# Choice experiment amongst Dutch consumers: Willingness to Pay for sustainability attributes of pork products

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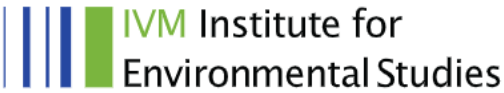


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# Preface

This thesis was written as part of my final research project for the Master's programme *Environment and Resource Management* at the *Vrije Universiteit Amsterdam*. Several people have been a big support during this process. First and foremost, I would like to thank my supervisor Dr. Mark Koetse, who has guided me through the process and regularly taken time out of his busy schedule to teach me new skills, discuss the progress of the project, and guide me in the right direction. I would not have been able to carry out this project without his help, and I have learned a lot from him about choice experiments and economic analysis. Moreover, I would like to thank the municipality of Haarlem, Netherlands, for wanting to collaborate with me on this thesis as part of the Cities2030 project. Even though things did not work out the way they were initially planned, I want to give a special thanks to Mr. Stephan Kooijman who was immediately enthusiastic about my project and facilitated contact with other people in the municipality. It was energizing being surrounded by someone who saw the potential of this study and who was as enthusiastic about it as I am. I would also like to thank all the people who took the time to participate in my study and filled in the questionnaire. Without their inputs, this study would not have been possible. A special thanks goes to my mom, who helped me enormously in gathering more participants through her own professional network, and to all other people who have spread my questionnaire. Lastly, I want to express how grateful I am for my friends, family and fellow students who have been there during the past months to help me stay focused as well as make me realize I am not alone in this. Writing a thesis can be a lonely road, and even more so when it takes place during a lockdown as part of a global pandemic. Despite the fact that most of us really missed the real-life contact and gatherings this year, we managed to find new and creative ways to keep supporting each other.

## Abstract

While livestock production has substantial damaging effects on the environment, human health and animal welfare, these negative externalities are not accounted for in the retail price of animal products. Internalizing externality costs can serve as a stepping stone towards more sustainable production. Because consumer willingness to pay (WTP) is crucial for more sustainable production processes to be viable, this study aimed to investigate Dutch consumers' WTP and relative preferences for sustainability attributes of pork. Using a choice experiment with 131 Dutch consumers, we examined whether fat content, animal welfare, production method, $CO_2$ emissions and price influence consumer choice. A random parameters logit model was estimated to show that all these attributes significantly impacted the choice of pork products and that preferences were heterogeneous among consumers. Animal welfare particularly positively affected consumer choice, attracting premiums of 58% on average. The second most preferred attribute was organic production, followed by low and average $CO_2$ emissions. These attributes attracted premiums of 42%, 41% and 28%, respectively. Fat content was negatively valued: every percentage point increase in fat content resulted in a 5% decrease in WTP. In line with previous studies, WTP values could be partially predicted by gender, age and income. This study gives a good indication of consumer values and suggests that Dutch people would be willing to pay significant premiums in order to guarantee that pork production becomes more animal- and environmentally friendly. This holds great potential for internalizing externalities into meat prices and increasing the sustainability of livestock production systems.

# List of acronyms

| | |
|---|---|
| **BAU** | Business as usual |
| **CE** | Choice experiment |
| **D66** | Democraten 66 (*English: Democrats 66*) |
| **EU** | European Union |
| **GHG** | Greenhouse gas |
| **KDE** | Kernel density estimate |
| **PvdD** | Partij voor de Dieren (*English: Party for the Animals*) |
| **TP** | True pricing |
| **WTP** | Willingness to pay |

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# 1. Introduction

## 1.1 Research problem

What we choose to eat has significant impacts not only on our health but also on the environment. Global food production is currently the single largest driver of environmental degradation, climate instability and the transgression of planetary boundaries[1]. The global food system is one of the main fields to be considered to achieve sustainable development and plays a crucial role in addressing economic, environmental and ethical problems[2]. Agriculture is responsible for 70% of global freshwater withdrawal and 30% of energy use[3,4]. Furthermore, it causes approximately 30% of greenhouse gas (GHG) emissions[5], with the livestock sector being the biggest emitter at 8-18% of global emissions[6-8]. The livestock industry is particularly damaging because it leads to water depletion; emits high amounts of GHGs leading to climate change; disrupts the phosphorus and nitrogen cycles; causes soil, freshwater and air pollution; and leads to deforestation and biodiversity loss[9-14]. Moreover, it negatively influences animal welfare[15,16] and can damage human health through pollution and consumption[13,17-21]. As these negative externalities are not sufficiently accounted for in the retail price, animal products are currently heavily underpriced and overconsumed, leading to substantial external societal costs. Sustainability issues related to livestock production are expected to increase as the demand for animal products keeps growing due to population growth and increasing meat consumption[22,23].

Public interest in sustainability issues has increased during the past years due to growing concerns about climate change and the state of the environment[24]. This also goes for the livestock industry: consumers are more and more concerned about where and how their animal products are made and increasingly think about the social, ethical and environmental aspects[25,26]. Such increased public interest is also the case in the Netherlands, where, for example, broiler and pig production systems have been under increased public scrutiny due to their negative impacts on animal welfare, the environment and public health[27-29]. Societal criticism persists even though the EU has passed legislation to diminish these negative externalities[30-32]. This criticism implies that further improvements in animal welfare, mitigating environmental degradation and improving food safety should be implemented[33].

It is important to understand the value that consumers give to the different sustainability attributes of animal products. By making trade-offs, consumers make choices that consider the social, ethical and environmental aspects of the animal products they buy based on personal preferences[34,35]. For example, regarding livestock production, trade-offs exist between animal welfare, animal health and environmental impact. These kinds of trade-offs influence consumers' willingness to pay (WTP) (i.e. the maximum price someone is willing to give up to receive a specific benefit[36]).

## 1.2 Research objective and relevance

Until now, no studies have looked at the WTP of Dutch consumers for different sustainability aspects of animal products. It is important to fill this gap in research since consumer preferences for different sustainability attributes and WTP for these various attributes differ between countries and cannot be generalized. Understanding consumer WTP for different sustainability attributes of pork is essential for several reasons. Generally, sustainable products are more expensive. Changing production practices to be more sustainable and making sustainability claims accordingly costs more money than just producing the conventional way. Hence, consumer WTP is crucial for more sustainable production processes to be viable[2]. Understanding consumers' preferences towards and valuation of several

sustainability claims will provide crucial information for producers and other stakeholders in the food supply chain about whether the costs of investing in more sustainable farming systems could be compensated[24,33]. Moreover, it helps marketers understand which labels to use and focus on[24,37]. Lastly, it provides valuable information for public policymakers concerned with designing and implementing production or labelling regulations regarding food product sustainability[24].

This research takes pork as an example, as pork accounts for almost 50% of all meat eaten in the Netherlands[10]. Hence, it results in the highest total societal costs, which amount to 2,530 million euros per year – more than twice as high as the total societal costs for beef and almost four times as high as the costs for chicken[38]. Following this information, the main research question of this project was:

*Which sustainability attributes of pork products do Dutch consumers value most, and what is their WTP for these attributes?*

Using a choice experiment (CE), consumer preferences were assessed, and WTP for a set of sustainability attributes of pork products was elicited. The CE method is an economic valuation method that elicits WTP using a stated preference technique[39]. CEs are often used to analyze the relative importance consumers give to specific product characteristics and find their WTP for these characteristics[39]. CEs are hypothetical because respondents do not have to exchange real money[40]. Rather, real-life purchasing situations are simulated by forcing consumers to make trade-offs between different product attributes, which can help analyze how consumers prioritize and value different product characteristics[41]. CEs have often been used in earlier studies to evaluate consumer preferences towards meat sustainability attributes[24,37,42-46]. The attributes evaluated in this specific experiment were animal welfare, fat content, $CO_2$ footprint, and production method. So far, no other study has examined how Dutch consumers value such a set of sustainability attributes of pork products.

By evaluating consumer preferences and WTP regarding sustainability attributes of pork, this study focuses on investigating how negative externalities of livestock production systems can be better dealt with. From an animal welfare and environmental sustainability perspective, the most desirable solution is a drastic reduction in meat production and consumption to reduce the negative externalities related to animal agriculture[1,11,47-49]. However, whereas a small part of the Dutch population (4%-5%) indicates to not consume meat at all and this amount has been increasing over the last years, most Dutch people still consume meat regularly[50]. Given that global meat demand is only expected to rise during the next decades[22,23], this study seeks to add to the debate on how the negative externalities of livestock production systems can be reduced.

# 2. Literature review

## 2.1 Consumer WTP for sustainability attributes of meat

Over the recent years, multiple studies have looked into consumers' WTP for sustainability attributes of meat. Attributes that have often been evaluated are health aspects (e.g. fat content, protein content, microbial contamination, traceability), environmental aspects (e.g. carbon footprint, manure used for fertilization), production methods (e.g. organic, GMO-free, antibiotic use), animal welfare (e.g. free-range, outdoor access, no fixation), origin (e.g. local, national, international) and price. Attribute preferences and WTP outcomes differ highly between and even within countries and can therefore not be generalized.

Regarding health aspects of meat, UK consumers seem highly influenced by meat's fat content when deciding which meat to buy. It was considered the second most important attribute after meat type. The higher the fat content, the less likely consumers were to buy the meat[43]. A previous Finnish study also confirmed this. Finnish consumers valued fat content the most of all attributes and were willing to pay the highest premiums (16.3%) for this low fat attribute[42]. Polish and German consumers also valued low fat content more than animal welfare and environmental attributes[44]. A recent choice experiment[37] in seven European countries (Finland, France, Greece, Italy, Spain, Turkey and the UK) revealed quite some differences. Little visible fat on meat only increased the WTP of French (€2.26/kg) and Italian (€1.10/kg) consumers.

When looking at environmental aspects, French, Greek, Spanish and Turkish consumers would be willing to pay more for meat with a lower carbon footprint. In contrast, Finnish, Italian, and UK consumers would not. However, WTP for a lower carbon footprint was always lower than for other attributes and ranged from €0.78/kg for Turkish consumers to €1.03/kg for Spanish consumers[37]. The popularity of beef products also decreased amongst Finnish consumers when carbon footprint was presented; however, stating the carbon footprint only decreased the WTP by 1.9%[42]. Italian consumers' WTP was found to decrease by 1.6% when presented with the adverse environmental effects of beef production, and messages about environmental effects led to stronger variations in WTP than messages about health effects[51]. Both Polish and German consumers were willing to pay slightly more for pork with a lower carbon footprint; however, this was considered the least important of all attributes (i.e. price, animal welfare, health, safety and environment)[44]. Belgians also valued carbon footprint labels less than other meat attributes, especially animal welfare. Their WTP for a premium for lower carbon footprint was 24-36% for a 30% $CO_2$ reduction and 18-27% for a 20% $CO_2$ reduction[24].

Concerning production methods, research revealed that consumers in Finland, France, Greece, Italy, Spain, Turkey and the UK all highly value organic production. WTP premiums for organically produced meat ranged from €0.92/kg for Spanish consumers to €4.12/kg for French consumers. WTP for organic production was second highest – after national origin – for all countries except the UK, where WTP for organic production was highest of all attributes[37]. Conversely, previous research amongst UK consumers showed that organic production was less critical in determining meat choice than meat type, fat content, origin and price[43]. In Finland, organic production was found to have the largest positive effect on product choice compared to animal welfare and safety and health-focused production. On average, the WTP for a premium for organic pork was 7.4%[42]. German consumers also had a high preference for organic beef and were willing to pay premiums between €3.18 and €8.18 per 200 grams[46]. An older study in Greece even reported WTP premiums of 103-125% for organic

pork[52], which is considerably higher than Irish consumers, of whom the majority were willing to pay just 1-5% extra[53]. Unlike many others, Belgian consumers found organic labels for chicken less appealing than free-range or animal welfare labels but were still willing to pay premiums of 12%[24].

Regarding animal welfare, several meta-analyses found that better animal welfare significantly increased consumers' WTP for meat products[54,55]. Consumers were willing to pay premiums of 7-14% for higher animal welfare[54]. However, animal welfare is often not the most important meat attribute among EU citizens compared to more traditional attributes such as fat content and origin[56], even though most European citizens claim to find animal welfare important[28]. UK consumers were willing to pay a price premium of 16% for meat from animals with improved animal welfare[57], which was even 19-23% for Spanish consumers[58]. Another study confirmed that Spanish and Italian consumers seem to have a higher WTP for animal welfare than German, French and UK consumers[56]. Compared to Polish consumers, Germans also valued animal welfare more, even though for both countries, health and safety aspects were more important than animal welfare[44]. In Finland, particular consumer segments were willing to pay significantly more for higher animal welfare, though organic production was considered more important. When higher animal welfare was paired with a lower fat content, Finnish consumers were willing to pay 14.3% more for beef and 19.2% more for pork. However, when fat content was not defined, this amount dropped to 3.1% for beef and 4.3% for pork[42]. Belgian consumers highly valued animal welfare labels and were willing to pay 26-39% more for them[24].

Concerning the origin of meat, national origin was most preferred and elicited the highest WTP amongst Finnish, French, Greek, Italian, Spanish, Turkish and UK consumers, ranging from €1.00/kg for UK consumers to €7.48/kg for French consumers[37]. Previous research also shows consumer preferences for local and national produce in Spain, France, UK[43,59,60], Germany, and Poland[44]. However, origin was not included as an attribute in this choice experiment given that most of the pork consumed in the Netherlands is already domestically produced; hence, it already generates the highest possible utility for consumers.

Lastly and logically, increasing prices were often associated with lower utility and demand[24,42,45,46]. A meta-analysis shows that a 1% increase in meat price leads to a 0.42% decrease in demand[54]. However, price seemed to be relatively unimportant for consumers in many countries compared to other attributes such as origin, fat content, production method and meat type[43,44,46].

Based on the externalities most commonly evaluated in previous studies, this study will assess WTP for fat content, carbon footprint, animal welfare, and production method. Previous literature shows that people in other European countries are often willing to pay for these external costs. It was assumed that this would be the same for the Dutch population, leading to the first hypothesis:

- ***Hypothesis 1****: WTP for regular pork is lower than WTP for more sustainable pork.*

Based on previous research as described above, several other hypotheses were made. Organic production was highly valued and elicited the highest or second highest WTP of all attributes (price, origin, PGI/PDO, halal, carbon footprint, protein content, fat content and organic) in all seven EU countries[37], and was also found to be more important than animal welfare in Finland[42]. Hence, the second hypothesis is:

- ***Hypothesis 2****: on average, organic production of pork elicits a higher consumer WTP than all other attributes at their maximum levels.*

Furthermore, decreased carbon footprint was continuously considered least important in other EU countries, and WTP for a decreased carbon footprint was lower than for other attributes[24,37,42,44]. Therefore, the third hypothesis is:

- ***Hypothesis 3****: on average, a decreased carbon footprint of pork elicits a lower WTP than all other attributes at their maximum levels.*

## 2.2 Demographic factors and consumer WTP

Several demographic factors have been found to influence people's WTP for sustainability attributes of meat, such as gender, age, income and education. For instance, females and younger consumers tend to care more about sustainability and health[42,43,51,61,62], and WTP for animal welfare was found to decrease 3-10% by each additional year of age[55]. People with a higher income were more likely to support environmentally sustainable production practices[63] and sometimes willing to pay up to even 50% more for sustainability labels than those with a lower income[24]. Moreover, consumers with a higher education level were found to care more about sustainability and the environment and had a higher WTP for sustainable products[2]. Given that previous studies showed that sociodemographic factors might influence people's WTP for sustainability attributes of meat, a sub-question of this research is:

*Which sociodemographic factors influence Dutch consumers' WTP for sustainability attributes of pork products?*

# 3. Theoretical background

## 3.1 Theory of environmental externalities

Several existing theories and concepts are valuable with regards to analyzing Dutch consumers' preferences and WTP for sustainability attributes of pork. Among those is the *theory of environmental externalities.* The theory of environmental externalities explains a core market failure in environmental economics (i.e. a situation in which an unregulated market fails to produce an outcome that is the most beneficial to society as a whole). It comes from the notion that market exchanges can also impact parties other than just the buyers and sellers, either in a positive or negative way[64]. For example, someone buying meat also affects other people, such as indigenous communities in the Amazon whose land is deforested to produce soy as feed for livestock[65], or those who are exposed to air pollution (i.e. ammonia and nitrogen oxide emissions) and water pollution (both nitrogen and phosphorus) resulting from livestock farming[66]. These third-party impacts are known as *externalities* and should be considered when assessing the overall costs and benefits of a market activity[64] such as meat production.

However, in most markets, only the *marginal costs and benefits* of a transaction are reflected in the demand and supply curves. This leads to an *equilibrium* ($Q_m$, $P_m$) in which private supply and private demand intersect, as shown in Figure 1 for a hypothetical pork market. Without externalities, this equilibrium represents a situation of economic efficiency because it maximizes the total benefits of the market, but clearly the negative externalities of pork production and consumption are abundant and substantial. Not considering negative externalities leads to net social benefits being overestimated. By internalizing externalities – i.e. incorporating the external costs into market decisions – net social benefits are maximized. This would result in a new cost curve, the so-called *social marginal cost curve* (also shown in Figure 1), which incorporates both the private production costs (e.g. livestock, feed, labor, and electricity costs) as well as the external costs (e.g. costs of water and air pollution, deforestation, contribution to climate change)[64].

One can see that in Figure 1, the social marginal cost curve moves away from the private marginal cost curve, indicating that the social marginal costs increase with the production and consumption of more pork. Several examples illustrate why this is likely. For instance, the GHG emissions caused by pork production can accelerate global warming. The impacts of global warming are typically more than linear, meaning that if global warming doubles, its impacts (e.g. on mortality, ecosystems and income) more than double[67,68]. Another example is the risk of zoonoses, which has been found to increase with the intensification of livestock production, for instance through concentration of animals in confined units and the sustained use of antibiotics[69,70]. Moreover, water use associated with livestock farming can pass critical thresholds if production keeps increasing, affecting both humans and the environment[71]. Additionally, the costs of adverse health impacts are assumed to increase as the consumption of pork increases. If (more) people consumed more pork, the risk of coronary heart disease, stroke, type-2 diabetes[18,19] and certain types of cancer such as colorectal cancer[17,20,21] would increase, leading to higher costs of the public health system as more people become sick.

The production costs and external costs together account for the *total social costs* of producing a good or service. Figure 1 shows that marginal benefits exceed social marginal costs until the point $Q^*$. After that, for every unit of pork produced, society would become worse off since marginal social costs would exceed marginal social benefits. Thus, in an unregulated market, pork production would be too high: it would be at $Q_m$, a point at which social marginal costs exceed marginal benefits. The optimal

level of pork production is $Q^*$ instead of the market outcome $Q_m$. The market price ($P_m$) also fails to reflect the *true social costs* of pork as it fails to account for externalities. The *socially efficient price* is actually higher ($P^*$)[64].

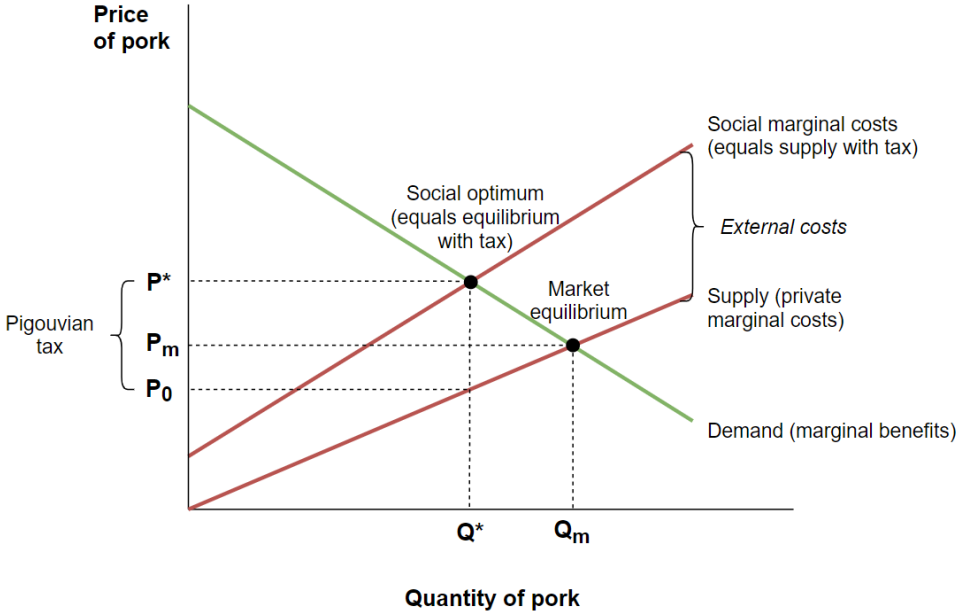


***Figure 1*** *Hypothetical market for pork including negative externalities and Pigouvian tax*

Internalizing negative externalities can be done in several ways, of which the most common is imposing a tax. This approach is known as *Pigouvian taxation* (i.e. after Arthur Pigou, a famous British economist in the 1920s)[72]. A Pigouvian tax is a per-unit tax set equal to the marginal external costs caused by producing a good or service in the social optimum[72]. Taxation follows the *polluter pays principle* since the people responsible for the pollution pay for the damages they impose upon society. To illustrate, setting a production tax equal to the marginal external costs related to pork production would increase the marginal cost of production to meet the social marginal cost curve in Figure 1, resulting in a market shift to a new equilibrium that is socially optimal (at $Q^*$, $P^*$). The Pigouvian tax would then be equal to the price that consumers pay for pork (P*) minus the price that the producers receive ($P_0$)[64].

## 3.2 Welfare analysis

As an integral part of economic theory, *welfare analysis* can show in more detail why it is socially preferable to internalize externalities. Welfare analysis shows total social welfare by identifying areas on the supply and demand graph that can measure total benefits and costs. The area under the demand curve indicates the total benefit to consumers, whereas the area under the supply curve shows the total costs to producers[64]. Without internalization of externalities, the difference between total benefits from consumption (i.e. the entire area under the demand curve up to $Q_m$) and the total price they pay ($Q_m$*$P_m$) results in total net consumer benefits, also called *consumer surplus* (green area in Figure 2). Producers' net benefit is called *producer surplus* (red area in Figure 2) and is defined as the difference between their production costs (area under supply curve up to $Q_m$) and revenues ($Q_m$*$P_m$). As previously explained, the market equilibrium is only economically efficient in case of absence of externalities. If there are no externalities, the market equilibrium maximizes net social benefit, and this net social benefit would be equal to the consumer surplus plus the producer surplus[64].

However, in the presence of externalities, such as is the case for the pork market, net social benefits can be defined as the sum of consumer and producer surplus minus total external costs[64]. External costs are the difference between social marginal costs and private marginal costs and are illustrated by the grey shaded area in Figure 2. In a pork market where we do not correct for welfare loss due to externalities, Figure 2 shows that net social welfare would be equal to:

*OEC (the sum of the consumer and producer surplus) – OEBA (external costs) – BDE (external costs)*
*= OEC – OEDA =* ***ABC – BDE***

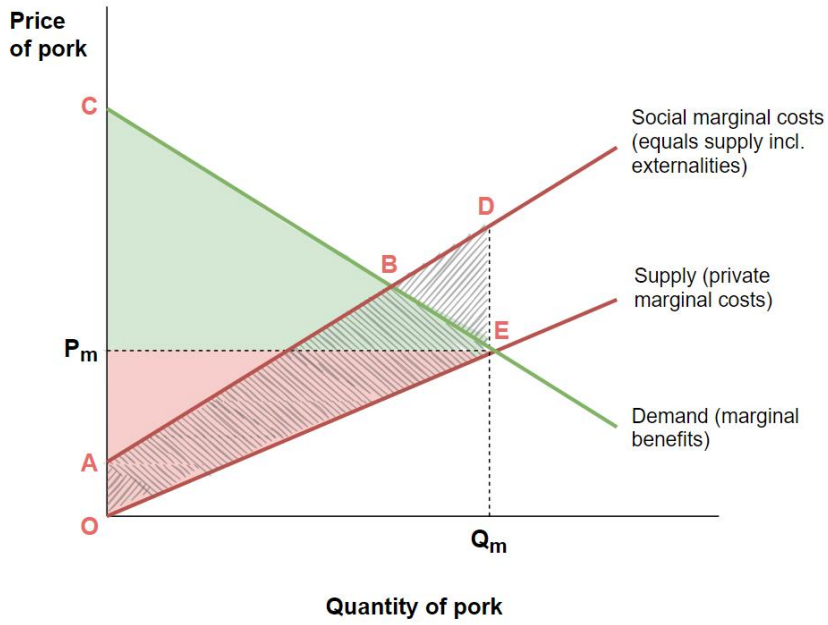


***Figure 2*** *Welfare analysis of a hypothetical pork market with externalities (without Pigouvian tax)*

As previously explained, a Pigouvian tax is equal to the marginal external costs in the social optimum[72]. Figure 3 illustrates that if we introduced a Pigouvian tax (B – F) into this pork market to internalize the externalities, the equilibrium would shift from $Q_m$ to $Q^*$. The new price on the market without tax would then become $P_0$, which is the price that producers will receive, whereas the price that consumers would pay would become P*. Due to introduction of the tax, the consumer surplus (green area) changes to area BCP*. Because a tax was introduced, the producer surplus is evaluated at a different price than the consumer price, and producer surplus (red area) becomes $OFP_0$. Since production is now at level $Q^*$ instead of $Q_m$, the externality costs (grey shaded area) decreased as well. Because the per-unit tax is equal to the vertical distance between the two supply curves (B – F) and tax is collected for $Q^*$ pork products, total tax revenue can be indicated by the yellow area in Figure 3. Figure 3 then demonstrates that net social welfare after introduction of a Pigouvian tax is the sum of consumer and producer surplus minus the externality damages plus the benefit of tax revenues, which is equal to:

*BCP* (consumer surplus) + $OFP_0$ (producer surplus) + $BFP_0P^*$ (tax revenue) – OFBA (external costs)*
*=* ***ABC***

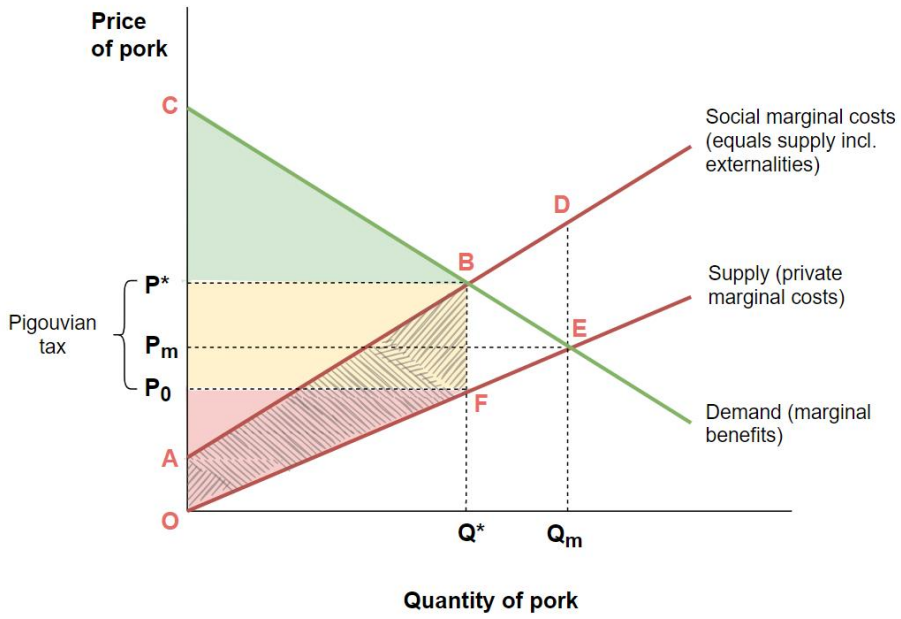


***Figure 3*** *Welfare analysis of a hypothetical pork market with externalities (with Pigouvian tax)*

This shows that in case of externalities, net social welfare increases due to introduction of a Pigouvian tax[64]; area ABC (net social welfare after introducing a Pigouvian tax) is bigger than area ABC – BDE (net social welfare before introducing a Pigouvian tax). Thus, introducing a Pigouvian tax increases net social welfare by helping us eliminate the *deadweight loss* (area BDE) in a market, which is the net loss of welfare due to not being in the social optimum[73].

## 3.3 True pricing

Another concept to internalize externalities of unsustainable products is True Pricing (TP). TP refers to internalizing the external costs of a product through so-called *true prices*[74], illustrated in Figure 4. TP makes a distinction in external costs between *natural costs* – such as contribution to climate change and water pollution – and *social costs* – such as child labour and underpayment[75,76]. The normative foundations underlying TP are rights-based. Generally accepted sets of rights for current and future generations are used, such as Human Rights, Fundamental Labour Rights and Environmental Rights[76]. Within the concept of TP, valuation of external costs is done based on *remediation costs*, the costs required to remediate the negative societal and environmental impacts of a product[77]. These remediation costs consist of restoration costs, compensation costs, prevention of re-occurrence costs, and retribution costs[76,77]. TP is based on the notion that all economic actors collectively have a responsibility to either produce and consume sustainable products or remediate these negative externality costs. The *true price gap* represents the sum of all remediation costs per unit of a specific product. The *true price* can then be seen as a virtual buying price that consists of the market price plus the true price gap[77].

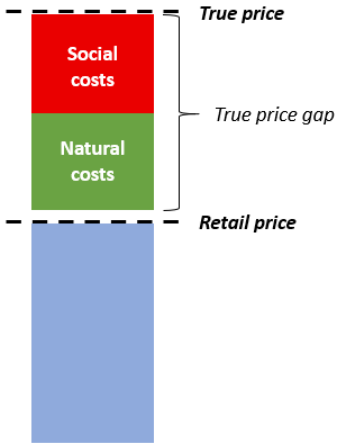


***Figure 4*** *Illustration of True Prices*

The underlying idea of TP is that the key issue driving many global problems nowadays is that those who cause the problems often do not bear the costs; negative externalities are not internalized. This

underlying idea is the same as in the theory of environmental externalities[64] discussed in paragraph 3.1. However, the fundamental difference between TP and Pigouvian taxation is that TP is an approach based on the remediation costs of violated rights, whereas Pigouvian taxation is based on the theoretical approach of welfare economics. The true price of a product includes the remediation cost of impacts related to violations of rights of present and future generations. Therefore, it should not be read as the *equilibrium price* of a product if all externalities would be internalized into the market price (i.e. as would be defined from a perspective of welfare economics). Within TP, no specific attention is paid to how market prices are set (e.g. how taxes and subsidies contribute to this), and externalities and market distortions caused by market power, taxation and subsidies are not included in the true price gap. TP also does not specify what would be the equilibrium market price of a sustainable product. Instead, the true price is calculated as a 'snapshot', adding the costs of current negative externalities of a particular production system to the retail price. In reality, if these costs would actually have to be paid, changing the production and consumption systems such that these costs would be reduced would sometimes be more efficient. Accordingly, the true price in a sustainable equilibrium would differ from the true price in the current market system. Moreover, positive externalities are only included in some specific cases[77]. There are several reasons for developing an approach rooted in generally accepted rights instead of welfare economics. Some of these are (1) avoiding netting positive and negative externalities, (2) avoiding unfair trade-offs, and (3) avoiding making assumptions on the substitutability of natural capital for other capitals[74,77].

TP can contribute to the transformation towards a more sustainable economy in many ways[75]. First, the true price gap indicates a virtual price that could, in theory, be paid to remediate a product's negative externality costs (i.e. if the infrastructure to pay and raise funds to remediate these externalities would exist). Second, in the future, voluntary payment of the true price gap could be considered an additional way for the public and private sector and civil society to focus on remediating negative externalities in value chains. Third, true prices could be used as a fundament for taxation to stimulate the prevention and remediation of negative externalities. Such a tax differs from a Pigouvian tax since it is not a payment for external costs based on evaluation of wellbeing but a payment for remediation costs, which are not relevant in welfare economics[77]. Fourth, true prices serve as a clear sustainability indicator that is comparable to a product's market price and simplifies comparing products based on their sustainability. Lastly, identifying and ranking the negative externality costs of a specific product or value chain can help businesses and governments prioritise efforts to improve sustainability[74].

## 3.4 Perceptions and environmental consequences of increased meat prices

When looking at the livestock sector in particular, negative externality costs are largely unaccounted for in retail prices and are currently borne by society. In the Dutch context, pork plays the most prominent role in causing negative externalities. Its retail price would increase by 53% compared to current supermarket prices if externalities such as climate and environmental impacts, loss of land and biodiversity, subsidies, and animal diseases would be internalized. This 53% is the minimum estimation: if other external costs such as antibiotic resistance, soil erosion, animal welfare and negative health impacts due to pork consumption were accounted for, this percentage would be even higher[38]. In this case, introducing a Pigouvian meat tax would increase net social welfare and make both society and the environment better off[64]. It is expected that such a tax would be welcomed by the majority of the Dutch population, as pig production systems have already been under increased public scrutiny due to their negative impacts on animal welfare, the environment and public health[27-

[29], and societal criticism persists despite the EU's efforts to diminish these negative externalities through legislation[30-32]. Recent research amongst the Dutch population indicates that the majority (52-69%) agrees that the government should impose a higher price for meat products[78,79]. The majority of Dutch people also agree that the livestock population should be reduced (54%); that we should abolish intensive livestock farming (60%); that extremely low prices for animal products should be forbidden (75%); and that the government should stop investing in the livestock sector (58%)[79].

Introducing a sustainability charge on meat, which would result in a new market equilibrium, has many benefits. By order of the True Animal Protein Price Coalition (i.e. an organization that wants to make the consumption and production of protein more sustainable in the Netherlands and Europe by introducing fairer prices for animal protein), Vergeer et al.[80] calculated that a meat price increase of only €2.00/kg in the Netherlands would have many advantages. It would lead to 4.2 Mt $CO_2$e less by 2030 and result in a general welfare increase of 791 million euros. Additionally, meat consumption would decrease by 49% compared to 2019, and pork consumption would even decrease by 58%. Government income would increase by 1,356 million euros per year by 2030. This revenue could be used to subsidize more sustainable farming practices such as improving animal welfare and investing in farming techniques with lower GHG emissions. Another important use of this revenue could be compensating households for their reduced purchasing power, for example by issuing higher health care allowances, lowering taxes on fruit and vegetables and giving extra compensation to low-income households.

Additional findings from a recent representative consumer survey amongst 1,558 German, French and Dutch consumers showed that 55% were ready to accept a higher meat price implemented by governments in order to compensate for the external costs of meat. The conditions are that the revenues of a higher meat price are used to reduce vegetable and fruit prices, that farmers are paid to increase sustainability and animal welfare standards, and that low-income groups are compensated. Approximately 33% of consumers were neutral about the proposal, and only 12% were opposed to fair and higher meat prices[81].

Over the past year, political support for higher meat prices has also grown in several countries as well as at EU level[81]. For example, in the Netherlands, left-wing parties such as PvdD and Groenlinks, democratic party D66 and Christian party ChristenUnie have all said to be in favour of a meat tax[82]. In Germany, plans for a meat tax have been taken a step further as Julia Klöckner, minister of agriculture, proposed concrete pathways to finance a price increase of animal products to improve animal welfare. This could be done by increasing the tax rates on animal products from 7% to 19%, or by implementing separate fees on animal products of €0.47 per kg meat, €0.02 per liter milk, and €0.02 per egg. Such measures would result in a state revenue of 4.2 to 6.3 billion euros annually, that could be used to make animal agriculture more sustainable[83]. The proposal of such an animal welfare fee would be supported by ~68% of German, French and Dutch consumers. Most consumers even thought this fee was too low: 80% of Germans, 67% of French people and 63% of Dutch people were willing to pay a meat tax of €1/kg under the condition that the tax enables farmers to improve animal welfare and decrease $CO_2$ emissions, and allows workers in slaughterhouses and farms to receive a better income[81]. What was surprising is that right-wing voters, in general, seemed to support a meat price increase of at least 1€/kg even more than left-wing voters[81], even though meat taxation has, in the Netherlands, only been on the agenda of left-wing parties so far[82]. This emphasizes the broad support amongst voters on the whole political spectrum for fair and honest meat prices.

# 4. Methodology

## 4.1 The discrete choice model

Choice experiments (CE) are often used to analyze the relative importance consumers give to specific product characteristics and find their WTP for these characteristics[39]. Hence, the main research question (i.e. *which sustainability attributes of pork products do Dutch consumers value most and what is their WTP for these attributes?*) was investigated through a CE. The CE method is an economic valuation method that elicits WTP using a *stated preference* technique, meaning that respondents are urged to make choices based on hypothetical scenarios[39,84]. CEs aim to see how people respond to this range of hypothetical choices and to establish the extent of WTP for a particular benefit by presenting people with several choice sets consisting of two or more different products or services described by their attributes. Respondents are then asked to choose one based on these differing characteristics[39].

According to Lancastrian consumer theory[85] and random utility model (RUM)[86], choices made in a CE reveal consumer trade-offs between the attributes of the goods[39]. Lancaster[85] proposed an alternative approach to the traditional analysis of consumer demand. Instead of assuming that consumers derive utility from certain goods, he proposed that consumers derive utility from the good's characteristics or attributes. Hence, it is not the goods themselves that are demanded. This approach helps us predict how consumer preferences will change when a certain good's characteristics or attributes are modified. RUM is derived from the economic assumption that a rational individual will select the option from a set of options that provides them with the greatest expected utility[86]. This utility is known to the decisionmaker but not to the researcher[87]. Because some of these utility aspects are unknown to the researcher, RUM models the utility a consumer derives from a good by making a distinction between a deterministic component (i.e. the part of the utility that the researcher can observe) and a random component (i.e. the remaining part of the utility that is unobservable to the researcher).

Analyzing trade-offs consumers make between the attributes of different products can reveal the value people ascribe to these different attributes[84]. Hence, this method is suitable for assessing the importance of different sustainability attributes of pork.

## 4.2 Product attributes

In this CE, pork was described using a combination of five attributes: fat content, animal welfare, production method, carbon footprint, and price. These are the attributes that have most often been evaluated in previous studies investigating WTP for sustainability aspects of meat[24,37,42-46,51,53,56-60]. Attributes and their levels can be found in Table 1.

***Table 1*** *Attributes and attribute levels of the Choice Experiment*

| ***Attributes*** | ***Attribute levels*** | | | | |
|---|---|---|---|---|---|
| **Fat content** | 5% | 10% | 20% | | |
| **Animal welfare** | No label | EU animal welfare label | | | |
| **Production method** | Conventional | Organic | | | |
| **Carbon footprint (kg $CO_2$e per kg pork)** | Small (≤4.3) | Average (4.4-6.6) | Large (>6.6) | | |
| **Price per kg** | €7.75 (BAU) | €8.53 (10% premium) | €9.69 (25% premium) | €11.63 (50% premium) | €13.56 (75% premium) |

The following section explains the chosen attributes and attribute levels.

- **Fat content**
  A relatively high proportion of fat in pork consists of saturated fat. Consuming too much saturated fat, for example through meat consumption, increases the risk of cardiovascular diseases[88]. Participants had to choose between pork with a fat content of 5%, 10% or 20%. Fat content was displayed both visually and verbally.

- **Animal welfare**
  Over the past years, multiple studies have revealed consumer concerns about animal welfare[28,35,55,57,89,90], and a previous meta-analysis demonstrated that people are willing to pay premiums for more animal-friendly meat[91]. Hence, the need for a standardized animal welfare labelling scheme at EU level was highlighted[92-94]. Since EU consumers have increasingly expressed their wish to be better informed on animals' farming conditions, the European Commission considers options for animal welfare labelling as part of the Farm to Fork Strategy[95]. This study tested people's WTP for such a standardized EU animal welfare label. Therefore, the animal welfare attribute had two levels: EU animal welfare label or no label.

- **Production method**
  The two production methods that repeatedly came back in previous studies regarding sustainability attributes of meat were conventional and organic production. Hence, these two methods have been used as levels for the production method attribute. Conventional farming is oriented towards using technology, irrigation water, pesticides, chemicals and other synthetic tools to cultivate crops, and often leads to detrimental environmental impacts to soil, surface water and groundwater resources, and pollutes drainage water[96]. Moreover, conventional agricultural practices do not include special measures to improve animal welfare[42], and pigs cannot display their natural behaviour[88]. On the contrary, pigs in organic farms have more space and distractions, eat organic feed and are given as few antibiotics as possible[43,88]. By refraining from using artificial pesticides and fertilizers, organic farming can help counteract loss of soil organic matter and biodiversity[97,98] and loss of associated ecosystem services[99]. Organic pig farming is better for the environment in terms of energy and pesticides used, $CO_2$, phosphate and sulfur dioxide equivalents emitted, and ammonia emitted. However, inorganic pig farming is better for the environment in terms of land used, nitrates and nitrous oxide emitted[71].

- **Carbon footprint**
  As consumers are becoming more concerned about the environmental impact of their food, they are becoming more interested in products' carbon footprint, food miles, and local food production[100-103]. Carbon footprint labels could become more widespread with increasing concerns about global warming[24,104]. A previous study among EU consumers shows that 72% of European citizens think carbon footprint labels should be mandatory in the future[105]. After a successful trial, the European Commission is now exploring how to integrate such labels into policies[106]. Given this information, carbon footprint has been included as an environmental attribute in this CE. Levels of carbon footprint were divided into small (≤4.3 kg $CO_2$e per kg of pork produced), average (4.4-6.6 kg $CO_2$e per kg of pork produced), and large (>6.6 kg $CO_2$e per kg of pork produced), based on a systematic review about the global warming potential of different food products[107]. To make the carbon footprint easier to understand, carbon emissions per kg of

pork were compared to kilometres driven in a passenger car, based on tailpipe emissions of passenger cars built in 2019[108].

- **Price**
  The business as usual (BAU) price was based on prices of pork chops in eight well-known Dutch supermarket chains (Albert Heijn, Jumbo, Plus, Hoogvliet, Dirk, Vomar, Coop, Poiesz) shortly before the CE was conducted. The average price was €7.75/kg. Six price levels were then chosen per kg of pork: €7.75 (BAU scenario), €8.53 (10% premium), €9.69 (25% premium), €11.63 (50% premium), and €13.56 (75% premium). A wide range of prices was preferred in the design in order to allow high WTP for the combinations of attributes that do not currently exist in stores.

## 4.3 Choice experiment design

Selected attributes and attribute levels were used to generate a so-called *optimal* or *statistically efficient design*, employing mostly qualitative priors based on theoretical considerations, using the Ngene software (http://ngene.org/). Statistically efficient designs maximize the amount of information gathered from a design. This distinguishes them from *orthogonal fractional factorial designs*, which are generated in such a way that the design's attributes are statistically independent while disregarding statistical efficiency. Consequently, optimal designs are statistically efficient but will likely contain correlations, whereas orthogonal fractional factorial designs do not have correlations but might not be the most statistically efficient designs available[109].

Generating this optimal design reduced the original 180 ($2^2 \times 3^2 \times 5$) combinations down to 30. These 30 choice sets were divided into five blocks of six choice sets, and participants were randomly assigned to one of the five blocks. Each choice set contained three alternatives (see Figure 5 for an example choice card), of which one was the BAU, to make the hypothetical choice more similar to a real shopping experience. In the Netherlands, the BAU alternative for this specific pork cut has a low fat percentage, does not have an EU animal welfare label, is conventionally produced, has a high carbon footprint (i.e. 7.4 kg $CO_2$e per kg pork[110]) and costs €7.75 on average.

| | Option A | Option B | Option C |
|---|---|---|---|
| **Meat and fat content** |  5% fat |  20% fat |  5% fat |
| **Animal welfare** | EU animal welfare label | EU animal welfare label | No label |
| **Production method** | Standard | Organic | Standard |
| **$CO_2$ emissions per kg** | Average – equal to driving a car for 36-54 km | Low – equal to driving a car for less than 36 km | High – equal to driving a car for more than 54 km |
| **Price per kg** | €8,53 | €13,56 | €7,75 |

***Figure 5*** *Example choice card*

Before answering the choice cards, participants were provided with information on the meaning of different attributes and attribute levels (see full questionnaire in Appendix 1), because this can influence their propensity to ignore certain attributes[111]. Moreover, a *cheap talk script* and certainty follow-up questions were included in the questionnaire to decrease hypothetical bias of the CE[112-114]. Cheap talk, made popular by Cummings and Taylor[113], is one of the earliest techniques used to decrease hypothetical bias and is still frequently applied. It makes respondents aware of hypothetical

bias and reminds them to answer the hypothetical choice as if it were a real-life purchase decision. A meta-analysis by Penn and Hu[114] emphasizes the value of cheap talk and certainty follow-up by showing that they are effective at reducing hypothetical bias.

## 4.4 Data collection

Data were collected during May 2021 through an online survey using the software Qualtrics (https://www.qualtrics.com/). The survey questions had a close-ended format, and the questionnaire was carried out in Dutch to decrease non-response bias. The full questionnaire, translated to English, can be found in Appendix 1. In addition to the CE, the survey also included several questions regarding pork consumption behaviour and participants' sociodemographic characteristics. For example, participants were asked whether and how often they eat pork for dinner, and a distinction was made between never consuming pork, daily pork consumption, multiple times a week, multiple times a month, or (less than) once a month. This information helped identify pork consumption behaviour of respondents and also served to exclude non-pork eaters from the choice experiment. In terms of sociodemographic questions, participants were asked to indicate their age, gender, net income per month, and highest completed level of education, in order to examine whether these factors had an influence on WTP. This was analyzed because previous research found that these factors influenced people's WTP for sustainability attributes of meat and for more sustainable products in general[2,24,42,43,51,55,61-63], as explained in paragraph 2.2.

The questionnaire was pretested with a group of 21 people that were selected through convenience sampling and snowball sampling. Participants of the pretest were asked to evaluate the clarity and length of survey elements and reflect upon whether they thought any important information or questions were missing. Based on the results of this pretest, most attributes and their levels were determined to work well. The levels of only one attribute, i.e. price, were adapted from showing a maximum price level of BAU plus 100% to a maximum price level of BAU plus 75%.

The target population of this study were Dutch pork consumers. Participants were recruited through convenience sampling, meaning that participants that were most accessible to the researcher were included[115]. Recruitment was done through LinkedIn, Instagram, Facebook, personal networks of the researcher and thesis supervisor, and snowball sampling. Though convenience sampling is a form of non-random sampling and may have led to biased results, random sampling was outside the scope of this research project due to high expenses and cumbersomeness[116]. However, the representativeness of the sample was taken into account during the analyses. Contact with participants and questionnaire administration was done electronically, and participants' anonymity was guaranteed.

## 4.5 Data analysis

Since it is assumed that individual preferences across respondents are heterogeneous because every person is different[117], and this heterogeneity should be addressed when analyzing consumer preferences[40,118,119], the discrete choice model was specified as a *random parameters logit (RPL) model.* RPL models can capture random taste variations and allow the unobserved, random part of utility to follow any distribution[120]. Because for RPL models parameters are assumed to vary amongst individuals, they take heterogeneity of the population into account. In this way, RPL models are aligned with reality, in which each individual has their unique collection of interconnected systematic and random components for every alternative in their perceived choice sets[121].

The RPL model, estimated with Nlogit 5.0 using 5000 Halton draws, was used to infer WTP from the trade-offs made by respondents. Price and fat content were modelled under a normal distribution, whereas animal welfare, production method, and $CO_2$ emissions were modelled under a uniform distribution. The BAU alternative was modelled as an alternative specific constant (ASC) and also modelled under a uniform distribution. WTP for each individual was calculated according to Hensher, Rose and Greene[121] as:

*WTP = –parameter of attribute / parameter price*

Using the software R for statistical computing and graphics (https://www.r-project.org/), kernel density estimates (KDE) were obtained to illustrate the distribution of WTP for each attribute. KDEs were used since they are useful for graphically presenting the distributions of WTP data[109]. Lastly, multiple regression analyses were conducted with IBM SPSS Statistics 27.0 to analyze whether age, gender, education and income could help predict WTP for sustainability attributes of pork.

# 5. Results

## 5.1 Characteristics of the sample

After removal of incomplete questionnaires and questionnaires from respondents indicating not to consume pork, of the original 166 responses, 131 usable responses (including fully answered CE) or 127 full responses (including answers to all sociodemographic questions) were left for analysis. Sociodemographic characteristics of the sample can be found in Table 2.

***Table 2*** *Sociodemographic characteristics of the sample (n=127). Population values are based on data from the Statistics Netherlands database (i.e. Centraal Bureau voor de Statistiek)*[122-126].

| Sociodemographic variables | Sample % | Population % |
|---|---|---|
| **Gender** | | |
| Male | 41.7 | 49.7 |
| Female | 57.5 | 50.3 |
| Not defined | 0.8 | 0.0 |
| **Age (in years)** | | |
| <18 | 1.6 | 19.2 |
| 18-25 | 27.6 | 10.1 |
| 26-35 | 15.7 | 12.8 |
| 36-45 | 11.8 | 11.9 |
| 46-55 | 19.7 | 14.4 |
| 56-65 | 20.5 | 13.3 |
| >65 | 3.1 | 18.3 |
| **Education** | | |
| Primary education | 0.0 | 7.8 |
| *Total* | *0.0* | *7.8* |
| Pre-vocational secondary education (VMBO) | 1.6 | - |
| Senior general secondary education (HAVO) | 3.9 | - |
| Pre-university education (VWO) | 7.1 | - |
| Secondary vocational education (MBO) | 9.4 | - |
| *Total* | *22.0* | *56.3* |
| Higher professional education (HBO) | 41.7 | - |
| University education - Bachelor | 6.3 | - |
| *Total* | *48.0* | *21.5* |
| University education - Master | 22.8 | - |
| University education - Doctorate | 7.1 | - |
| *Total* | *29.9* | *12.7* |
| **Income (€/month, net)** | | |
| <1,000 | 13.4 | 5.7 |
| 1,000-1,499 | 6.3 | 13.4 |
| 1,500-1,999 | 10.2 | 20.3 |
| 2,000-2,499 | 15.7 | 18.2 |
| 2,500-2,999 | 22.0 | 15.6 |
| ≥3,000 | 27.6 | 26.8 |
| Not defined | 4.7 | - |
| **Proportion residing in each province** | | |
| Drenthe | 2.4 | 2.9 |
| Flevoland | 0.0 | 2.4 |
| Friesland | 0.8 | 3.8 |
| Gelderland | 0.8 | 12.0 |

| | | |
|---|---|---|
| Groningen | 2.4 | 3.4 |
| Limburg | 51.2 | 6.5 |
| Noord-Brabant | 7.1 | 14.7 |
| Noord-Holland | 18.9 | 16.5 |
| Overijssel | 7.1 | 6.7 |
| Utrecht | 6.3 | 7.5 |
| Zeeland | 0.0 | 2.2 |
| Zuid-Holland | 2.4 | 21.4 |
| Other | 0.8 | - |

This table shows that ~58% of the sample was female and ~42% was male, which is slightly different from the Dutch population in which the ratio of male to female is more equally divided. Each age category was represented in the sample, though there was an underrepresentation of people older than 65. People in the age groups of 18-25 y.o., 46-55 y.o. and 56-65 y.o. were slightly overrepresented. This could be due to the use of an electronic survey method as well as convenience- and snowball sampling. All income categories were adequately represented, and no categories were particularly over- or underrepresented. However, the sample was biased towards higher educated participants, as the shares of people having completed higher professional education (HBO) or any form of university education (i.e. bachelor, master or doctorate) were more than twice as high as in the general Dutch population. Moreover, there was a major overrepresentation of respondents from Limburg, whereas provinces such as Gelderland and Zuid-Holland were heavily underrepresented. The sample being biased towards higher educated participants and participants from Limburg is likely attributable to convenience sampling.

Most of the respondents indicated that they ate pork several times a month (53%), followed by several times a week (33%) and (less than) once a month (14%). Judging on a scale from 1 to 10, respondents rated how sure they were about their choices in the CE with a 7.6 on average. All respondents said to have answered every choice card with the same attention level.

## 5.2 Estimates from RPL model

The data was analyzed using Nlogit 5.0, which helped estimate coefficients for the utilities of each attribute level. The results from the RPL analysis are presented in Table 3. The RPL estimation was based on 786 observations (131 individuals performing six choice tasks each), with three options per choice task, giving a total of 2,358 alternatives to be evaluated. The RPL model was statistically significant overall with a Chi-square of 423 with 14 degrees of freedom and a p-value equal to zero. Moreover, based on its McFadden pseudo-$R^2$ of 0.25, the overall model fit was adequate, implying that the model could adequately explain individuals' choice probabilities[109].

The RPL model illustrated general consumer preferences for the product characteristics of pork. The coefficients in Table 3 describe the impact that each attribute had on the utility gained from the pork product. All coefficients were statistically significant at a 0.01 level, indicating that single coefficients had a significant influence on the choice tasks being modeled. Coefficients also had the expected signs. The coefficient of price was negative, indicating that consumer utility and probability of choice decrease with increasing price. This is in line with a priori expectations based on economic theory and previous experiments[42,45,46,127] and can be seen as an indication of theoretical validity of the experiment's findings[43]. Fat content also had a negative coefficient, indicating that a higher fat content decreased the utility of pork products. The coefficient for ASC (i.e. the BAU alternative) was also negative, indicating that respondents preferred other more sustainable pork options over the BAU

option. The coefficients for animal welfare, organic production, middle- and low $CO_2$ emissions were all positive, indicating that consumer utility increases with these attributes. The attribute *animal welfare* resulted in the largest increase in utility, meaning that it had the largest positive effect on product choice on average compared to other attributes. This was followed by *low $CO_2$ emissions, organic production,* and *average $CO_2$ emissions*, respectively. All these attributes increased the utility of a pork product compared to the BAU alternative. There is heterogeneity in consumers' preferences for most sustainability attributes of pork since the derived standard deviations or ranges of the coefficients of all the attributes were statistically significant at a 0.01 level, except for average and low $CO_2$ emissions. This is in line with the hypothesis of taste heterogeneity in RPL modelling[121].

***Table 3*** *RPL model with correlated error component estimates (n=131).*

| | | | | |
|---|---|---|---|---|
| Log likelihood | -651.91011 | | | |
| Chi-square (14 d.f.) | 423.19830 | | | |
| Pseudo-R2 | 0.24505 | | | |
| *Random parameters* | | *Coefficients* | *Standard errors* | *p-values* |
| ASC | Mean | -4.97616* | 0.65691 | 0.0000 |
| | Range (+-) | 3.78056* | 1.01670 | 0.0002 |
| Fat content | Mean | -0.12928* | 0.01894 | 0.0000 |
| | St. dev. | 0.10134* | 0.02148 | 0.0000 |
| Animal welfare | Mean | 1.25067* | 0.24240 | 0.0000 |
| | Range (+-) | 1.60606* | 0.48657 | 0.0010 |
| Organic production | Mean | 0.88307* | 0.23300 | 0.0002 |
| | Range (+-) | 1.58043* | 0.48742 | 0.0012 |
| Average $CO_2$ emissions | Mean | 0.65552* | 0.16826 | 0.0001 |
| | Range (+-) | 0.06450 | 0.78576 | 0.9346 |
| Low $CO_2$ emissions | Mean | 0.93300* | 0.19606 | 0.0000 |
| | Range (+-) | 1.01933 | 0.65946 | 0.1222 |
| Price | Mean | -0.42893* | 0.06266 | 0.0000 |
| | St. dev. | 0.27203* | 0.04793 | 0.0000 |

*Significant at a 1% level

## 5.3 Consumers' WTP for sustainability attributes

Respondents' WTP for the various sustainability attributes of pork has been graphically represented in the form of KDEs (Figures 6 and 7), from which extreme values were omitted in order to improve visual representation. These KDEs allow for visualization of the underlying distribution of respondents' WTP. For fat content (Figure 6), WTP is mostly negative, and the distribution is skewed to the left with a focal value around minus 25 cents. Visualization of the distribution of respondents' WTP for the other attributes is displayed in Figure 7. This Figure shows that the distributions of WTP for animal welfare, organic production, average and low $CO_2$ emissions have similar shapes and are all skewed to the right, with focal values around €2.00, €1.25, €1.25 and €1.75, respectively.

Descriptive statistics of the WTP for each attribute can be found in Table 4. These statistics were calculated as the average of all individual WTP values that were obtained using the individual coefficients derived from the RPL model (WTP was computed as *–parameter attribute/parameter price*). Consumers are willing to pay the highest price premium for pork that guarantees animal welfare standards. This premium comes down to €4.53/kg, a 58% premium compared to the BAU price. The second most preferred attribute is organic production, for which consumers are willing to pay on average €3.25/kg, a 42% premium compared to current supermarket prices. Though low and average $CO_2$ emission attributes elicited the lowest WTP on average (€3.16/kg and €2.18/kg, respectively), respondents were still willing to pay substantial premiums (between 28-41%) for lower $CO_2$ emissions compared to the BAU scenario. Additionally, the mean WTP for low $CO_2$ emissions

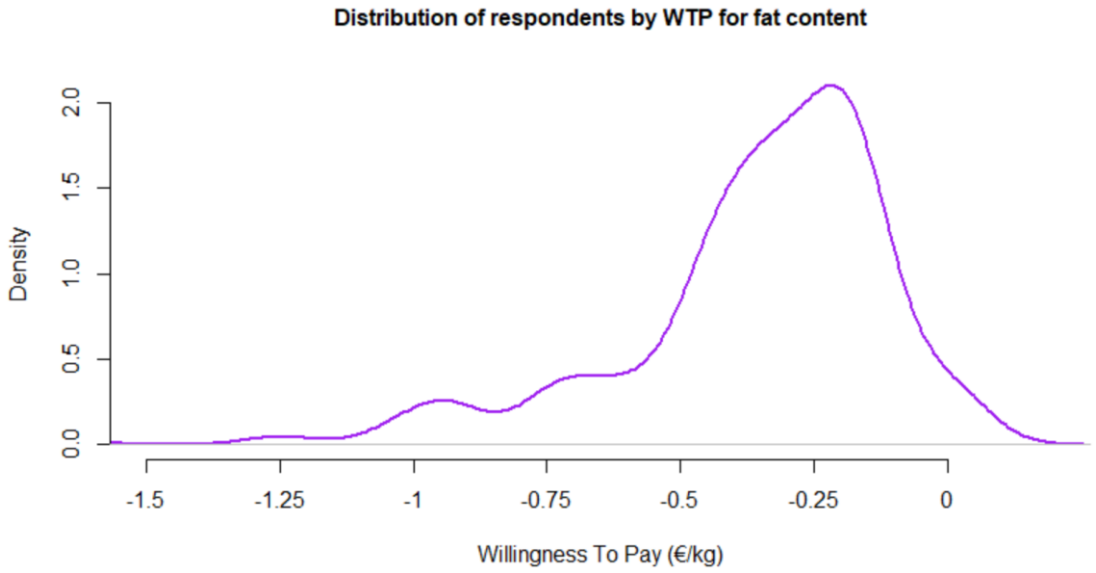


***Figure 6*** *Kernel density estimation of WTP per kg for every additional percentage point of fat content of pork.*

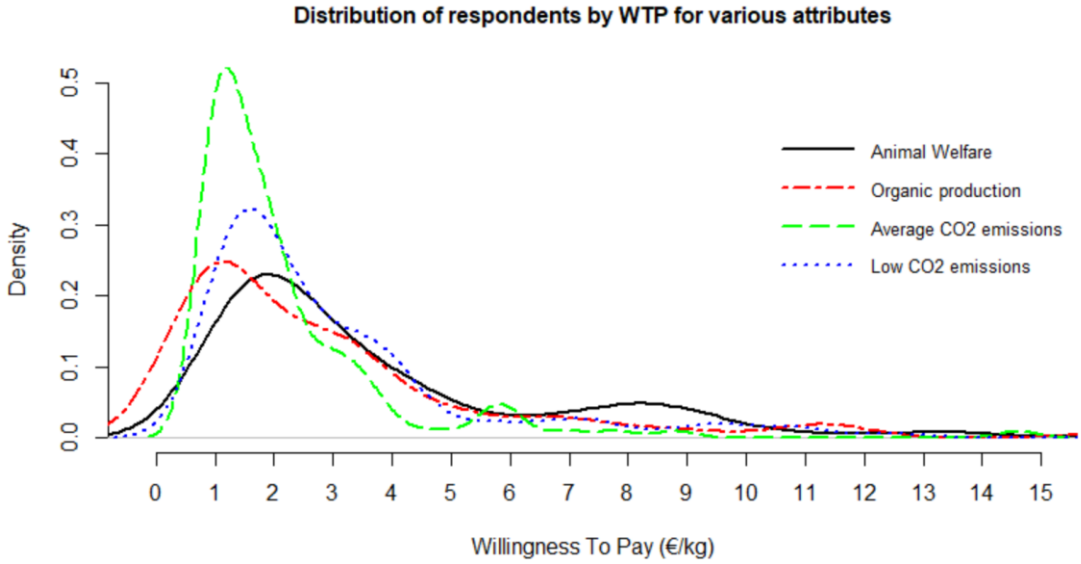


***Figure 7*** *Kernel density estimates of WTP per kg of pork with EU animal welfare label (black line), pork that is organically produced (red line), pork with average CO2 emissions (green line), and pork with low CO2 emissions (blue line).*

(€3.16/kg) was almost as high as the mean WTP for organic production (€3.25/kg). As expected, fat content was the only attribute with a negative average WTP. The average WTP for fat content was minus €0.39/kg, indicating that respondents were willing to pay 39 cents less per kg for every additional percentage point of fat content of pork. Since the results of the CE indicate that consumers are willing to pay higher prices for more sustainable pork, Hypothesis 1 (*WTP for regular pork is lower than WTP for more sustainable pork*) is accepted. Hypothesis 3 (*on average, a decreased carbon footprint of pork elicits a lower WTP than all other attributes at their maximum levels*) is also accepted, given that the average WTP for animal welfare (€4.53/kg) and organic production (€3.25/kg) are both higher than for average (€2.18/kg) or low (€3.16/kg) $CO_2$ emissions. However, Hypothesis 2 (*on average, organic production of pork elicits a higher consumer WTP than all other attributes at their*

*maximum levels*) is rejected because the highest average WTP was for animal welfare (€4.53/kg) and not organic production (€3.25/kg).

***Table 4*** *Marginal WTP values based on individual parameter estimates of sustainability attributes using the RPL model*

| | Mean WTP (€/kg) | Mean WTP (%) | Median WTP (€/kg) | Min. value (€/kg) | Max. value (€/kg) | Range (€/kg) |
|---|---|---|---|---|---|---|
| **Fat content*** | -0.39 | -5 | -0.31 | -1.91 | 0.06 | 1.97 |
| **Animal welfare** | 4.53 | 58 | 2.72 | 0.86 | 47.17 | 46.31 |
| **Organic production** | 3.25 | 42 | 2.03 | -0.11 | 25.45 | 25.56 |
| **Average $CO_2$ emissions** | 2.18 | 28 | 1.60 | 0.83 | 14.60 | 13.77 |
| **Low $CO_2$ emissions** | 3.16 | 41 | 2.22 | 1.00 | 18.65 | 17.65 |

*For fat content, WTP is expressed in €/kg per percentage point increase in fat content

Though extreme values were left out of the KDEs, Table 4 shows the minimum and maximum WTP values reported for each attribute. By far the highest absolute WTP reported was for animal welfare (€47.17/kg), which was almost twice as high as the second-highest maximum WTP reported (€25.45/kg for organic production). The WTP ranges as specified in Table 4 show that the spread of WTP for animal welfare and organic production is substantially larger than the spread of WTP for average and low $CO_2$ emissions. However, care should be taken while interpreting these marginal WTP values, and they should not be interpreted as absolute market prices. Rather, they can be interpreted as the maximum consumer surplus, and they give insights into the relative importance of the examined attributes. All WTP values except for fat content were positive, indicating that consumers were willing to pay a surplus for animal welfare, organic production, low and average $CO_2$ emissions.

## 5.4 Market shares calculations

Using the estimated coefficient values obtained from the RPL model, the probability that consumers select a certain pork product from a set of alternative product variations can be derived. These probabilities can be translated into market shares for different hypothetical pork products (Table 5). For this exercise, I assumed that the future pork market offers four different pork products ranging in terms of sustainability: (1) a BAU product, (2) a 'fully sustainable' product, (3) a product rather focused on animals, and (4) a product rather focused on the environment.

***Table 5*** *Projected market shares of four alternative pork products based on coefficient estimations obtained from the RPL*

| | *Alternative 1: BAU* | *Alternative 2: fully sustainable* | *Alternative 3: improved animal welfare and organic* | *Alternative 4: low $CO_2$ emissions* |
|---|---|---|---|---|
| Fat content | 5% | 5% | 5% | 5% |
| Animal welfare | No label | EU animal welfare label | EU animal welfare label | No label |
| Production method | Conventional | Organic | Organic | Conventional |
| $CO_2$ emissions | High | Low | High | Low |
| Price (€/kg) | 7.75 | 13.56 | 11.63 | 9.69 |
| **Market share** | **0.02%** | **66.13%** | **26.02%** | **7.83%** |

In a pork market consisting of these four hypothetical alternatives, our analysis shows that the most sustainable pork product (alternative 2) would have a market share of more than 66%, whereas the market share of the BAU alternative would decrease to just 0.02%. Alternative 3 and 4 would have a market share of 26.02% and 7.83%, respectively. The outcomes of this market analysis indicate that offering more sustainable pork products on the pork market would be financially viable, and consumers would be willing to buy pork that is more sustainably produced despite the higher prices compared to BAU products.

## 5.5 Influence of sociodemographics on WTP

Multiple regression analyses were carried out with the software IBM SPSS Statistics 27.0 to determine if sociodemographic attributes like gender, age, educational background and income had a significant influence on respondents' WTP for sustainability attributes of pork. The first multiple regression was run to predict WTP for fat content from gender, age, educational background and income. At a 10% significance level, these variables were not found to predict WTP for fat content, $F(20, 110)=1405$, $p=0.135$, $R^2=0.203$. However, at a significance level of ~14%, about 20.3% of the variance in WTP for fat content could still be explained by these factors. Multiple regressions were also run to predict WTP for animal welfare, organic production, average $CO_2$ emissions and low $CO_2$ emissions from gender, age, educational background and income. These variables were found to statistically significantly predict WTP for animal welfare, $F(20, 110)=2680$, $p=0.001$, $R^2=0.328$; WTP for organic production, $F(20, 110)=2658$, $p=0.001$, $R^2=0.326$; WTP for average $CO_2$ emissions, $F(20, 110)=3164$, $p=0.000$, $R^2=0.365$; and WTP for low $CO_2$ emissions, $F(20, 110)=2475$, $p=0.001$, $R^2=0.310$. Variables that added statistically significantly to the prediction have been summarized in Table 6. Educational background did not have a significant influence on WTP for any of the attributes. In terms of gender, males were found to have a lower WTP for all attributes than females. WTP for animal welfare, organic production, low and average $CO_2$ emissions also seemed to decrease with age, as people aged older than 25 had a significantly lower WTP than people aged 18-25 y.o., the category used as a reference in these multiple regressions. Income was found to play a big role in predicting WTP for animal welfare, organic production, low- and average $CO_2$ emissions as well. Compared to people earning more than 3,000 euros net per month (i.e. the reference category), people with an income lower than 3,000 euros net per month had a significantly lower WTP. The unstandardized regression coefficients became less negative as income increased, indicating that the higher someone's income is, the higher their WTP. All models except the one for WTP for fat content were statistically significant at a 1% level, and their $R^2$ ranged between 0.310 and 0.365. Thus, the explanatory power of gender, age, education and income shows a clear and consistent pattern across WTP for animal welfare, organic production, average and low $CO_2$ emissions, and ranges between 31% and 36.5% (based on $R^2$ values). This means that these factors can explain approximately one-third of the variation in WTP.

***Table 6*** *Statistically significant outcomes of multiple regression analyses*

| | **WTP animal welfare** | | **WTP organic production** | | **WTP average $CO_2$ emissions** | | **WTP low $CO_2$ emissions** | |
|---|---|---|---|---|---|---|---|---|
| | Unstandar-dized B | Sig. | Unstandar-dized B | Sig. | Unstandar-dized B | Sig. | Unstandar-dized B | Sig. |
| *Gender* | | | | | | | | |
| Male | -3.693*** | 0.001 | -2.082*** | 0.009 | -1.179*** | 0.001 | -1.566*** | 0.006 |
| *Age* | | | | | | | | |
| 26-35 y.o. | -3.934** | 0.019 | -2.611** | 0.028 | -1.382** | 0.011 | -1.409* | 0.096 |
| 36-45 y.o. | -4.112** | 0.020 | -3.767*** | 0.003 | -1.780*** | 0.002 | -2.161** | 0.017 |
| 46-55 y.o. | -4.796*** | 0.002 | -3.353*** | 0.003 | -1.685*** | 0.001 | -1.684** | 0.035 |
| 56-65 y.o. | -5.365*** | 0.001 | -4.201*** | 0.000 | -2.020*** | 0.000 | -2.750*** | 0.001 |
| Older than 65 | -5.212* | 0.067 | -3.799* | 0.061 | -1.740* | 0.061 | / | / |
| *Income (€/month, net)* | | | | | | | | |
| <1,000 | -11.193*** | 0.000 | -7.876*** | 0.000 | -4.029*** | 0.000 | -5.481*** | 0.000 |
| 1,000-1,499 | -8.832*** | 0.000 | -6.288*** | 0.000 | -3.142*** | 0.000 | -4.265*** | 0.000 |
| 1,500-1,999 | -6.666*** | 0.000 | -4.769*** | 0.000 | -2.335*** | 0.000 | -3.080*** | 0.001 |
| 2,000-2,499 | -5.472*** | 0.001 | -3.841*** | 0.001 | -1.857*** | 0.001 | -2.768*** | 0.001 |
| 2,500-2,999 | -3.791*** | 0.004 | -2.686*** | 0.004 | -1.234*** | 0.004 | -1.797*** | 0.008 |

***, **, * significant at a 1%, 5%, 10% level, respectively

# 6. Discussion & conclusions

## 6.1 Discussion of results

Through the use of a choice experiment, this paper investigated Dutch consumers' relative preferences and WTP for different sustainability aspects of pork, i.e. fat content, animal welfare, production method, and $CO_2$ emissions. The results show heterogeneity in consumer preferences and WTP for all attributes except $CO_2$ emissions. Such heterogeneity was also found in previous studies[24,37,42]. Generally, consumers were found to dislike higher fat content in pork, whereas they appreciated all other sustainability attributes.

The results of this study imply that animal welfare in particular is of great importance to Dutch consumers, as the EU animal welfare logo received the highest WTP (an average premium of 58%). The 58% premium found in this study is relatively high compared to previous studies, such as a meta-analysis by Cicia and Colantuoni[54] that reported premiums of 7% to 14% for animal welfare. This high WTP for animal welfare could potentially be explained by looking at previous research that showed that Dutch consumers care about farm animal welfare, think it should be better protected and are likely to be willing to pay more for more animal friendly products[28], as well as recent critical discussions about the poor animal welfare conditions in the pig and broiler industry in the Netherlands[27-29]. Dutch people's WTP being highest for animal welfare instead of for organic production was not conform expectations. However, several other studies in Belgium[24] and Finland[128] also showed that consumers generally value animal welfare more than organic production when making decisions about which broiler product to buy.

Organic pork production seemed to be highly valued by Dutch consumers as well, matching the results of previous studies[37,42,46,52,129]. When looking at average individual utility parameters, this attribute elicited the second-highest WTP, attracting a premium of 42% on average. This is a considerably higher premium than the premiums for organic production reported in earlier studies, such as 7.4% amongst Finnish consumers[42] or 12% amongst Belgian consumers[24]. However, higher premiums than the one found in the current study were reported as well, for example by Krystallis, Arvanitoyannis and Chryssohoidis[52], who reported premiums of 103-125% for organic pork. Organic labelling may be highly valued by consumers due to the fact that it can serve as a label that offers multiple benefits and decreases consumers' burden to select products with high sustainability standards[90].

Though low and average $CO_2$ emissions seemed to be less important to Dutch consumers than organic production and animal welfare, these attributes still elicited premiums of 41% and 28%, respectively. Dudinskaya et al.[37] also showed that while consumers in most European countries positively valued carbon footprint labels, their WTP for this attribute was lower than for other attributes such as organic production and national origin. Other studies also confirmed this relatively lower importance of reduced $CO_2$ emissions compared to other attributes[24,44,130]. Meat consumption decisions seem to be more strongly driven by animal welfare concerns than by environmental concerns[131,132], which is in line with the results of this study. Decreased $CO_2$ emissions being valued less than other attributes is not surprising, as currently, carbon footprint labels do not exist in the Dutch food market, whereas organic and animal welfare labels do. Hence, they might be more familiar with these labels already, while they are not used to carbon footprint labels yet. However, with consumers increasingly caring about the sustainability aspects of their food[25,26], carbon footprint labels have the potential to become more important in the future[24]. Even though such labels do not exist in the Dutch food market to date, WTP premiums were still significant and relatively close to WTP premiums for other attributes (i.e. the

41% premium that respondents were willing to pay for low $CO_2$ emissions was almost as high as the 42% premium they were willing to pay for organic production). Moreover, if WTP would be calculated based on the random parameters in utility functions as indicated by the RPL model (Table 3) instead of taking the average of individual WTP values, WTP for low $CO_2$ emissions (€2.18/kg) would be even higher than WTP for organic production (€2.06/kg), emphasizing that decreased $CO_2$ emissions seem important to Dutch consumers. This indicates that communicating the carbon footprint of meat products could be successful in the Netherlands in the future and suggests that Dutch people could support an environmental footprint label as is currently being developed by the European Commission[106].

This CE also revealed that less fat on pork products was preferred amongst Dutch consumers, as their WTP decreased by 5% for every additional percentage point of fat content. This matches findings from previous studies that showed that consumers generally opt for cuts lower in fat content[42-44], and can most likely be explained by the fact that consumers view fat content in meat as a health indicator[133]. However, the standard deviation for fat content was significant, demonstrating heterogeneous preferences amongst respondents. This could be due to, for instance, the fact that some consumers may feel that a certain degree of fat content on meat makes it juicier and tastier[134].

Apart from investigating what Dutch people are willing to pay for more sustainable pork, this study aimed to explore whether this WTP depended on sociodemographic factors such as age, gender, educational background and income. Age, gender and income were all found to significantly influence WTP for animal welfare, organic production and reduced $CO_2$ emissions. Males had a lower WTP than females, and younger people had a higher WTP than older people. This confirms findings from previous studies in which females and younger consumers tended to care more about sustainability and had a higher WTP[42,43,51,55,61,62]. Moreover, WTP was found to increase with a higher income. This also matches the results of previous studies[24,63,135]. However, WTP for fat content could not be predicted by age, gender, income, or education. Approximately one third of variance in WTP for the other attributes was explained by these variables. This suggests that there are most likely other factors that have an influence on WTP than sociodemographic factors. Famous behavioural theories such as the Theory of Planned Behaviour[136] state that behavioural intention (i.e. in this case WTP for sustainable pork) can be influenced by attitudes, subjective norms and perceived behavioural control. Indeed, previous studies show that attitudes such as increasing public concern about health, climate change and animal welfare[24,28,137] could result in a higher WTP for sustainability attributes of meat[63]. In contract, lack of concern about climate change and unawareness of the significant environmental impacts of meat consumption could lead to a lower WTP[138]. Normative beliefs could also potentially influence people's WTP for sustainable meat production, as they have been found to highly influence meat avoidance or meat consumption reduction[139,140]. For example, most consumers still regard most meat production methods as morally unacceptable[141], potentially increasing their WTP for animal welfare. Shame and guilt about meat consumption[142,143] could also possibly influence WTP for sustainable meat. For instance, shame about consuming conventional meat was found to increase the demand for animal-friendly production practices[144]. Future research should be done to determine which factors besides gender, age and income influence Dutch consumers' WTP for more sustainable pork in order to be able to design behavioural interventions tailored at targeting these determinants.

## 6.2 Policy implications

The high WTP for an EU animal welfare label found in this study suggests that implementing such a label as part of the Farm to Fork Strategy[95] would be supported by Dutch consumers. It is advised that

policymakers further investigate which animal welfare aspects Dutch and other European consumers believe are most important and currently insufficiently addressed in livestock production systems[145], since this is influenced by society's moral values[146]. Taking consumers' concerns into account for the development of a new EU animal welfare label could contribute to its success. Moreover, this study shows that there is a high potential for carbon footprint labels in the Netherlands since such labels are currently not at all used on the Dutch meat market, while this study indicates that people are willing to pay considerable premiums for lower $CO_2$ emissions compared to conventional production. If such labels would be introduced, it is important to use a public labelling authority rather than a commercial source, as public sources usually have higher credibility and help improve consumer trust[147]. Implementation of transparent and understandable labelling systems as well as consumer education on the meaning of various sustainability labels can lay the groundwork for public acceptance of future policies and regulations regarding food and GHG emissions, such as the introduction of meat taxation to internalize externalities[101,148,149].

True prices based on rights-based remediation costs[74] have not yet been calculated for pork products or other meat types in the Netherlands, nor has an optimal Pigouvian tax[72] been established. However, the high premiums for sustainability attributes found in this study indicate that Dutch consumers would be open to internalizing at least part of the negative externalities into pork prices and that potential for increasing meat prices to better reflect externalities exists. Policymakers should further investigate whether increasing meat prices in the Netherlands can be better done through TP or Pigouvian taxation, as both are fundamentally different approaches. Pigouvian taxes are a payment for external costs based on preference or evaluation of wellbeing, whereas the true price is a payment for remediation costs based on generally accepted human rights for current and future generations[77]. Both methods have their advantages and disadvantages, and it should be evaluated which approach is most feasible and preferred. It is important for policymakers to encourage consumers to accept such future invasive interventions, which can be done through, for instance, informational campaigns aimed at increasing awareness on the unsustainable impacts of meat[149].

Introducing higher pork prices can aid in increasing the sustainability of the production process[35]. Under the current conventional and commoditized meat production system, meat producers experience high barriers to make their production process more sustainable, which is why they stick to the status quo situation[150]. Radical system innovations are needed to improve animal welfare and decrease environmental impacts within livestock production systems, which are often costly[151]. However, this study has shown that Dutch consumers are willing to pay for more sustainable pork, which is crucial to make sustainable production processes viable as it indicates that the costs of investing in more sustainable farming systems could be compensated[2,24,33]. In order to cater to heterogeneous consumer preferences, it is essential to have a diversity of systems in place, where some might focus more on animal welfare and some more on environmental friendliness[152]. Such a diversified supply can increase the likelihood that consumers refrain from buying the unsustainable BAU alternative and instead more often choose a more sustainable pork product[35]. Besides focusing purely on animal welfare or decreasing the environmental footprint of pork, previous research has shown that it is possible to create synergies in livestock production systems between reduced emissions, economic viability and animal welfare[153,154]. Policymakers should work together with other stakeholders such as farmers, innovation consultants and animal welfare and environment experts to determine the feasibility of such kinds of synergistic meat production systems in the Netherlands. Together, these stakeholders could share and integrate their specific knowledge about, for instance,

production costs, sustainability impacts, and product positioning, which could lead to pork products that are feasible for all and result in more sustainable Dutch livestock production.

## 6.3 Limitations

It is important to recognize some of the limitations of this study. Overall, the reported WTP values suggest that Dutch consumers are willing to pay premiums for pork that is organically produced, takes into account animal welfare, and is produced with less $CO_2$ emissions than conventional pork. However, the premiums found in this study are sometimes higher than premiums found in previous studies and should be interpreted with caution. Rather than being interpreted as an absolute market price, they should be interpreted as consumers' valuation of specific sustainability attributes. The market share analysis for potential future sustainable pork products implied that offering more sustainable pork products on the pork market would be financially viable, and consumers would be willing to buy pork that is more sustainably produced despite the higher prices compared to BAU products. Though this seems realistic based on findings from previous studies, it is likely that WTP estimates as well as subsequent market shares of sustainable pork products were overestimated due to the hypothetical nature of CEs, which do not involve tangible products and real money. In addition to hypothetical bias, WTP estimates could have been overestimated due to self-selection bias, as individuals with an affinity for sustainability may have been more likely to take part in the survey. This affects mainly the external validity of the results, as the average WTP values as measured in this study are most probably an overestimation of population averages. Moreover, due to convenience sampling, certain groups, such as people aged 18-25 and 56-65 as well as people with higher education levels, were overrepresented. Lastly, the relatively small sample (n=131) of this CE is another limitation. As with any research, more robust conclusions could be drawn from a bigger and randomly selected sample. Hence, in the future, a similar study based on random sampling and with a bigger sample size could be done to overcome this limitation. Moreover, to overcome the limitations of hypothetical bias, future research could look more into realistic price levels for these sustainability attributes with the help of, for instance, store tests, in order to examine whether such sustainable product differentiation has real-life market potential and evaluate how it would affect the sales of different pork products. Although WTP values and market shares for sustainable pork products were likely overestimated, the results of this study still indicate a strong consumer preference for more sustainable pork products and show that consumers seem to accept great price premiums in order to guarantee that pork production becomes more animal- and environmentally friendly.

## 6.4 Conclusion

The primary aim of this study was to investigate which sustainability attributes of pork Dutch consumers value most and what their WTP for these attributes is. To answer this research question, we carried out a choice experiment based on five attributes, i.e. fat content, animal welfare, production method, $CO_2$ emissions and price. Based on individual utility parameters, Dutch consumers seem to value animal welfare most (average premium of 58%), followed by organic production (average premium of 42%), low $CO_2$ emissions (average premium of 41%) and average $CO_2$ emissions (average premium of 28%), respectively. In line with expectations, fat content was negatively valued amongst Dutch consumers, and WTP decreased by 5% for every additional percentage point of fat content in pork. WTP for all attributes except fat content was statistically significantly predicted by gender, age and income level. A market analysis showed that there is great potential for the introduction of more sustainable pork products compared to the BAU alternative. Though WTP estimates and market shares of more sustainable pork were likely overestimated due to the

hypothetical nature of choice experiments and self-selection bias, this study gives a good indication of consumer preferences and values and suggests that Dutch people would be willing to pay significant premiums to account for the negative externalities of pork production. This holds great potential for internalizing externalities into meat prices and increasing the sustainability of livestock production systems.

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# Appendix 1. Questionnaire

**Block 1: Introduction**

Dear participant,

How nice that you would like to participate in this survey about Dutch people's willingness to pay for sustainability aspects of pork.

The survey will take approximately 10 minutes to complete. Your answers will be anonymous and data will only be shared with the research team consisting of myself and my tutor at the university. We don't know who answered what. Therefore, please try to complete the questions as honestly as possible and trust your initial feelings. There is no right or wrong.

Participation is completely voluntary. All information is confidential and will be handled with care. You can terminate your participation at any time without having to justify yourself. Your privacy will be maintained, and personally identifiable information will not be reported. All data collected through this survey will be stored in a password-protected location on the researchers' computers.

If you have any questions or remarks regarding this survey please email them to f.m.j.severens@student.vu.nl

Good luck and thank you very much in advance for your cooperation!

Floor Severens

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By participating in this study, you indicate that you have read and understood the above information and that you voluntarily agree to participate in this study.

- ○ I agree to participate in this study (1)
- ○ I don't want to participate in this study (2)

*Skip To: End of Survey If Q1 = I don't want to participate in this study*

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Do you ever eat pork for dinner? Think of, for example, schnitzel, pork tenderloin, sausages, pork chops, spare ribs, minced meat, bacon.

- ○ Yes (1)
- ○ No (2)

*Skip To: End of Survey If Q2 = No*

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How often do you eat pork for dinner?

- ○ Every day (1)
- ○ Multiple times a week (2)
- ○ Multiple times a month (3)
- ○ (Less than) once a month (4)

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Block 2: Valuation scenario

**IMPORTANT: READ THIS INFORMATION CAREFULLY!**

The production of meat leads to various "hidden costs" that are not normally included in the cost price, such as costs due to climate change, environmental damage, land use, animal diseases and negative effects on public health. If we add up all the hidden costs of meat production in the Netherlands, this equals approximately 4.5 billion euros per year. These costs are borne by society.

This study focuses only on pork because it is the most commonly eaten meat in the Netherlands. The aim of the study is to discover what the Dutch are prepared to pay for the following sustainability aspects of pork:

- **Fat content**
  The fat in pork contains a lot of saturated fat (about 30%). Eating a lot of saturated fat increases the risk of cardiovascular diseases. In this questionnaire, you have the choice of pork with a fat content of 5%, 10% or 20%.
- **Animal welfare**
  For the wellbeing of pigs it is important that their natural behavior is stimulated. This means, for example, that they can go outside more often and roll around in the mud, that they have sufficient space to move around and that they live in a group. In this questionnaire, you can choose between pork without an animal welfare label and pork with a special EU animal welfare label that pays attention to the aforementioned points.
- **Production method**
  In this questionnaire, you can choose between pork produced using conventional or organic methods. Organic meat is produced by taking the environment and animal welfare into account. The pigs have more space and distraction, eat organic feed and are given as few antibiotics as possible. Organic livestock feed, some of which must come from the region, improves landscape and soil quality and reduces deforestation in other parts of the world. However, because animals in organic livestock farming are given more space, organic production leads to higher nitrogen emissions.
- **CO2 emissions**
  The Earth is warming up because more and more greenhouse gases such as CO2 are entering the air. We cannot stop the warming, but by emitting less CO2 we can limit the warming and slow it down. The production of meat causes high CO2 emissions. This makes it better for the climate to eat less meat. In this questionnaire you have the choice between pork with a low, medium or high CO2 emissions.

Previous similar surveys show that respondents often indicate a higher willingness to pay than what they are actually willing to pay for a particular product. This may be because people do not really

think about how big the effect of extra costs on the (family) budget is. In short, it is easy to want to pay more when the extra costs are not really incurred.

For the next section, please imagine that you would like to purchase pork. Please always indicate which of the 3 alternatives presented has your preference.

Block 3: Version 1

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  10% vet |  10% vet |  5% vet |
| **Dierenwelzijn** | Geen label | Geen label | Geen label |
| **Productiewijze** | Standaard | Standaard | Standaard |
| **$CO_2$ uitstoot per kilo** | Gemiddeld – gelijk aan 36 - 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €13,56 | €11,63 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  10% vet |  10% vet |  5% vet |
| **Dierenwelzijn** | Geen label | EU dierenwelzijn label | Geen label |
| **Productiewijze** | Biologisch | Standaard | Standaard |
| **$CO_2$ uitstoot per kilo** | Hoog – gelijk aan meer dan 54 km autorijden | Laag – gelijk aan tot 36 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €9,69 | €9,69 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  10% vet |  10% vet |  5% vet |
| **Dierenwelzijn** | Geen label | EU dierenwelzijn label | Geen label |
| **Productiewijze** | Standaard | Biologisch | Standaard |
| **$CO_2$ uitstoot per kilo** | Laag – gelijk aan tot 36 km autorijden | Gemiddeld – gelijk aan 36 - 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €8,53 | €13,56 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

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| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  10% vet |  10% vet |  5% vet |
| **Dierenwelzijn** | Geen label | EU dierenwelzijn label | Geen label |
| **Productiewijze** | Biologisch | Biologisch | Standaard |
| **$CO_2$ uitstoot per kilo** | Laag – gelijk aan tot 36 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €8,53 | €13,56 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

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| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  20% vet |  5% vet |  5% vet |
| **Dierenwelzijn** | EU dierenwelzijn label | Geen label | Geen label |
| **Productiewijze** | Biologisch | Standaard | Standaard |
| **$CO_2$ uitstoot per kilo** | Hoog – gelijk aan meer dan 54 km autorijden | Laag – gelijk aan tot 36 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €11,63 | €9,69 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  20% vet |  5% vet |  5% vet |
| **Dierenwelzijn** | EU dierenwelzijn label | Geen label | Geen label |
| **Productiewijze** | Biologisch | Biologisch | Standaard |
| **$CO_2$ uitstoot per kilo** | Laag – gelijk aan tot 36 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €13,56 | €8,53 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

Block 4: Version 2

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  20% vet |  5% vet |  5% vet |
| **Dierenwelzijn** | EU dierenwelzijn label | EU dierenwelzijn label | Geen label |
| **Productiewijze** | Biologisch | Standaard | Standaard |
| **$CO_2$ uitstoot per kilo** | Gemiddeld – gelijk aan 36 - 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €13,56 | €8,53 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

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| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  10% vet |  20% vet |  5% vet |
| **Dierenwelzijn** | Geen label | Geen label | Geen label |
| **Productiewijze** | Standaard | Standaard | Standaard |
| **$CO_2$ uitstoot per kilo** | Hoog – gelijk aan meer dan 54 km autorijden | Gemiddeld – gelijk aan 36 - 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €11,63 | €11,63 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

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| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  5% vet |  20% vet |  5% vet |
| **Dierenwelzijn** | Geen label | EU dierenwelzijn label | Geen label |
| **Productiewijze** | Biologisch | Standaard | Standaard |
| **$CO_2$ uitstoot per kilo** | Gemiddeld – gelijk aan 36 - 54 km autorijden | Laag – gelijk aan tot 36 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €11,63 | €8,53 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  5% vet |  20% vet |  5% vet |
| **Dierenwelzijn** | EU dierenwelzijn label | EU dierenwelzijn label | Geen label |
| **Productiewijze** | Standaard | Biologisch | Standaard |
| **$CO_2$ uitstoot per kilo** | Gemiddeld – gelijk aan 36 - 54 km autorijden | Laag – gelijk aan tot 36 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €8,53 | €13,56 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  5% vet |  20% vet |  5% vet |
| **Dierenwelzijn** | EU dierenwelzijn label | Geen label | Geen label |
| **Productiewijze** | Standaard | Biologisch | Standaard |
| **$CO_2$ uitstoot per kilo** | Laag – gelijk aan tot 36 km autorijden | Gemiddeld – gelijk aan 36 - 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €11,63 | €8,53 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  10% vet |  5% vet |  5% vet |
| **Dierenwelzijn** | EU dierenwelzijn label | Geen label | Geen label |
| **Productiewijze** | Standaard | Biologisch | Standaard |
| **$CO_2$ uitstoot per kilo** | Hoog – gelijk aan meer dan 54 km autorijden | Gemiddeld – gelijk aan 36 - 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €9,69 | €9,69 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

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Block 5: Version 3

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  5% vet |  20% vet |  5% vet |
| **Dierenwelzijn** | Geen label | EU dierenwelzijn label | Geen label |
| **Productiewijze** | Biologisch | Standaard | Standaard |
| **$CO_2$ uitstoot per kilo** | Hoog – gelijk aan meer dan 54 km autorijden | Laag – gelijk aan tot 36 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €9,69 | €9,69 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  10% vet |  20% vet |  5% vet |
| **Dierenwelzijn** | Geen label | Geen label | Geen label |
| **Productiewijze** | Standaard | Standaard | Standaard |
| **$CO_2$ uitstoot per kilo** | Hoog – gelijk aan meer dan 54 km autorijden | Gemiddeld – gelijk aan 36 - 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €11,63 | €9,69 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  20% vet |  5% vet |  5% vet |
| **Dierenwelzijn** | EU dierenwelzijn label | Geen label | Geen label |
| **Productiewijze** | Standaard | Biologisch | Standaard |
| **$CO_2$ uitstoot per kilo** | Laag – gelijk aan tot 36 km autorijden | Gemiddeld – gelijk aan 36 - 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €9,69 | €11,63 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  20% vet |  5% vet |  5% vet |
| **Dierenwelzijn** | Geen label | EU dierenwelzijn label | Geen label |
| **Productiewijze** | Biologisch | Standaard | Standaard |
| **$CO_2$ uitstoot per kilo** | Hoog – gelijk aan meer dan 54 km autorijden | Laag – gelijk aan tot 36 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €8,53 | €13,56 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  10% vet |  10% vet |  5% vet |
| **Dierenwelzijn** | EU dierenwelzijn label | Geen label | Geen label |
| **Productiewijze** | Standaard | Biologisch | Standaard |
| **$CO_2$ uitstoot per kilo** | Hoog – gelijk aan meer dan 54 km autorijden | Laag – gelijk aan tot 36 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €8,53 | €11,63 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  5% vet |  20% vet |  5% vet |
| **Dierenwelzijn** | EU dierenwelzijn label | Geen label | Geen label |
| **Productiewijze** | Standaard | Biologisch | Standaard |
| **$CO_2$ uitstoot per kilo** | Laag – gelijk aan tot 36 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €11,63 | €8,53 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

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Block 6: Version 4

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  5% vet |  10% vet |  5% vet |
| **Dierenwelzijn** | Geen label | EU dierenwelzijn label | Geen label |
| **Productiewijze** | Biologisch | Standaard | Standaard |
| **$CO_2$ uitstoot per kilo** | Laag – gelijk aan tot 36 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €9,69 | €11,63 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

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| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  20% vet |  5% vet |  5% vet |
| **Dierenwelzijn** | EU dierenwelzijn label | EU dierenwelzijn label | Geen label |
| **Productiewijze** | Standaard | Biologisch | Standaard |
| **$CO_2$ uitstoot per kilo** | Gemiddeld – gelijk aan 36 - 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €8,53 | €13,56 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  20% vet |  5% vet |  5% vet |
| **Dierenwelzijn** | EU dierenwelzijn label | Geen label | Geen label |
| **Productiewijze** | Biologisch | Standaard | Standaard |
| **$CO_2$ uitstoot per kilo** | Gemiddeld – gelijk aan 36 - 54 km autorijden | Laag – gelijk aan tot 36 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €13,56 | €8,53 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  10% vet |  10% vet |  5% vet |
| **Dierenwelzijn** | Geen label | EU dierenwelzijn label | Geen label |
| **Productiewijze** | Biologisch | Standaard | Standaard |
| **$CO_2$ uitstoot per kilo** | Laag – gelijk aan tot 36 km autorijden | Gemiddeld – gelijk aan 36 - 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €11,63 | €8,53 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  20% vet |  5% vet |  5% vet |
| **Dierenwelzijn** | Geen label | EU dierenwelzijn label | Geen label |
| **Productiewijze** | Biologisch | Biologisch | Standaard |
| **$CO_2$ uitstoot per kilo** | Laag – gelijk aan tot 36 km autorijden | Gemiddeld – gelijk aan 36 - 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €8,53 | €13,56 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  5% vet |  20% vet |  5% vet |
| **Dierenwelzijn** | EU dierenwelzijn label | EU dierenwelzijn label | Geen label |
| **Productiewijze** | Standaard | Biologisch | Standaard |
| **$CO_2$ uitstoot per kilo** | Gemiddeld – gelijk aan 36 - 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €9,69 | €9,69 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

Block 7: Version 5

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  20% vet |  10% vet |  5% vet |
| **Dierenwelzijn** | Geen label | Geen label | Geen label |
| **Productiewijze** | Biologisch | Standaard | Standaard |
| **$CO_2$ uitstoot per kilo** | Hoog – gelijk aan meer dan 54 km autorijden | Gemiddeld – gelijk aan 36 - 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €13,56 | €11,63 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  10% vet |  10% vet |  5% vet |
| **Dierenwelzijn** | Geen label | Geen label | Geen label |
| **Productiewijze** | Standaard | Standaard | Standaard |
| **$CO_2$ uitstoot per kilo** | Gemiddeld – gelijk aan 36 - 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €13,56 | €9,69 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  5% vet |  10% vet |  5% vet |
| **Dierenwelzijn** | Geen label | EU dierenwelzijn label | Geen label |
| **Productiewijze** | Biologisch | Standaard | Standaard |
| **$CO_2$ uitstoot per kilo** | Laag – gelijk aan tot 36 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €9,69 | €9,69 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  5% vet |  20% vet |  5% vet |
| **Dierenwelzijn** | EU dierenwelzijn label | Geen label | Geen label |
| **Productiewijze** | Biologisch | Biologisch | Standaard |
| **$CO_2$ uitstoot per kilo** | Hoog – gelijk aan meer dan 54 km autorijden | Gemiddeld – gelijk aan 36 - 54 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €13,56 | €8,53 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  20% vet |  5% vet |  5% vet |
| **Dierenwelzijn** | EU dierenwelzijn label | Geen label | Geen label |
| **Productiewijze** | Standaard | Biologisch | Standaard |
| **$CO_2$ uitstoot per kilo** | Gemiddeld – gelijk aan 36 - 54 km autorijden | Laag – gelijk aan tot 36 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €8,53 | €11,63 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

| | Optie A | Optie B | Optie C |
|---|---|---|---|
| **Vlees en vetgehalte** |  5% vet |  20% vet |  5% vet |
| **Dierenwelzijn** | EU dierenwelzijn label | EU dierenwelzijn label | Geen label |
| **Productiewijze** | Standaard | Biologisch | Standaard |
| **$CO_2$ uitstoot per kilo** | Gemiddeld – gelijk aan 36 - 54 km autorijden | Laag – gelijk aan tot 36 km autorijden | Hoog – gelijk aan meer dan 54 km autorijden |
| **Kiloprijs** | €9,69 | €13,56 | €7,75 |

Which alternative would you be most likely to buy? Select your preference...

- ○ Option A (1)
- ○ Option B (2)
- ○ Option C (3)

---

Block 8: Follow-up

How sure are you of your choices on a scale from 1 to 10?

1 2 3 4 5 6 7 8 9 10

---

How difficult did you find it to fill in the choice cards?

- ○ Very easy (1)
- ○ Easy (2)
- ○ Not difficult and not easy (3)
- ○ Difficult (4)
- ○ Very difficult (5)

---

Have you answered all the choice cards with the same amount of attention?

- ○ Yes (1)
- ○ No (2)

*Skip To: Q38 If Q36 = Yes*

Can you indicate from which choice card onwards your attention decreased?

- ○ From choice card 1 (1)
- ○ From choice card 2 (2)
- ○ From choice card 3 (3)
- ○ From choice card 4 (4)
- ○ From choice card 5 (5)
- ○ From choice card 6 (6)
- ○ I don't know (7)

How important were the following items to you in making your choices?

| | Not important at all (1) | Not important (2) | Not important and not unimportant (3) | Important (4) | Very important (5) |
|---|---|---|---|---|---|
| Fat content (1) | ○ | ○ | ○ | ○ | ○ |
| Animal welfare (2) | ○ | ○ | ○ | ○ | ○ |
| Production method (3) | ○ | ○ | ○ | ○ | ○ |
| CO2 emissions (4) | ○ | ○ | ○ | ○ | ○ |
| Price (5) | ○ | ○ | ○ | ○ | ○ |

Block 9: General questions

In the final part of this survey, we would like to learn a little more about you.

What is your gender?

- Male (1)
- Female (2)
- Different (3)
- I prefer not to say (4)

---

Which category best represents your age?

- Younger than 18 (1)
- 18-25 years old (2)
- 26-35 years old (3)
- 36-45 years old (4)
- 46-55 years old (5)
- 56-65 years old (6)
- Older than 65 (7)

---

What is your personal net income per month (the amount you receive per month)?

- Less than € 1.000,- (1)
- € 1.000 to € 1.499 (2)
- € 1.500 to € 1.999 (3)
- € 2.000 to € 2.499 (4)
- € 2.500 to € 2.999 (5)
- € 3.000 or more (6)
- I prefer not to say (7)

---

What is the highest level of education you have completed?

- None (1)
- Primary school (2)
- Preparatory secondary vocational education (VMBO) (3)
- Higher general secondary education (HAVO) (4)
- Preparatory scientific education (VWO) (5)
- Secondary vocational education (MBO) (6)
- Higher vocational education (HBO) (7)
- Scientific education (WO) – Bachelor (8)
- Scientific education (WO) – Master (9)
- Scientific education (WO) – Doctorate (10)

---

In which province do you currently live?

- ○ Drenthe (1)
- ○ Flevoland (2)
- ○ Friesland (3)
- ○ Gelderland (4)
- ○ Groningen (5)
- ○ Limburg (6)
- ○ Noord-Brabant (7)
- ○ Noord-Holland (8)
- ○ Overijssel (9)
- ○ Utrecht (10)
- ○ Zeeland (11)
- ○ Zuid-Holland (12)
- ○ Different, namely (13) _____