	35 %
No, hardly	109	35 %
No, absolutely not	31	10 %
Don't know	27	9 %

**Graph and table 4.12. Can respondents as consumers influence producers to make them display the emissions of green house gases their products have caused?**

Not answered	0	0 %
Yes, absolutely	73	24 %
Yes, to some extent	166	54 %
No, hardly	35	11 %
No, absolutely not	6	2 %
Don't know	30	10 %

**Graph and table 4.13. Willingness to pay for lower emitting salad version X**

Not answered	3	2 %
Don't buy salad	10	6 %
Not more	51	33 %
< 10 % more	32	21 %
< 20 % more	29	19 %
< 30 % more	14	9 %
Over 30 % more	2	1 %
Don't know	14	9 %
Sum	155	100 %

**Graph and table 4.14. Willingness to pay for lower emitting salad version Y**

Not answered	3	2 %
Don't buy salad	6	4 %
Not more	31	20 %
< 10 % more	29	19 %
< 20 % more	47	30 %
< 30 % more	19	12 %
Over 30 % more	11	7 %
Don't know	9	6 %
Summa	155	100 %

**Graph and table 4.15. Willingness to pay for lower emitting milk version X**

Not answered	3	2 %
Don't buy milk	8	5 %
Not more	36	23 %
< 10 % more	38	25 %
< 20 % more	16	10 %
< 30 % more	32	21 %
Over 30 % more	16	10 %
Don't know	6	4 %
Summa	155	100 %

**Graph and table 4.16. Willingness to pay for lower emitting milk version Y**

Not answered	3	2 %
Don't buy milk	10	6 %
Not more	18	12 %
< 10 % more	25	16 %
< 20 % more	37	24 %
< 30 % more	33	21 %
Over 30 % more	24	15 %
Don't know	5	3 %
Summa	155	100 %

**Graph and table 4.17. Willingness to pay for lower emitting beef version X**

Not answered	6	4 %
Don't buy meat	25	16 %
Not more	46	30 %
< 10 % more	46	30 %
< 20 % more	13	8 %
< 30 % more	6	4 %
Over 30 % more	2	1 %
Don't know	11	7 %
Summa	155	100 %

**Graph and table 4.18. Willingness to pay for lower emitting beef version Y**

Not answered	2	1 %
Don't buy meat	17	11 %
Not more	31	20 %
< 10 % more	53	34 %
< 20 % more	23	15 %
< 30 % more	7	5 %
Over 30 % more	13	8 %
Don't know	9	6 %
Summa	155	100 %

**Graph and table 4.25. Willingness to drink tap water instead of bottled water.**

Not answered	6	2 %
I don't drink bottled water	185	60 %
Yes, twice a week	75	24 %
Yes, once a week	18	6 %
Yes, but more seldom	12	4 %
No, probably not	9	9 %
Don't know	5	2 %
Sum	310	100

**Graph and table 4.26. Willingness to eat potatoes instead of rice**

Not answered	5	2 %
I don't eat rice	34	11 %
Yes, twice a week	148	48 %
Yes, once a week	56	18 %
Yes, but more seldom	31	10 %
No, probably not	29	9 %
Don't know	7	2 %
Sum	310	100 %

**Graph and table 4.27. Willingness to eat pork instead of beef**

Not answered	7	2 %
I don't eat beef	45	15 %
Yes, twice a week	111	36 %
Yes, once a week	59	19 %
Yes, but more seldom	35	11 %
No, probably not	44	14 %
Don't know	9	9 %
Sum	310	100 %

**Graph and table 4.28. Willingness to eat chicken instead of beef**

Not answered	5	2 %
I don't eat beef	42	14 %
Yes, twice a week	133	43 %
Yes, once a week	62	20 %
Yes, but more seldom	24	8 %
No, probably not	38	12 %
Don't know	6	2 %
Sum	310	100 %

**Graph and table 4.29. Willingness to eat beans instead of beef**

Not answered	5	2 %
I don't eat beef	38	12 %
Yes, twice a week	54	17 %
Yes, once a week	61	20 %
Yes, but more seldom	50	16 %
No, probably not	95	31 %
Don't know	7	2 %
Sum	310	100 %

	# of X	# of Y	% of X	% of Y
Not answered	6	3	4 %	2 %
Production label	62	81	40 %	52 %
Product label	53	32	34 %	21 %
Some other label	16	16	10 %	10 %
Don't know	18	23	12 %	15 %
Sum	155	155	100 %	100 %

**Graph and table 4.37. Respondents preferred type of label version X**

## **Appendix 3**

### **Sampled stores**

#### **Lund:**

Ica Malmborgs Tuna, Tunavägen 39, 223 63 Lund, Is a large to medium large Ica store. Many students and teachers from the near by Economy departments of the university shop here.

Willys, Magistrats vägen 12, 226 43 Lund. Willys store located near the student area Delphi. Costumers come also from other near by neighborhoods and from the rest of the city.

Konsum, Mårtensstorget, 13 223 51 Lund, Large Domus store in the city center. High degree of young costumers.

#### **Malmö:**

Ica Malmborgs Caroli, Stora Kvarngatan 53, Malmö Large inner city Ica store.

Willys, Malmö Willys, Celsiusgatan 38  
212 14 Malmö. Large Willys store situated in-between a low income neighborhood and a run down industrial area. Costumers both from near by areas and from the rest of the city.

Coop Forum, Stadiongatan 24, 217 62 Malmö. Largest type of Coop store with many elderly costumers from near by neighborhoods as well as costumers from the rest of the city.

#### **Staffanstorp:**

ICA Supermarket, Bråhögsplassen 1, 24531 Staffanstorp, Medium large Ica store in central Staffanstorp.

Willys, Barkvägen 32, 245 92 Staffanstorp. New built Willys store out side of town. The few costumers seem to be people passing by on nearby trafficked roads.

Coop konsum, Malmövägen 12, 24531, Staffanstorp, Small Coop neighborhood store in central Staffanstorp.

#### **Eslöv:**

Ica Kvantum, Kvarngränd 1, 24138 Eslöv. Medium large Ica store in central Eslöv.

Coop Extra Västerlångg. 12, 24131 Eslöv, Medium large Coop store with low price profile located in central Eslöv.

#### **Löddeköpinge:**

Ica Maxi, Marknadsv 8, 24642 Löddeköpinge, Very large Ica store situated at the shopping mall area Center Syd. Costumers are people going home from work on the close by highway E6 and other visitors to the shopping mall area.

Willys, Varuvägen 1, 246 42 Löddeköpinge, Large Willys store situated at the shopping mall area Center Syd, Customers are people going home from work on the close by highway E6 and other visitors to the shopping mall area.

## Appendix 4:

### Calculations and sources for surveys

**4.5.1 Question 12 “If you chose tap water instead of bottled mineral water your emissions of Co2 are reduced with 40 g of Co2/glas. To reduce your impact on climate would you consider choosing tap water instead of bottled water?”**

Calculations based on a 20 centiliter glass of water (Aftonblader 2007 )

**4.5.2 Question 13 “If you chose potatoes instead of rice your emissions of Co2 are reduced with 400 g of Co2/portion. To reduce your impact on climate would you consider choosing potatoes instead of rice?”**

Calculations based on a 200 gram portion (Aftonblader 2007 )

**4.5.3 Question 14 “If you chose pork instead of beef your emissions of Co2 are reduced with 1300 g of Co2/portion. To reduce your impact on climate would you consider choosing pork instead of beef?”**

Calculations based on a 140 gram portion (KRAV )

**4.5.4 Question 15 “If you chose chicken instead of beef your emissions of Co2 are reduced with 1600 g of Co2/portion. To reduce your impact on climate would you consider choosing chicken instead of beef?”**

Calculations based on a 140 gram portion of beef and 200 gram portion of chicken (KRAV )

**4.5.5 Question 16 “If you chose beans instead of beef your emissions of Co2 are reduced with 1900 g of Co2/portion. To reduce your impact on climate would you consider choosing beans instead of beef?”**

Calculations based on a 140 gram portion of beef and 200 gram portion of beans (KRAV Aftonblader 2007)

Aftonbladet 2007-02-23 <http://www.aftonbladet.se/nyheter/article405721.ab> 090525 Data originates from the project Menuetool [http://www.ima.kth.se/pdf/menutool\\_slutrapport.pdf](http://www.ima.kth.se/pdf/menutool_slutrapport.pdf) 090525

KRAV

[www.kostochnaring.se/kompetensdagar/docs/krav\\_klimatsmart\\_mat\\_dokumentation.ppt](http://www.kostochnaring.se/kompetensdagar/docs/krav_klimatsmart_mat_dokumentation.ppt) - 090525