Interested, indifferent or active information avoider of climate labels

Cognitive dissonance and ascription of responsibility as motivating factors

Edenbrandt, Anna Kristina; Lagerkvist, Carl-Johan; Nordström, Leif Jonas

Publication date:
2020

Document version
Publisher's PDF, also known as Version of record

AgriFood economics centre

WORKING PAPER 2020:1

Anna Kristina Edenbrandt
Carl Johan Lagerkvist
Jonas Nordström

Interested, indifferent or active information avoider of climate labels:

Cognitive dissonance and ascription of responsibility as motivating factors

Interested, indifferent or active information avoider of climate labels: Cognitive dissonance and ascription of responsibility as motivating factors

Anna Kristina Edenbrandt[a,1], Carl Johan Lagerkvist[a] and Jonas Nordström[b]

[a] Department of Economics, Swedish University of Agricultural Sciences, Sweden.
[b] Agrifood Economics Centre, Lund University, Sweden, and Department of Food and Resource Economics, University of Copenhagen, Denmark.

Abstract

Active avoidance of information is gaining attention in the behavioural sciences, and recently, as is its' relevance from an economic theory perspective. We explore motivations for and policy implications of active avoidance of carbon emissions information. In the first stage of a stated preference survey, respondents indicated whether they wished to access carbon emissions information (*info-takers*) or not (*info-decliners*) when selecting a protein source. In the second stage, all respondents were provided with carbon emissions information. The info-takers reduced emissions from their food choices by 32%, while the info-decliners also reduced their emissions (by 12%). This indicates active information avoidance among at least some info-decliners. We explore cognitive dissonance, responsibility feelings and personal norms as motivators for actively avoiding carbon emissions information on meat products, and how these motivators affect a person's actions when information is imposed upon them. Information increases choice task uncertainty mostly among individuals who experience climate-related cognitive dissonance and/or responsibility feelings. These findings point to the potential that carbon emissions information can have as a measure for transitioning towards the consumption of food products that have a lower carbon footprint. The study also highlights the importance of how this information is provided and presented

Keywords: Climate label; information avoidance; cognitive dissonance; carbon emission reduction; consumer behavior, strategic avoidance

JEL-codes: D12, D83, Q18, Q54

Revised 30 June 2020

[1] E-mail: anna.edenbrandt@slu.se. Edenbrandt is funded by a grant from the Swedish Retail and Wholesale Council.

Introduction

The global food system is a significant contributor to climate change, generating approximately 25-30% of total greenhouse gas emissions (Mbow and Rosenzweig, 2019). Of all food products, meat has the highest environmental impact (Tukker et al., 2006). Present meat consumption patterns contribute to increasing emission levels, and therefore constitute a growing concern with respect to climate impact (Hedenus et al., 2014; Wellesley et al., 2015). Consumers can reduce carbon emissions by adapting their food purchases towards products that have a lower climate impact (de Boer and Aiking, 2011). Labels with Carbon dioxide (CO_2) information and other means of climate labelling can aid consumers in their purchase decisions. Another means of altering consumer choices could be to use taxes that internalise the negative externalities of the CO_2 emissions (CO_2E) (Bonnet and Bouamra-Mechemache, 2018).

There are currently few established labels that inform about the CO_2e from each product in grocery stores, although label initiatives have been initiated in various supermarket chains and countries (Liu et al., 2016). Experimental studies have explored consumers' willingness to pay more for lower-impact variants of a product (Canavari and Coderoni, 2020; Elofsson et al., 2016; Grunert et al., 2015; Lombardi et al., 2017; Thøgersen and Nielsen, 2016; Van Loo et al., 2014). Yet, to obtain insights into the behavioural impacts that climate labels are likely to have, it is important to understand the information-seeking process.

In general, consumers have little knowledge about the climate impact of various food products (Hartmann and Siegrist, 2017). This highlights the potential of providing more information in order to direct consumers towards more sustainable food choices. While providing information as a way of changing consumer behaviour is a relatively easy and cheap instrument to use, its effects rely on consumers being willing to access and process the information, and ultimately, to incorporate it into their purchase decisions. Typically, information is assumed to be processed and incorporated into the decision process when it is found useful, but is otherwise ignored (Stigler, 1961). There are, however, occasions when individuals actively avoid information, and this may be attributed to motivations that are rational to the individual. Examples include a desire to avoid unwanted information (e.g., disease condition), or a desire to be surprised (Golman et al., 2017; Hertwig and Engel, 2016). While active avoidance of information has gained increased attention in other fields (Sharot and Sunstein, 2020), and the relevance from an economic theory perspective is discussed in Golman, Hagmann and Loewenstein (2017), it is of interest to explore the mechanism and policy implications of such information-avoidance behaviour in a food context. It is particularly relevant to explore active information avoidance[2] when analysing consumer purchase behaviour and sustainability information such as CO_2e.

Active information avoidance has been explored in the area of CO_2e information by Thunström et al. (2014), who develop a theoretical model on wilful avoidance of CO_2e information in transport, and how this is affected by social norms and feelings of guilt. In the area of food choices, two studies find evidence of consumers actively avoiding food product information related to animal welfare (Bell et al., 2017; Onwezen and van der Weele, 2016). Both studies are based on the individuals' self-indicated avoidance ('If I buy cheap chicken/meat, I'd rather not think about the possibility that it is a fast-growing chicken/has used an antibiotic' and 'So long as pork is safe, healthy, and delicious, I would rather NOT know how the pig/hog was raised'). Importantly, such direct questioning may be associated with concerns of social desirability bias. Moreover, these studies do not explore individual behaviour following the imposition of information among those who state that they prefer to avoid such information. Three recent studies target these concerns with experimental approaches to explore active information avoidance regarding country of origin and

[2] Also referred to as willful information avoidance.

calories. They find that a fairly large proportion of participants decline access information about calories – 60% (Thunström et al., 2016), 46% (Nordström et al., 2020) – and country of origin – ~20% (Beiermann et al., 2017). Hence, there is some evidence of individuals actively avoiding certain types of information when making food choices. However, the motivation for such behaviour is sparsely explored, an exception being Nordström et al. (2020), who find that active information avoidance is motivated by optimal expectations, i.e., individuals chose not to know the calorie content so that they can downplay the probability that their preferred meal is high in calories.

In this article, we investigate whether consumers actively avoid information about the climate impact of food products, and we explore motivations for such active avoidance. We test whether conflicting cognitions and responsibility feelings in the domain of climate change and food affects choices when exposed to CO_2e information. This can provide insights that are of interest to policy makers regarding the expected effects of carbon labels, and how different types of consumers are affected by such labels. We identify consumers who wish to avoid climate impact information, but when such information is imposed upon them, change their purchase behaviour towards lower emissions products. These findings highlight the importance of policy regimes that disable avoidance. Moreover, we find that consumers with high levels of conflicting cognitions and responsibility feelings become more uncertain in their choices when climate impact information is imposed upon them, suggesting a potential way to influence these consumers towards more climate-friendly food choices.

Theoretical framework

We follow the definition of *active information avoidance* by Golman, Hagmann, and Loewenstein (2017), who state that an individual has to be aware that the information in question exists, yet chooses not to get the information, even if it is available without cost or even costly to avoid. We here refer to costs as defined in a neoclassical framework, including monetary and search costs. There are many motivations for active avoidance of information, and individuals may use different methods to avoid readily available information. Importantly, actively avoiding information need not be irrational; e.g., an individual may expect that the information will cause discomfort of some kind. Two broad motivational categories of active information avoidance relevant to food choices and climate impact information can be distinguished[3]:

(1) Dissonance avoidance occurring as a result of the *cognitive dissonance* (discomfort) from being exposed to information that conflicts with one's prior beliefs (Golman et al., 2017), or that cause unpleasant emotions or diminish pleasant ones (Sweeny et al., 2010). This is also termed *emotion regulation* in the field of psychology (Hertwig and Engel, 2016).
(2) Strategic avoidance. This is an intrapersonal[4] strategic device for eschewing responsibility (Hertwig and Engel, 2016) that arises when information is expected to cause a person to feel an unwelcome responsibility to change his or her behaviour (Sweeny et al., 2010). An example would be individuals who like to consider themselves altruistic and therefore avoid information to generate 'moral wiggle room', where the they can allow themselves to act selfishly (Dana et al., 2007).

[3] There are several other motivations and methods for actively avoiding information that have been explored in experiments in other contexts (Golman et al., 2017; Grossman and van der Weele, 2017). We argue that cognitive dissonance avoidance and responsibility feelings are of relevance in the context of credence attributes of food (in our case, climate impact information).

[4] *Intrapersonal* strategic information avoidance is a device to disable one's own ability to make certain decisions (e.g., altruistic choices). *Interpersonal* strategic information avoidance is rather a device to eschew knowledge that other individuals/entities rely on one's knowledge in making their own decisions. This is mainly exemplified in bargaining situations (Golman et al., 2017).

In the following, a theoretical basis is outlined, and this is used to form the hypothesis.

Dissonance avoidance

The theory of cognitive dissonance (Festinger, 1957) provides a basis for understanding dissonance avoidance as an emotion regulation device. Cognitive dissonance arousal related to food consumption and climate impact can be caused by (a) cognitive discrepancy (conflicting cognitions), and (b) dissonance (psychological tension as a result of such cognitive discrepancy) (Ong et al., 2017). Cognitive discrepancy can, in turn, be either in the same domain (intra-attitudinal), e.g., 'red meat is nutritious and good for me' vs 'red meat may cause cancer', or in different domains (inter-attitudinal); 'consuming red meat is an important part of my culture' vs 'red meat is bad for the climate'.

Strategic avoidance

The Norm Activation Model (NAM) (Schwartz, 1977) provides a theoretical basis for strategic avoidance of climate impact information. The NAM proposes a sequential model; problem awareness → ascription of responsibility → personal norm → pro-social intention/behaviour (Han, 2014). A person who attributes responsibility for taking action to themselves and who has personal moral norms that suggest action may want to access information that increases the problem awareness. However, for some, it is also possible that they want to avoid being exposed to information about the first stage (problem awareness), as an internal strategic device to eschew responsibility.

Behaviour following the imposition of information

With the introduction of additional information, a choice situation becomes more complex. An exception is when an individual is indifferent to the additional information, for whom the choice complexity is expected to be unchanged. A result from the larger cognitive burden that increased choice complexity implies is that individual choices become less consistent (Caussade et al., 2005; Dellaert et al., 2012; DeShazo and Fermo, 2002). Moreover, there is evidence of heterogeneity in consistency between individuals depending on their self-stated certainty (Lundhede et al., 2009). We expect that individuals who experience conflicting beliefs and/or emotions with regard to climate impact and food consumption will find that climate impact information increases the choice task complexity more than for individuals with less cognitive dissonance. We also expect that individuals with a high degree of responsibility and personal norms that oblige them to change behaviour will find the choice tasks more difficult when provided with carbon information. Following this, we expect that the introduction of climate impact information will increase choice uncertainty more for individuals who experience higher cognitive dissonance and/or responsibility feelings and norms that compel them to change their behaviour. The choice uncertainty takes the form of inconsistent choices, as measured by larger error variance in econometric choice models.

Hypothesis

We divide individuals into two groups based on their choice on whether to access free (non-costly) information or not (upper box in Figure 1): *info-takers* and *info-decliners*. The middle box in Figure 1 contains the motivations for wishing to access information or not. *Info-takers* can be divided into two sub-groups based on their motivation: those who choose to access information out of *interest*, to increase their awareness, and those who choose to access information out of *indifference* (it is

non-costly to access)[5]. *Info-decliners* can also be divided into two sub-groups based on their motivation for declining information; out of *indifference* and out of active information *avoidance*.

The *interest*-individuals are expected to have responsibility feelings and personal norms (R&N) that move them to act on climate impact information (stage 2 and 3 in the NAM). We do not know a priori whether individuals in the *interest*-group anticipate CD to a large degree or not; they may be worried about the climate but do not necessarily hold positive perceptions of meat (and hence do not experience conflicting cognitions). The *indifference* group do not anticipate CD or R&N that make them feel obliged to change their behaviour if exposed to climate impact information on food products. In contrast to the *indifference* group, *avoiders* anticipate CD and/or R&N that oblige them to react to climate impact information.

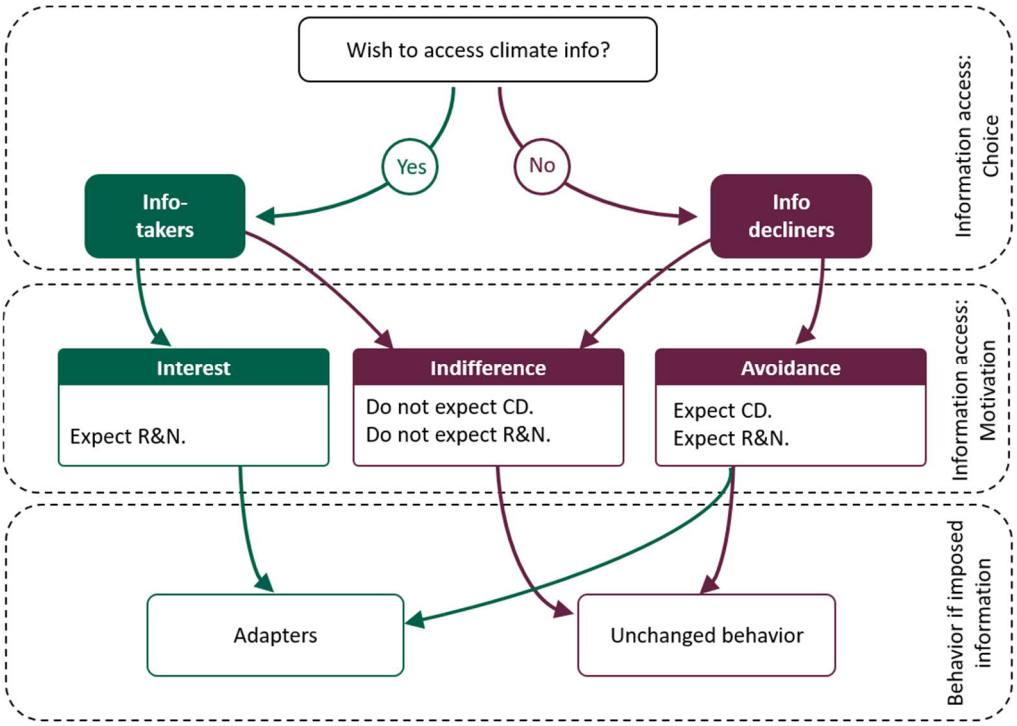


Figure 1. Decision schedule for information takers and decliners, expected motivations and behavioural change.

The lower box shows the behavioural implications when climate impact information is imposed upon individuals, and this is divided into those who change their behaviour after receiving the information (*adapters*), and those that do not (*unchanged behaviour*). For the *interest*-group, climate impact information increases their problem awareness (first stage in the NAM) and they will change their behaviour towards lower carbon-emissions products (*adapters*). We note that it is possible that some individuals in this group will not change their behaviour if they already make climate friendly choices.

The indifference group do not change their behaviour when imposed with climate impact information (*unchanged behaviour*). Finally, for individuals who decline information out of avoidance, we do not know *a priori* whether they will change behaviour if they are imposed with climate impact information. This is an empirical question, as it depends on the importance of the

[5] Following expected utility theory, individuals will choose to ignore costless information only if they anticipate that it would not change their behaviour, making them exactly indifferent about learning the information or not.

CD and/or the extent of R&N relative to the positive preferences for foods that have high carbon footprints. When exposed to climate impact information, *avoiders* may change their behaviour to reduce CD or follow their R&N (*Adapters*). It is also possible that *avoiders*, though not changing their behaviour following the information exposure, do experience disutility caused by cognitive dissonance or from the failure to act in accordance with their responsibility feelings. We make the following predictions: *H1. There are individuals who actively avoid climate impact information ('Info-decliners')* and *H2. The behaviour predicted in H1 is explained by active information avoidance (rather than indifference)*. We test this by investigating whether info-decliners change their behaviour when provided with climate impact information. The rationale behind this approach is that, if individuals are indeed indifferent to the information offered, it is not rational to react to the information when provided with it. We will test whether info-decliners change their behaviour in the form of altered preferences for product types after receiving information.

We expect that anticipated CD is largest for individuals who find competing attitudes/values to be of importance; i.e., they hold positive perceptions of meat consumption (tasty, nutritious, familiar, part of tradition and identity) *and* experience negative emotions when presented with information about climate impacts. We predict that CD is a motivation for changing behaviour: *H3a. Individuals who experience high CD are more likely to change their choice behaviour after receiving climate impact information compared to individuals with little or no CD.*

Following the theory of CD, we predict that CD is a motivation for avoiding information: *H3b. Info-decliners (H1) who experience high CD are more likely to change their choice behaviour after receiving climate impact information compared to info-decliners with little or no CD.*

We expect that individuals who find personal carbon reduction to be important and feel morally obligated to act accordingly will anticipate that climate impact information will demand that they change their behaviour. If such changes in behaviour are undesired (Sweeny et al., 2010), or cause them feelings of guilt if they do not act on the information, avoidance of information can be used as a strategic device to feel better. Here, moral norms play a central part, as they are grounded in concepts such as the welfare and rights of others, considerations of fairness and justice (Kaiser et al., 1999). We test whether: *H4a: Individuals with high levels of R&N that oblige action are more likely to change their choice behaviour after receiving climate impact information than individuals with lower R&N.*

Following the NAM, we will test for strategic reasons for declining to access climate impact information: *H4b. Info-decliners (H1) with high levels of R&N that oblige action are more likely to change their choice behaviour after receiving climate impact information than info-decliners with lower R&N.*

Next, we explore how CD and R&N affect choices after climate impact information on meat products is received by both info-decliners and info-takers. We hypothesise that individuals who have strong positive attitudes and beliefs towards the product (meat lovers) as well as strong negative feelings for consumption of the product (climate anxiety) will expect CD if exposed to climate impact information. Following this, we hypothesise that the introduction of climate impact information makes the choice task more difficult for respondents who experience CD compared to those who do not experience CD. We predict that: *H5: CD increases choice uncertainty (error variance) when exposed to climate impact information.*

We further predict that individuals who feel responsible to change their behaviour but who would rather not undertake such changes will find choice task complexity higher when exposed to climate impact information: *H6: R&N that oblige action increase choice uncertainty (error variance) when exposed to climate impact information.*

Method

We conducted a stated preference choice experiment. The objective of analysing motivations for actively avoiding information requires detailed responses to a number of scales at the individual level. This prevented a store-based experiment. A further advantage with the conducted survey method is that it enabled us to have a large sample of responses from a representative sample of the population, and it provided us the freedom to design products that are not yet on the market. An online survey was distributed by a research panel firm in Sweden, resulting in 803 responses. The survey included initial screening questions on sociodemographic characteristics, which were used to ensure a representative sample of the population with respect to gender, age and region. Next, there were questions regarding food-related habits and general food attitudes, followed by the choice tasks. A final section included questions regarding attitudes and beliefs, for measuring CD and R&N, detailed further below.

The choice experiment used meat products, since this is a category where significant differences in CO_2e levels exist, and where the level of CO_2e is relatively high for some products. Following discussions in two focus group sessions and an analysis of retail sales data, minced meat was selected as the most suitable product. A hybrid meat product, combining meat with vegetable protein, was included as a viable option for less-involved consumers (de Boer and Aiking, 2017). Relevant product attributes and levels were also selected in this process (Table A1 in the appendix). Price levels were selected based on current market prices. The levels of CO_2 equivalent for each of the meat types were based on recent LCA reviews (Blonk et al., 2008; Clune et al., 2017). Given the common unfamiliarity with CO_2 equivalents, a short explanation was provided before the first task containing such information (survey available in the supplementary material).

The experimental design was generated using a d-efficiency criterion for evaluation, and Bayesian priors were included from the pilot study (n=400). The final main effects design included 12 choice tasks, and these were blocked in three to reduce the burden on respondents. Each choice task included four alternatives and the option to purchase none of the products. The order of the choice tasks and the position of the alternatives were randomised.

Design of information experiment

We used a within-subject design in the experiment[6]. Each respondent was initially presented with four choice tasks, where the product type was presented (control), without information about the products' climate impact. Following this, respondents were asked if they wished to see an additional label displaying the CO_2e levels for the product (info-takers) or not (info-decliners). They were unable to proceed until responding either 'yes' or 'no'; the effort was thereby equal for the two options. We note that respondents may have opted for 'no information' if they wished to limit their cognitive burden, and would therefore avoid any additional labelling information. While this could be solved by providing some 'nonsense information' to those declining the climate impact information, we decided against it, as there would be a risk of confusing the respondents.

Following the information question, all respondents were provided with the final four choice tasks where the CO_2e information was included on all products as an additional label. We recognise that this approach may annoy participants who were provided information against their will. For this reason, we included an explanation for these participants that the choice tasks were decided as part

[6] We use a within-subject design, as we believe that this is behaviourally plausible in the context of the study; we measure a reaction to added information, and since food purchases are repeated on a regular basis, and the information is not currently available, the within-subject design is reasonable. We tested a between-subject design in a pilot study (n=400), and found the results to be very similar to the within-subject design presented in this study. More details are presented in Section A1 in the appendix.

of an experimental design, and they were therefore provided with the information. When examining active information avoidance, there are two possible approaches: 1) the average-effect approach and 2) the imposed-information approach. With the average-effect approach, a portion of participants are given the information without being asked whether they wish to receive it or not (control), while the remaining participants are given the choice whether or not to access the information. Comparing the average behaviour in these groups makes it possible to identify whether there are any active information avoiders. This approach has been applied in a number of studies on information avoidance (Beiermann et al., 2017; Thunström et al., 2016, 2014). However, the objective of this study – to explore motivations for actively avoiding information and behavioural change – requires information on the individual level, and comparing averages is therefore not sufficient. For this reason, some degree of imposed information provision is needed. This approach has been applied in other studies (Woolley and Risen, 2017).

Ideally, responses to the information question should be incentive compatible. We tested alternative measures during survey testing (focus groups), where the likelihood of receiving climate impact information was affected by the answer given to the climate question. These efforts were not understood by the participants. More details are provided in Section A2 of the appendix. The final four choice tasks (Treatment) were based on the same experimental design as the first four (Control).

Measures of expected cognitive dissonance from climate impact information

Cognitive dissonance is a latent construct, which can be measured using beliefs and values as proxies. The CD measure was designed to capture the conflict between conceptualisations of eating meat on the one hand and meat-related climate anxiety on the other. The conceptualisations of eating meat included five statements relating to enjoying the taste, being part of one's identity, eating meat being natural, meat having a central role in meals, and its nutritional importance on a Likert scale with anchors (1=disagree–5=agree) (M=3.8 and S.d.=0.95). The climate-anxiety scale was generated from a short version of the positive and negative affect scale (PANAS) (Watson et al., 1988) that included only the negative part of the scale. Respondents indicated their feelings when exposed to information about climate impacts from food, including *afraid, nervous, upset, distressed* and *guilty*[7] on a scale from 1-5 (never–always) (α=0.90 M=2.2 S.d.=1.0). The CD scale was constructed by reversing the absolute value of the difference between the two sub-scales, such that CD=0 implies low CD, and 4 implies high CD.

Measures of Responsibility and Personal Norms

A composite measure for R&N was constructed based on feelings of personal responsibility and personal norms that oblige climate reducing action (α=0.84 M=3.8 S.d.=0.9). Personal responsibility feelings were measured by two items, modified from Kaiser et al., (1999): *Because my personal contribution is very small I do not feel responsible for climate change* (reverse coded) and *I feel co-responsible for climate change because I contribute with carbon emissions through my consumption.* Personal norms were measured by two items, building on Han, (2014); Onwezen et al., (2013): *I feel a moral obligation to reduce my contribution to climate change* and *I do not have a responsibility to reduce my contribution to climate change if other consumers do not* (reverse coded).

Other control measures

A measure of attitudes towards the relation between humans and nature was developed using four selected questions from the New Ecological Paradigm (NEP) questionnaire, modified to describe the context of climate change (Dunlap et al., 2000) (α=0.73 M=3.6 S.d.=0.75). We included a

[7] The short version is tested in Mackinnon et al., (1999), although here, *scared* was altered to *guilty* following focus group discussions.

measure of case-specific problem awareness, where individuals indicated to what extent they agree with the statement *Red meat has a large negative climate impact.* To obtain insights about the motivation for declining information, a question was included following the choice tasks where individuals could indicate which statement(s) they agreed with. Finally, we asked respondents to indicate their recent consumption behaviour in five different domains of relevance for climate impact: flying, traveling by car, overall consumption, consumption of meat and energy usage. They selected from a scale of *have reduced, plan to reduce, no change, plan to increase* and *have increased*.

Econometric methods

Data from the choice experiment is analysed taking departure in random utility theory (McFadden, 1974). For individual *i*, the utility of choosing alternative *k =1,...,K* on choice situation *t =1,…,T* is:

$$U_{ikt} = \beta' x_{ikt} + \varepsilon_{ikt}, \quad (1)$$

where x_{ikt} is a vector of the observable variables related to alternative *k* and the person, β is a vector of parameters to be estimated and ε is a random term with mean zero that denotes the unobserved part of utility. ε is iid extreme value type 1 distributed with variance $\pi^2/6\lambda^2$, where λ is a scale parameter. In our case, $T = 8$, four choice situations without climate labelling (control) and four with climate labelling (treatment), and $K = 5$. To allow for heterogeneity in preferences between the respondents, we estimate mixed logit (ML) models, where all product attributes are described by a density function $f(\beta)$, which takes the form:

$$\beta_i = b + \sigma v_i, \quad (2)$$

with the population mean *b*, parameter standard deviation σ_i and random error term v_i ~i.i.d. $N(0,1)$ capturing the individual specific heterogeneity (Train, 2009). The unconditional probability can then be written as:

$$P_{i\boldsymbol{k}} = \int \left(\prod_{t=1}^{T} \left[\frac{\exp\left(\lambda(\boldsymbol{\beta}_i' \boldsymbol{x}_{ikt})\right)}{\sum_{k=1}^{K} \exp\left(\lambda(\boldsymbol{\beta}_i' \boldsymbol{x}_{ikt})\right)} \right] \right) f(\beta | \mathrm{b}, \sigma) d\beta, \quad (3)$$

where $\boldsymbol{\beta}_i$ is the individual specific parameter vector. The ML models are estimated in R (R Core Team, 2018), using the Apollo package (Hess and Palma, 2019). Estimates were stable at 1,000 Halton draws, and at different starting values. All estimates were specified with a normal distribution except price, for which a negative lognormal distribution was modelled, since it is expected to be negative for all respondents.

To test H2-H4, we examine whether preferences for meat types and for opting out are different after carbon information is provided (Treatment), and whether such changes depend on the degree of CD and/or the extent of R&N. We include interaction terms, and in the ML specifications, these are included in the form of shifters in the mean. For H2, this takes the form:

$$b = b_1 + b_2 treatment, \quad (4)$$

i.e. we test whether the mean differs between Control and Treatment. The variable *treatment* takes the value one for the treatment group (the four last choice tasks for the respondents) and zero otherwise. For H3 and H4, we also include interactions with CD and R&N respectively. Finally, to test H5, we allow the error variance to depend on the degree of CD. More specifically, we specify λ as:

$$\lambda = \exp(\gamma_1 treatment + \gamma_2 CD + \gamma_3 CD * treatment) \quad (5)$$

where γ_3 is the main parameter of interest, enabling us to test if the scale (and thereby error variance) is affected differently by the information treatment, depending on the level of cognitive dissonance. A corresponding function is specified in the model with R&N to test H6. These specifications also allow for scale differences between the control group and treatment group.

Given that the hypothetical products likely share a different error structure compared to not purchasing any (opt out), we specify an error component for the product alternatives with mean 0, and a normal distribution (Brownstone et al., 2000). Thereby, the variance of the opt-out option and the hypothetical alternatives are allowed to differ. The off-diagonal elements in the covariance matrix is set to zero.

Results

Information takers vs decliners

One third (33%) of respondents indicate that they do not wish to access climate impact information for the products, supporting the first hypothesis of info-decliners. There is a significant difference between info-takers and info-decliners in self-reported frequency of meat consumption; 40% of decliners consume red meat four times a week or more often, while only 27% of the info-takers do so. On the problem-awareness question, info-takers were more in agreement with the proposition that meat is bad for the climate in comparison with info-decliners (χ^2 =125.7 p-val.<0.001). Interestingly, even though info-decliners, on average, do not believe that meat has a large climate impact, 25.2% do believe so. Moreover, a non-negligible share of info-takers do not believe that meat has a large negative climate impact (16.2%) (Figure A1 in the appendix).

To further explore differences between info-takers and info-decliners, we estimate a logit model with the indicated wish to access climate impact information or not as the dependent variable (Table 1). We note that sociodemographic characteristics are poor predictors of desire to access information, as the parameters for most characteristics are insignificant (not reported). The most important predictor of choice of information access are the R&N, problem awareness (belief that red meat affects the climate negatively) and CD. The measure based on selected questions from the NEP scale is insignificant, implying that after controlling for the other aspects, the attitude towards nature and the role of humans in it does not explain information demand. When excluding the case-specific problem awareness variable, the NEP becomes statistically significant (Table A2 in the appendix), suggesting that these measures to some extent measure the same construct (general and case specific problem awareness). Regressing the R&N measure on sociodemographic characteristics does not provide significant parameters (with the exception of gender) (Table A3 in appendix). However, regressing CD and Problem Awareness respectively reveals that older individuals experience less CD with respect to meat consumption and agree less with the large negative impact of meat.

Table 1. Estimates from logit model of info-decliners/takers

	Coef.	z	dy/dx	z
Cognitive dissonance (CD)	**0.29**	3.02	**0.05**	3.08
Responsibility feelings & personal norms (R&N)	**0.78**	5.87	**0.13**	6.34
NEP	0.22	1.42	0.04	1.42
Problem Awareness	**0.39**	4.33	**0.06**	4.51
Meat consumption (reference level ≤1/week)				
2-3/week	0.06	0.24	0.01	0.24
≥4/week	-0.13	-0.50	-0.02	-0.50
N	803			
LL	399.01			
Pseudo R^2	0.22			

Note: Dependent variable: 1=info-taker, 0=info-decliner. Model includes variables for gender, region and age, and intercept. Bold estimates indicate a significance level of 5%.

Following the choice tasks, respondents indicated which statements they agreed with concerning a set of motivations for wanting or not wanting to access CO_2e information. The most notable differences between info-decliners and info-takers is their distrust in climate impact information (48% vs 27%, p-val.=0.000). Moreover, more info-decliners agree that climate change is not caused by humans (8.6% vs 2.1%, p-val.=0.000). A low agreement with *I want to use climate impact information when I purchase food* among the info-decliners (7.1%) is consistent with their previous decision to decline access information in the experiment. The corresponding rate among info-takers was 55%. This relatively low agreement among info-takers signals that some individuals indicated that they wish to see climate impact information out of indifference (the cost of saying yes and no was very similar) (see Table A4 in the appendix).

We also explore whether info-decliners were uninterested in the climate impact information on meat but had planned or already made changes towards more climate-friendly behaviour in other domains. Across all five domains (flying, traveling by car, overall consumption, consumption of meat, energy usage) the info-takers had higher scores.

Next, we investigate whether info-decliners and info-takers have different preferences for the products in the experiment. The results for the control tasks (without climate impact information) are presented in Table 2, where the relative size of the standard deviation to the mean reveals the degree of heterogeneity in preferences. As a point of reference, a main effects model with all respondents is presented. All else equal, participants on average prefer organic products over conventional, and they are more likely to choose lower-priced products. The negative opt-out parameter implies that respondents prefer to choose a product over not selecting any. The statistically significant standard deviation for the error component implies that the error variance, and hence the discussion process, differs between experimentally generated products compared to

the opt-out alternative, something that has been found in previous studies (Mørkbak and Nordström, 2009; Scarpa et al., 2013).

There are relatively homogenous preferences for *beef* and *beef & pork* compared to *pork*. In contrast, preferences for *chicken*, *beef & beans* and *meat substitute* are heterogeneous. For example, while the mean estimate for *chicken* compared to *pork* is negative, the large standard deviation relative to the mean implies that 42% of respondents prefer chicken over pork. In the second model, all mean coefficients are interacted with the wish to access climate impact information (info-takers). This reveals that only the estimates associated with the meat types are statistically significantly different between the info-takers and info-decliners.

Table 2. Mixed logit models for Control sample

	All respondents				All respondents info-demander effects			
Variable	Coef.	t-ratio	S.d	t-ratio	Coef.	t-ratio	S.d	t-ratio
Status quo	-3.36	-11.48			-3.44	-9.05		
Beef	2.62	16.51	1.68	8.42	3.29	11.53	1.70	8.38
Beef & pork	1.74	13.39	0.84	3.51	2.10	10.06	0.82	3.40
Pork	0.00				0.00			
Chicken	-0.48	-2.26	2.43	11.06	-1.22	-3.82	2.44	10.18
Beef & beans	0.48	3.67	2.03	12.73	-0.35	-1.66	1.94	12.38
Meat substitute	-12.11	-3.52	13.63	5.15	-23.54	-3.78	14.77	4.13
Organic	0.36	4.80	0.74	5.51	0.24	1.97	0.79	6.55
Log (Price)[a]	-3.30	-35.16	0.76	6.62	-3.20	-23.42	0.70	9.02
Mean price/S.d price	-0.05		0.04		-0.04		0.04	
S.d for err. comp.			2.97	8.44			3.02	9.78
Shifters for info-takers								
Beef					-0.98	-3.01		
Beef & pork					-0.52	-2.09		
Pork					0.00			
Chicken					1.05	3.10		
Beef & beans					1.27	5.24		
Meat substitute					13.50	4.01		
Status quo					0.02	0.06		
Organic					0.14	0.93		
Price					0.01	0.89		
# individuals	803				803			
# observations	3212				3212			
LL	-4124.4				-4055.9			
BIC	8378.0				8305.6			

Note: Bold estimates indicate a significance level of 5%.

[a] Price takes a negative lognormal distribution. The estimated parameter is $\log(\beta_{price})$. The $mean_{price} = exp(\beta_{price}+(s^2_{price}/2))$ and $S.d_{price} = mean_{price}*(exp(s^2_{price})-1)^{1/2}$

Choice behaviour of info-decliners after receiving climate impact information

To test the second hypothesis – whether info-decliners are avoiders (rather than indifferent) – we analyse the effect that climate impact information has on choice behaviour in the experiment. ML models for info-decliners and info-takers are estimated separately, where the product type and opt-out parameters are interacted with the treatment period (Table 3).

Table 3. Mixed logit models with treatment-shifters

	Info-decliners				Info-takers			
Variable	Coef.	t-ratio	S.d.	t-ratio	Coef.	t-ratio	S.d.	t-ratio
Status quo	-3.13	-6.72			-3.83	-12.07		
Beef	3.34	9.00	3.07	9.25	2.62	14.15	2.13	11.23
Beef & pork	2.10	8.74	1.76	7.47	1.71	9.90	1.56	9.16
Pork	0.00				0.00			
Chicken	-1.46	-4.17	2.76	10.60	0.09	0.42	2.61	12.83
Beef & beans	-0.34	-1.54	2.36	8.18	1.19	7.44	2.32	13.20
Meat substitute	-9.72	-3.21	6.76	3.44	-4.23	-4.33	10.59	8.96
Organic	0.01	0.13	0.80	5.51	0.48	6.04	0.88	6.89
Log (Price)[a]	-3.33	-23.45	0.83	9.27	-3.33	-33.87	0.85	-17.67
Mean price/S.d price	-0.05		0.06		-0.05		0.06	
S.d for err. comp.			3.38	7.69			3.45	11.59
Shifters for Treatment[b]								
Status quo	-0.03	-0.14			-0.06	-0.35		
Beef	-0.91	-3.30			-2.36	-12.46		
Beef & pork	-0.54	-2.29			-1.65	-9.30		
Chicken	0.79	2.97			0.26	1.51		
Beef & beans	-0.87	-3.89			-2.25	-12.04		
Meat substitute	0.24	0.38			1.28	3.94		
# individuals	267				536			
# observations	2132				4285			
LL	-2310.3				-5023.0			
BIC	4789.2				10229.9			

Note: Bold estimates indicate a significance level of 5%.

[a] $mean_{price} = \exp(\beta_{price} + (s^2_{price}/2))$ and $S.d_{price} = mean_{price} * (\exp(s^2_{price}) - 1)^{1/2}$, [b] Specified in equation (4)

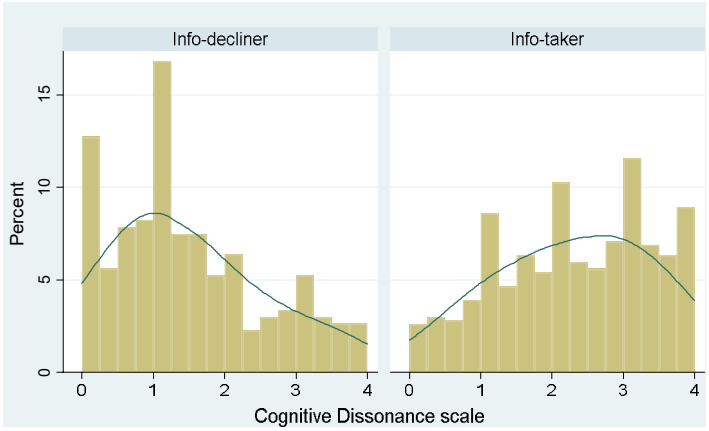
Interaction parameters between treatment and *organic* and *price* are not included, as they were insignificant in both models. Info-takers change preferences significantly after receiving carbon information on the products; *beef*, *beef & pork* and *beef & beans* become less preferred in favour of the *meat substitute*. Interestingly, info-decliners also shift preferences following the provision of information. This provides support for the second hypothesis of active information avoidance: there are individuals who incorporate the climate impact information into their decisions even though they declined to access such information.

Cognitive dissonance and choice behaviour after receiving climate impact information

There are differences in the average CD between the info-takers and info-decliners (p-val.=0.000), while there is no statistical difference in the distribution (p-val=0.891) (Figure 2a). We test H3a and H3b by interacting the level of CD with the product-type parameters and treatment. These model specifications include a large number of interactions, and the number of observations does not allow

for random preference heterogeneity, wherefore we estimate MNL models. We present the parameters in focus for the hypothesis in Table 4, while the full results are available in Table A4 in the appendix.

a)



b)

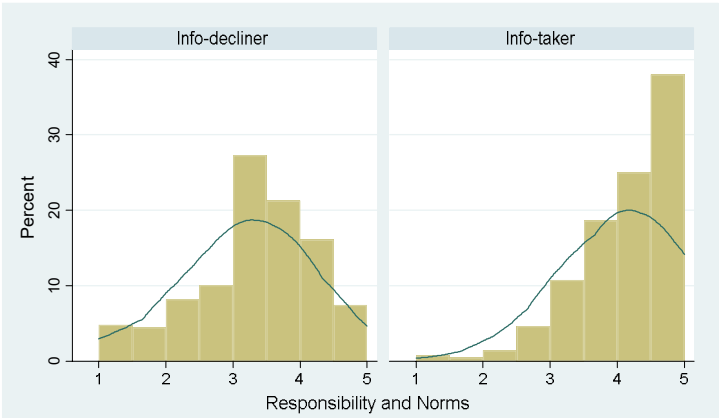


Figure 2. Histogram by info-decliners and info-takers

Table 4. MNL model with Treatment (Tr.) and Cognitive Dissonance (CD) interactions

	All				Info-decliners only			
	Main	Tr.	CD	Tr.*CD	Main	Tr.	CD	Tr.*CD
Product type								
Beef	2.07	-0.21	-0.18	-0.42	2.30	-0.32	-0.02	-0.11
Beef & pork	1.59	-0.54	-0.26	-0.08	1.79	-0.45	-0.23	0.09
Chicken	- 0.32	0.06	0.22	0.05	-0.51	0.23	-0.38	0.14
Beef & beans	-0.13	-0.59	0.33	-0.20	-0.13	-0.57	0.02	0.07
Meat substitute	-1.39	-0.12	0.67	0.10	-3.18	-0.67	0.07	0.32
Other attributes								
Opt out	-1.12				-1.16			
Organic	0.13				-0.05			
Price	-0.02				-0.02			
# Choices / Indiv.	32 085	803			10660	267		
LL	-9321.4				-2817.8			

Note: Utility function: $V_j = \sum_{k=1}^{K} \beta_k^{Main} Producttype_k + \sum_{k=1}^{K} \beta_k^{Tr} Producttype_k * Tr + \sum_{k=1}^{K} \beta_k^{CD} Producttype_k * CD + \sum_{k=1}^{K} \beta_k^{Tr*CD} Producttype_k * Tr * CD + \beta_{org} Org + \beta_{price} price + \beta_{opt-out} Opt - out$ (individual subscripts are omitted). Bold estimates indicate a significance level of 5%.

In the first model, including all respondents, individuals with higher levels of CD are more likely to choose lower carbon-emissions product types. Moreover, as predicted in H3a, climate impact information affects individuals with higher CD more than individuals who have less or no CD (*Tr*CD*-column). When including info-decliners only (second model in Table 4), this pattern does not hold. While the likelihood of purchasing the different product types changes with the level of CD, this is not affected by the information treatment. Hence, there is no support for H3b.

Responsibility and personal norms, and choice behaviour after receiving climate impact information

Info-takers have a higher degree of agreement with the responsibility and personal norms statements (p-val.=0.000 for each of the four statements) (Figure 2b). High values represent a high degree of perceived personal obligation to act in a climate-friendly way. There is higher agreement among the info-takers ($M_{decliners}$=3.2 M_{takers}=4.0 p-val.=0.000), while there is larger heterogeneity among the info-decliners ($S.d._{decliners}$=0.91 $S.d._{takers}$=0.80 p-val.=0.009).

H4a and H4b are tested by interacting the level of R&N with the product-type parameters and treatment (Table 5). Full results can be found in Table A5 in the appendix. The first model, including all respondents, shows that individuals with high levels of R&N that obliged them to act in a climate-friendly way are more likely to choose the lower carbon-emissions product types before the information treatment. Moreover, the treatment effect varies significantly with R&N (*Tr*R&N* column). Individuals with high R&N are less likely to choose *beef*, *beef & pork* and *beef & beans* after they receive the CO_2e information compared to individuals with low R&N levels. These product types are also the highest emitters of carbon. There is, therefore, support for H4a.

Table 5. MNL model with Treatment (Tr.)- and Responsibility & Norms (R&N) interactions

	All				Info-decliners only			
		Tr.	R&N	Tr.*R&N		Tr.	R&N	Tr.*R&N
Product type								
Beef	**2.27**	0.67	**-0.15**	**-0.44**	**1.42**	0.24	0.17	-0.23
Beef & pork	**1.88**	0.29	**-0.21**	**-0.27**	**1.07**	0.12	0.05	-0.14
Chicken	**-0.64**	0.08	**0.21**	0.02	-0.35	-1.05	-0.04	**0.46**
Beef & beans	**-1.26**	0.20	**0.47**	**-0.32**	**-0.98**	-1.02	**0.30**	0.17
Meat substitute	**-4.45**	0.66	**1.14**	-0.13	**-4.16**	0.07	**0.70**	0.01
Other attributes								
Opt out	**-1.13**				**-1.16**			
Organic	**0.14**				-0.05			
Price	**-0.02**				**-0.02**			
# Choices / Indiv.	32085	803			10660	267		
LL	-9341.7				-2837.3			

Note: Utility function: $V_j = \sum_{k=1}^{K} \beta_k^{Main} Producttype_k + \sum_{k=1}^{K} \beta_k^{Tr} Producttype_k * Tr + \sum_{k=1}^{K} \beta_k^{R\&N} Producttype_k * R\&N + \sum_{k=1}^{K} \beta_k^{Tr*R\&N} Producttype_k * Tr * R\&N + \beta_{org} Org + \beta_{price} price + \beta_{opt-out} Opt - out$ (individual subscripts omitted). Bold estimates indicate a significance level of 5%.

The R&N impact on the treatment effects is less significant in the info-decliners-only model, where only the treatment effect on the likelihood of choosing chicken increases more for individuals with high levels of R&N. There is therefore little support for H4b. The insignificant interaction effects in the info-decliners-only model does not lend support for the idea that info-decliners with motivations for avoiding information (CD and/or RN) react more strongly to climate impact information when provided with it. We acknowledge that the lower number of info-decliners (267 vs 536) may contribute to the insignificant results.

Cognitive dissonance, responsibility and norms, and choice task complexity

We test whether the introduction of climate impact information makes the choice task more complex for respondents who experience CD (H5) and R&N (H6), by including these measures in the scale term and interactions with the treatment (eq. 3). Results are presented for CD in the first model in Table 6, and R&N in the second. The models become more computationally burdensome compared to the models presented in Tables 3 and 4, and for this reason only the product types are specified with distributions. The scale parameter is obtained from exp(λ), where the normalisation is one. Therefore, the λ parameters should be tested against zero. In both models, the treatment λ parameter is positive, implying an increased choice uncertainty after the introduction of climate impact information. The scale does not vary with the level of CD, as revealed by the statistically insignificant λ_{CD} parameter. However, individuals with higher levels of CD show larger choice inconsistencies in the choice tasks with climate impact information (*CD*Tr*). This is in line with prior expectations, providing support for H5.

Table 6. Mixed logit models with scale shifters

	Cognitive Dissonance (CD)				Responsibility and Norms (R&N)			
	Coef.	t-ratio	Std.dev	t-ratio	Coef.	t-ratio	Std.dev	t-ratio
Status quo	**-1.42**	-9.61			**-1.04**	-5.41		
Beef	**2.16**	11.11	**2.28**	11.14	**1.63**	6.27	**1.72**	6.51
Beef & pork	**1.19**	8.17	**1.78**	11.69	**0.89**	5.38	**1.32**	6.45
Pork	0				0			
Chicken	**-0.57**	-3.62	**2.20**	10.97	**-0.41**	-3.23	**1.61**	5.99
Beef & beans	**0.30**	2.55	**2.11**	11.19	**0.23**	2.57	**1.55**	6.35
Meat substitute	**-3.79**	-5.99	**5.33**	7.19	**-2.66**	-4.38	**3.76**	4.88
Organic	**0.16**	3.41			**0.13**	3.21		
Price	**-0.03**	-9.53			**-0.02**	-5.52		
Shifters for Treatment								
Beef	**-1.62**	-11.16			**-1.24**	-6.51		
Beef & pork	**-1.07**	-8.60			**-0.80**	-5.67		
Pork	0				0			
Chicken	**0.37**	3.26			**0.27**	3.09		
Beef & beans	**-1.46**	-10.64			**-1.10**	-6.28		
Meat substitute	**0.98**	4.25			**0.69**	3.64		
Scale shifters (λ)[a]								
Treatment	**0.55**	4.81			**0.96**	4.08		
CD	-0.01	-0.31						
CD*Treatment	**-0.14**	2.82						
RN					0.07	1.86		
RN*Treatment					**-0.18**	-3.14		
# individuals	803				803			
# observations	6417				6417			
LL	-8023.2				-8026.9			
BIC	16230.5				16237.9			

Note: Bold estimates indicate a significance level of 5%.

[a] Specified in equation (5)

The second model in Table 6 reveals that, similarly to the CD model, the level of R&N does not affect the scale significantly, but after the information treatment, the level of R&N is associated with a lower scale (0.83) and thereby a higher error variance. These findings support H6; individuals with

a high degree of R&N concerning meat consumption become less certain in their choices after the provision of climate impact information.

Changes in CO_2 emissions after receiving climate impact information

Finally, we explore the effect on carbon emissions from the CO_2e information, and we compare the effect on those who have climate impact information imposed on them (info-decliners) with those who received it voluntarily (info-takers). We summarise the total amount of CO_2 equivalents from the chosen products in the control tasks and compare it with the total amount in the treatment tasks. The percentage of change in total CO_2 equivalents constitutes the effect on emissions from the imposed information. Since the experimental design is the same for the control tasks and the treatment tasks, the total CO_2 equivalents can be compared[8]. For the whole sample, the provision of climate impact information reduced the total amount of CO_2 equivalent emissions from the chosen products by 25% (Table 7). Although the reduction is larger among the info-takers (32%), a reduction can still be seen among individuals who indicated that they prefer not to access climate impact information. As expected, the total CO_2 equivalent emissions from the low-emissions product types (e.g. *pork*, *chicken*, and *meat substitute*) increase as a result of their being used as substitutes for the high-emissions product types.

Table 7. Effect on carbon emissions from information treatment in percent

	All respondents	Info-decliners	Info-takers
Beef	-33	-16	-45
Beef & pork	-19	-9	-27
Pork	50	20	69
Chicken	73	75	73
Beef & beans	-48	-26	-54
Meat substitute	56	19	58
Total	-25	-12	-32

Discussion

One possible measure for reducing the climate impact of food consumption is to include carbon emissions (CO_2e) labels on food products. However, in order such labelling programmes to be effective, consumers must consider the information and change their consumption patterns accordingly. There is evidence from other domains that some consumers actively avoid certain types of information in order to eschew uncomfortable feelings (Onwezen and van der Weele, 2016; Thunström et al., 2016). This article explores whether consumers desire to learn about their climate impact when making food purchases, and how their behaviour is affected when such information is imposed upon them. Data was collected in an online questionnaire, which included a stated preference experiment. One third of the respondents did not wish to access CO_2e information when choosing minced meat products (info-decliners). Interestingly, when CO_2e information about the products was imposed upon the info-decliners, their likelihood of purchasing products with high CO_2e declined. This suggests some degree of active information avoidance.

We investigate two motivations for avoiding climate impact information: (1) Avoiding discomfort due to conflicting beliefs or emotions – cognitive dissonance (CD). We propose that individuals with higher levels of CD are more likely to change their behaviour if information is imposed upon

[8] While distribution between the blocks is close to being evenly distributed, some minor differences occur, wherefore we weigh the blocks equally when calculating the CO_2 equivalents before and after the information treatment.

them. (2) Strategic avoidance implies that responsibility feelings and personal norms (R&N) that oblige a person to take action they would rather avoid motivate information avoidance. We find that both motivations affect how a person reacts to information. A higher degree of CD related to meat consumption is associated with higher uncertainty when making purchases due to the imposition of climate impact information. Similarly, stronger R&N that oblige an individual to act in a climate-friendly way are associated with higher levels of uncertainty when making the decision after CO_2e information is included on the products. Moreover, individuals with higher levels of CD and R&N are more likely to bias their purchase behaviour towards lower carbon-emissions products when provided with climate impact information. However, among info-decliners, we only find weak support for this effect from R&N, and no effect from CD. A possible reason for this is that the info-decliners who are avoiders (as opposed to indifferent) are relatively few and that such effects are therefore not possible to measure in our experimental setup.

Policy implications

Our findings have practical implications for policy makers and other actors that seek to reduce CO_2e emissions due to food consumption. This study highlights that individuals who are information-decliners will not actively seek out information, but may be affected when exposed to it. We identify three types of individual: (1) Those who are *interested* in climate impact information (they wish to access such information, and they alter their behaviour when it is provided and the information deviates from their expectations). (2) Those who are *indifferent* (they may or may not wish to access information, but are not affected by it). (3) *Avoiders*, who decline information when given the choice, but at least some of them are affected sufficiently to change their behaviour when information is imposed upon them. The implication from these findings is that while *interested* individuals can be expected to more actively seek out climate impact information (e.g., turn the package, read a complex label), avoiders will only be affected by the label if it is imposed upon them. Hence, while CO_2e can be reduced by providing consumers with labels on their products, such initiatives will likely need to be mandatory or provided by groceries, because high-emissions producers are unlikely to voluntarily provide such information on a product level. Importantly, the impact of a mandatory CO_2e label will be affected by the way it is presented (label complexity and position). The results from this study indicate that if a label is difficult to avoid, the effects are likely to be considerably larger.

We use a heterogeneous definition of a product category, where minced protein includes both types of red meat, as well as chicken and meat substitutes. The inclusion of low carbon-emissions product types in the same choice context as red meat products makes such alternatives more feasible and increases awareness. The market share for minced meat substitutes, minced chicken and minced beef combined with minced beans are currently very low, while the market share in this experiment is significant; and for chicken and meat substitutes, it increases following the inclusion of climate impact information. The introduction of specific CO_2e labels on all products is a complicated task that requires policy and/or groceries to demand such information from producers. A more feasible measure, which can be implemented by groceries, is the use of simple nudges (Panzone et al., 2018). Making changes in the choice presentation has proven to be effective in restaurant settings (Kurz, 2018). In the grocery setting, a possible nudge could be to place meat substitutes and chicken products on the same shelf as red meat products, together with some kind of simple CO_2 label on the products, such as red, yellow and green, to help the consumer identify low-emissions product groups.

Limitations and future research directions

There is no established CD scale, but various methods are used in the literature. There are many possible variants of questions that could be asked, and their appropriateness is also likely to vary with the context. While the approach in this study has been instructive, we suggest that more work

is needed on the measurement of CD and the development of short scales that can be included in questionnaires. Moreover, while challenging to measure, it would be informative to include the degree of disutility experienced due to imposition of information in future studies on active information avoidance.

Conclusion

The results from this study highlight the potential that climate impact information has as a measure for transitioning towards food consumption that results in lower carbon emissions. The study also reveals that some individuals avoid carbon information where possible, yet alter their behaviour if information is imposed upon them. While info-takers reduced their CO_2e emissions by 32% after receiving climate impact information, the info-decliners also reduced theirs by 12%. This study contributes with insight into motivations behind the avoidance of climate impact information and how these motivations affect a person's actions when information is provided. The study demonstrates that, when positive beliefs and preferences towards carbon-heavy consumption are combined with climate concerns, carbon emissions information results in greater uncertainty in choice behaviour. Similarly, responsibility feelings and norms that move a person to transition to climate-friendly consumption result in increased choice uncertainty when exposed to climate impact information. These findings highlight the potential that climate impact information has for influencing these consumers to consume products that cause lower carbon emissions.

References

Beiermann, J., Jones Ritten, C., Thunström, L., Ehmke, M., 2017. Measuring the value of information - revealed preferences for country of origin information. J. Behav. Exp. Econ. 71, 96–104.

Bell, E., Norwood, F.B., Lusk, J.L., 2017. Are consumers wilfully ignorant about animal welfare? Anim. Welf. 26, 399–402.

Blonk, H., Kool, A., Luske, B., Waart, S. De, 2008. Environmental effects of protein-rich food products in the Netherlands Consequences of animal protein substitutes. Blonk Milieu Advies, Gouda 1–19.

Bonnet, C., Bouamra-Mechemache, T.C., 2018. An environmental tax towards more sustainable food: empirical evidence of the consumption of animal products in france. Ecol. Econ. 147, 48–61.

Brownstone, D., Bunch, D.S., Train, K., 2000. Joint mixed logit models of stated and revealed preferences for alternative-fuel vehicles. Transp. Res. Part B Methodol. 34, 315–338.

Canavari, M., Coderoni, S., 2020. Consumer stated preferences for dairy products with carbon footprint labels in Italy. Agric. Food Econ. 8, 1–16.

Caussade, S., Ortúzar, J. de D., Rizzi, L.I., Hensher, D.A., 2005. Assessing the influence of design dimensions on stated choice experiment estimates. Transp. Res. Part B Methodol. 39, 621–640.

Clune, S., Crossin, E., Verghese, K., 2017. Systematic review of greenhouse gas emissions for different fresh food categories. J. Clean. Prod. 140, 766–783.

Dana, J., Weber, R.A., Kuang, J.X., 2007. Exploiting moral wiggle room: Experiments demonstrating an illusory preference for fairness. Econ. Theory 33, 67–80.

de Boer, J., Aiking, H., 2017. Pursuing a Low Meat Diet to Improve Both Health and Sustainability: How Can We Use the Frames that Shape Our Meals? Ecol. Econ. 142, 238–248.

de Boer, J., Aiking, H., 2011. On the merits of plant-based proteins for global security: Marrying macro and micro perspectives. Ecol. Econ. 70, 1259–1265.

Dellaert, B.G.., Donkers, B., Soest, A. Van, 2012. Complexity Effects in Choice Experiment–Based Models. J. Mark. Res. 49, 424–434.

DeShazo, J.R., Fermo, G., 2002. Designing choice sets for stated preference methods: The effects of complexity on choice consistency. J. Environ. Econ. Manage. 44, 123–143.

Dunlap, R.E., Van Liere, K.D., Mertig, A.G., Jones, R.E., 2000. Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. J. Soc. Issues 56, 425–442.

Elofsson, K., Bengtsson, N., Matsdotter, E., Arntyr, J., 2016. The impact of climate information on milk demand: Evidence from a field experiment. Food Policy 58, 14–23.

Festinger, 1957. The Theory of Cognitive Dissonance. Stanford University Press, Stanford.

Golman, R., Hagmann, D., Loewenstein, G., 2017. Information Avoidance. J. Econ. Lit. 55, 96–135.

Grossman, Z., van der Weele, J.J., 2017. Self-image and willful ignorance in social decisions. J. Eur. Econ. Assoc. 15, 173–217.

Grunert, K.G., Hieke, S., Wills, J., 2015. Sustainability labels on food products: Consumer motivation, understanding and use. Food Policy 44, 177–189.

Han, H., 2014. The norm activation model and theory-broadening: Individuals' decision-making on environmentally-responsible convention attendance. J. Environ. Psychol. 40, 462–471.

Hartmann, C., Siegrist, M., 2017. Consumer perception and behaviour regarding sustainable protein consumption: A systematic review. Trends Food Sci. Technol. 61, 11–25.

Hedenus, F., Wirsenius, S., Johansson, D.J.A., 2014. The importance of reduced meat and dairy consumption for meeting stringent climate change targets. Clim. Change 124, 79–91.

Hertwig, R., Engel, C., 2016. Homo Ignorans: Deliberately Choosing Not to Know. Perspect. Psychol. Sci. 11, 359–372.

Hess, S., Palma, D., 2019. Apollo: a flexible, powerful and customisable freeware package for choice model estimation and application. J. Choice Model. 32.

Kaiser, F.G., Ranney, M., Hartig, T., Bowler, P.A., 1999. Ecological Behavior, Environmental Attitude, and Feelings of Responsibility for the Environment. Eur. Psychol. 4, 59–74.

Kurz, 2018. Nudging to reduce meat consumption: Immediate and persistent effects f an intervetion at a university restaurant. J. Environ. Econ. Manage. 90, 317–341.

Liu, T., Wang, Q., Su, B., 2016. A review of carbon labeling: Standards, implementation, and impact. Renew. Sustain. Energy Rev. 53, 68–79.

Lombardi, G.V., Berni, R., Rocchi, B., 2017. Environmental friendly food. Choice experiment to assess consumer's attitude toward "climate neutral" milk: the role of communication. J. Clean. Prod. 142, 257–262.

Lundhede, T.H., Olsen, S.B., Jacobsen, J.B., Thorsen, B.J., 2009. Handling respondent uncertainty in choice experiments: evaluating recoding approaches against explicit modelling of uncertainty. J. Choice Model. 2, 118–147.

Mackinnon, A., Jorm, A.F., Christensen, H., Korten, A.E., Jacomb, P.A., Rodgers, B., 1999. A short form of the Positive and Negative Affect Schedule: Evaluation of factorial validity and invariance across demographic variables in a community sample. Pers. Individ. Dif. 27, 405–

416.

Mbow, C., Rosenzweig, C., 2019. IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse gas fluxes in Terrestrial Ecosystems. https://doi.org/10.4337/9781784710644

McFadden, D., 1974. Conditional logit analysis of qualitative choice behavior, in: Zarembka, P. (Ed.), Frontiers in Econometrics. Academic Press, New York, pp. 105–142.

Mørkbak, M.R., Nordström, J., 2009. The impact of information on consumer preferences for different animal food production methods. J. Consum. Policy 32, 313–331.

Nordström, J., Thunström, L., van't Veld, K., Shogren, J.F., Ehmke, M., 2020. Strategic Ignorance of Health Risk – Its Causes and Policy Consequences. Behav. Public Policy 1–32.

Ong, A.S.J., Frewer, L.J., Chan, M., 2017. Cognitive dissonance in food and nutrition - A conceptual framework. Trends Food Sci. Technol. 59, 60–69.

Onwezen, M.C., Antonides, G., Bartels, J., 2013. The Norm Activation Model: An exploration of the functions of anticipated pride and guilt in pro-environmental behaviour. J. Econ. Psychol. 39, 141–153.

Onwezen, M.C., van der Weele, C.N., 2016. When indifference is ambivalence: Strategic ignorance about meat consumption. Food Qual. Prefer. 52, 96–105.

Panzone, L.A., Ulph, A., Zizzo, D.J., Hilton, D., Clear, A., 2018. The impact of environmental recall and carbon taxation on the carbon footprint of supermarket shopping. J. Environ. Econ. Manage. https://doi.org/doi.org/10.1016/ j.jeem.2018.06.002

R Core Team, 2018. R: A Language and Environment for Statistical Computing.

Scarpa, R., Zanoli, R., Bruschi, V., Naspetti, S., 2013. Inferred and stated attribute non-attendance in food choice experiments. Am. J. Agric. Econ. 95, 165–180.

Schwartz, S.H., 1977. Normative Influences on altruism, in: Berkowitz (Ed.), Advances in Experimental Social Psychology. Academic Press, New York, pp. 221–279.

Sharot, T., Sunstein, C.R., 2020. How people decide what they want to know. Nat. Hum. Behav. 4, 14–19.

Stigler, G.J., 1961. The Economics of Information. J. Polit. Econ.

Sweeny, K., Melnyk, D., Miller, W., Shepperd, J.A., 2010. Information Avoidance: Who, What, When, and Why. Rev. Gen. Psychol. 14, 340–353.

Thøgersen, J., Nielsen, K.S., 2016. A better carbon footprint label. J. Clean. Prod. 125, 86–94.

Thunström, L., Nordström, J., Shogren, J.F., Ehmke, M., vant Veld, K., 2016. Strategic self-ignorance. J. Risk Uncertain. 52, 117–136.

Thunström, L., van't Veld, K., F. Shogren, J., Nordström, J., 2014. On strategic ignorance of environmental harm and social norms. Rev. Econ. Polit. 124, 195.

Train, K., 2009. Discrete choice models with simulation, Second. ed. Cambridge University Press, Cambridge.

Tukker, A., Huppes, G., Heijungs, R., Koning, A. de, Oers, L. van, Suh, S., Geerken, T., Holderbeke, M. van, Jansen, B., Nielsen, P., 2006. Environmental Impact of Products (EIPRO), European Comission. Technical Report Series.

Van Loo, E.J., Caputo, V., Nayga, R.M., Verbeke, W., 2014. Consumers' valuation of sustainability labels on meat. Food Policy 49, 137–150.

Watson, D., Clark, L. a., Tellegan, A., 1988. Development and validation of brief measures of positive and negative affect: The PANAS scales. J. Pers. Soc. Psychol. 54, 1063–1070.

Wellesley, L., Happer, C., Froggatt, A., 2015. Changing Climate, Changing Diets Pathways to Lower Meat Consumption. Chatham House Rep. 64.

Woolley, K., Risen, J.L., 2017. Closing your eyes to follow your heart: Avoiding information to protect a strong intuitive preference. J. Pers. Soc. Psychol. https://doi.org/10.1037/pspa0000100

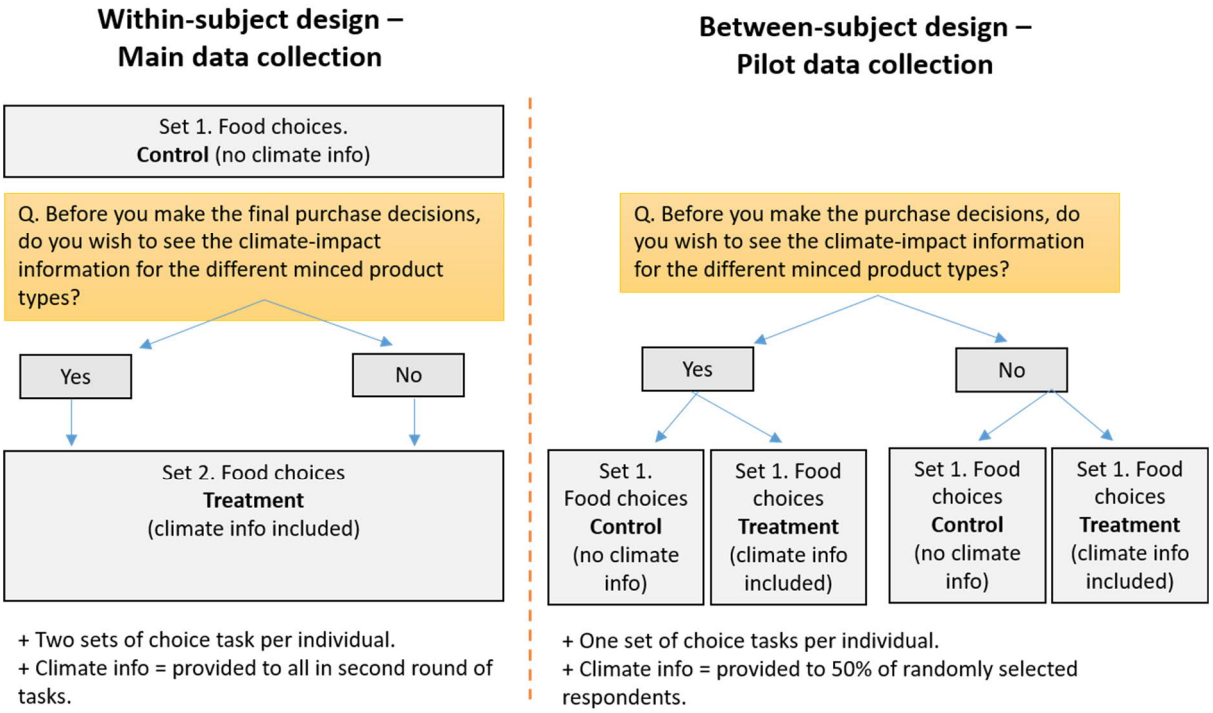
Appendix

Table A1. Attributes and levels for grounded meat product in choice experiment

Attribute	Levels	Treatment information (CO2e)
Product type (Grounded meat)	Beef	27
	Beef & pork 50/50	16
	Beef & beans 70/30	19
	Pork	6
	Chicken	4
	Meat substitute	3
Production method	Conventional, Organic	
Price	25,33,41,49,57,65	

Section A1. Experimental design

While we decided on a within-subject design for this study, we tested a between-subject design in a large pilot study (N=400). The figure below illustrates our design for the experiment used for main data collection as well as pilot data collection. While participants in the main survey made choices, first without, and then with, climate impact information, the pilot study participants were randomly assigned to either receive (treatment group) or to not receive (control) climate impact information. The results from the main study corroborate our findings from the pilot study in showing that information-decliners make significantly different choices in how they treat the information compared with the control. We are therefore confident that the effects of repeating decisions are not driving the findings in the results from the main data collection.



Section A2. Design for increased incentive compatibility

We tested the following design: the probability of receiving information was lower if respondents declined access to the information. We explained that, for 50% of participants, the information would be presented only if they had requested it, and for the other 50%, there was a lottery that decided if they received climate information or not. This design is indeed more incentive-compatible, but we are concerned with the quality of such data. We tested such an incentive-compatible design in focus groups (explained in page 10 of the manuscript), but participants found such probability descriptions difficult to understand, and even after more comprehensive explanation was provided, the incentive-compatibility mechanism was largely misunderstood. We concluded that having such a feature in the survey instrument would likely provide misleading results, and for this reason, we decided on a more simple design. Similar design has been used in other research on information avoidance (Woolley and Risen 2017).

Figure A1.“*Red meat has large negative impact on climate change”* 1=do not agree 5=agree

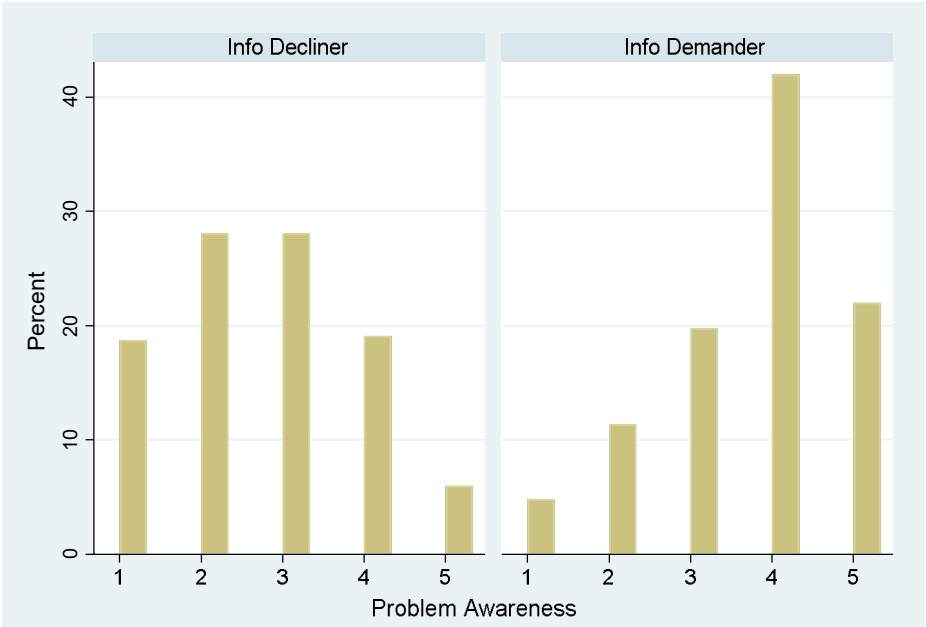


Table A2. Logit-model where Problem awareness is excluded

	Coef.	z
Male	**0.39**	2.04
Age category (reference level: 35-49)		
<24	0.09	0.19
25-34	-0.26	-0.95
50-74	-0.37	-1.72
75-	-0.40	-0.97
Region (reference level: Middle region)		
Northern region	-0.36	-1.51
Southern region	0.26	1.33
CD	**0.38**	4.19
Responsibility & Norms	**0.86**	6.57
NEP	**0.34**	2.27
Meat eating frequency		
<1 time/week		
2-3/week	-0.04	-0.18
4 or more/week	-0.28	-1.08
Problem Awareness		
Constant	**-4.28**	-6.93
N	803	
LL	-408.48	
Pseudo R2	0.20	

Bold estimates indicate significance level at 5% level.

Table A#.

	CD		Responsibility & Norms		Problem Awareness	
	Coef.	t-value	Coef.	t-value	Coef.	t-value
Male	-0.40	-5.02	-0.47	-7.14	-0.39	-4.60
Age category						
<24	0.12	0.59	-0.13	-0.74	0.96	4.43
25-34	0.17	1.49	-0.09	-0.95	0.23	1.89
35-49 reference level	0		0		0	
50-74	-0.24	-2.56	-0.13	-1.71	-0.29	-2.92
75-	-0.45	-2.47	0.04	0.24	-0.41	-2.15
Region						
Middle region (ref.)	0		0		0	
Northern region	-0.03	-0.27	0.11	1.26	0.06	0.48
Southern region	0.05	0.60	-0.01	-0.12	0.05	0.57
Constant	2.29	23.19	4.05	49.58	3.54	33.95
R^2 adjusted	0.07		0.06		0.10	
F-statistic	9.52		8.83		13.68	
N	803		803		803	

Estimated all of these with educ too, where educ was insign for all.

Table A4

	Info-demanders	**Info-decliners**	**Difference**
Don’t trust that the climate information is correct	27.2	48.3	**
Not caused by humans	2.1	8.6	**
Reducing climate impact not my personal responsibility	7.5	16.9	**
Climate info makes me feel bad	13.3	10.9	-
I already know much about climate impact from food	24.6	21.4	-
I do not know how to interpret the climate info	26.1	26.2	-
I want to use climate info	55.6	7.1	**

** p-value < 0,001

Table A4a. MNL model with Treatment- and CD interactions

			Treatment effect		**CD-effect**		**Treatment* CD-effect**	
	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio
Product type								
Beef	**2.07**	15.41	-0.21	-1.16	**-0.18**	-3.31	**-0.42**	-5.11
Beef & pork	**1.59**	12.17	**-0.54**	-3.06	**-0.26**	-4.49	-0.08	-1.02
Pork	0		0		0		0	
Chicken	**- 0.32**	-2.04	0.06	0.30	**0.22**	3.44	0.05	0.64
Beef & beans	-0.13	-1.11	**-0.59**	-3.30	**0.33**	6.62	**-0.20**	-2.61
Meat substitute	**-1.39**	-6.12	-0.12	-0.42	**0.67**	8.20	0.10	0.94
Opt-out								
Opt-out	**-1.12**	-19.91						
Product attributes								
Organic	**0.13**	3.24						
Price	**-0.02**	-15.16						
# Observations	32 085							
# Individuals	803							
LL	-9321.4							

Table A4b. MNL model with Treatment- and CD interactions, Info-decliners

			Treatment effect		**CD-effect**		**Treatment* CD-effect**	
	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio
Product type								
Beef	**2.30**	11.19	-0.32	-1.23	**-0.02**	-8.57	-0.11	-0.79
Beef & pork	**1.79**	9.52	-0.45	-1.82	**-0.23**	-2.34	0.09	0.64
Pork	0		0		0		0	
Chicken	**-0.51**	-2.05	0.23	0.73	**-0.38**	-3.91	0.14	0.88
Beef & beans	-0.13	-0.72	**-0.57**	-2.12	0.02	0.14	0.07	0.52
Meat substitute	**-3.18**	-4.70	-0.67	-0.69	0.07	0.72	0.32	0.89
Opt-out								
Opt-out	**-1.16**	-12.01						
Product attributes								
Organic	-0.05	-0.78						
Price	**-0.02**	-8.57						
# Observations	10660							
# Individuals	267							
LL	-2817.8							

Table A5a. MNL model with Treatment- and Responsibility & Norms (RN) interactions

			Treatment effect		**RN-effect**		**Treatment* RN-effect**	
	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio
Product type								
Beef	**2.27**	8.69	0.67	1.83	**-0.15**	-2.21	**-0.44**	-4.56
Beef & pork	**1.88**	7.56	0.29	0.84	**-0.21**	-3.26	**-0.27**	-2.91
Pork								
Chicken	**-0.64**	-2.12	0.08	0.20	**0.21**	2.69	0.02	0.25
Beef & beans	**-1.26**	-5.01	0.20	0.52	**0.47**	7.50	**-0.32**	-3.30
Meat substitute	**-4.45**	-8.46	0.66	0.98	**1.14**	9.36	-0.13	-0.82
Opt-out								
Opt-out	**-1.13**	-20.05						
Product attributes								
Organic	**0.14**	3.32						
Price	**-0.02**	-15.35						
# Observations	32085							
# Individuals	803							
LL	-9341.7							

Table A5b. MNL model with Treatment- and Responsibility & Norms (RN) interactions, Info-decliners

			Treatment effect		RN-effect		Treatment* RN-effect	
	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio
Product type								
Beef	**1.42**	3.58	0.24	0.45	0.17	1.43	-0.23	-1.38
Beef & pork	**1.07**	3.03	0.12	0.23	0.05	0.48	-0.14	-0.94
Pork								
Chicken	-0.35	-0.74	-1.05	-1.64	-0.04	-0.29	**0.46**	2.39
Beef & beans	**-0.98**	-2.54	-1.02	-1.72	**0.30**	2.60	0.17	0.97
Meat substitute	**-4.16**	-3.14	0.07	0.04	**0.70**	1.96	0.01	0.03
Opt-out								
Opt-out	**-1.16**	-12.05						
Product attributes								
Organic	-0.05	-0.71						
Price	**-0.02**	-8.64						
# Observations	10660							
# Individuals	267							
LL	-2837.3							

About AgriFood Economics Centre

AgriFood Economics Centre provides economic expertise in the fields of food, agriculture, fishing and rural development. The Centre is a cooperation for applied research between the Swedish University of Agricultural Sciences (SLU) and Lund University. The aim is to supply government bodies with a solid scientific foundation supporting strategic and long-term policy choices.

Publications can be ordered free of charge from **www.agrifood.se**

AgriFood Economics Centre
PO Box 7080
SE-220 07 Lund
SWEDEN

www.agrifood.se
mail: info@agrifood.se

AgriFood
economics centre